AN ABSTRACT OF THE THESIS OF

Gary Michael Stonedahl for the degree of Doctor of Philosophy

in Entomology presented on December 9, 1982

Title: A systematic study of the genus Phytocoris Fallén (Heteroptera: Miridae) in western North America

Redacted for Privacy

Abstract approved: _____

John D. Lattin

The western Nearctic species of the genus Phytocoris Fallén were taxonomically revised. Over 15,000 specimens were examined. Information concerning host plant associations and distributions was compiled and summarized for use by future researchers. External morphological features and characters of the male genitalia were used to distinguish species. The genital tubercles above the clasper bases, claspers, and sclerotized process of the vesica were especially useful in this effort. These structures have been illustrated for each of the included species.

One-hundred and sixty-two species of Phytocoris are now recognized from western North America. These have been arranged into 20 species-groups ranging in size from two to twenty-two species. The formation of species-groups was based primarily on characters of the male genitalia. Relationships between groups were cladistically analyzed. Forty-four characters of the male genitalia and external morphology were used to determine the final arrangement of species-groups.

Forty-six new species are described, and the following synonymies are proposed (senior synonym first): acaciae Knight = minuendus Knight; calli Knight = laticeps Knight; deserticola Knight = lineatellus Knight; empirensis Knight = rinconae Knight; fraterculus Van Duzee = westwoodi Bliven; fuscipennis Knight =

longirostris Knight; geniculatus Van Duzee = blackwelli Bliven; interspersus Uhler = eurekae Bliven; juniperanus Knight = chiricahuae Knight, flaviatus Knight, santaritae Knight; ketinelbi Bliven = kahtahbi Bliven; knowltoni Knight = albertae Knight, elongatus Knight; maritimus Van Duzee = sequoiae Bliven; neglectus Knight = yuroki Bliven; nigrifrons Van Duzee = abiesi Knight, tehamae Bliven; palmeri Reuter = hesperellus Knight, hesperius Knight, vittatus Reuter; politus Reuter = rusticus Van Duzee; relativus Knight = albiscutellatus Knight; stellatus Van Duzee = arcatae Bliven, tinctus Knight; stitti Knight = albiceps Knight, merinoi Knight; strigosus Knight = flavellus Knight; sublineatus Knight = subcinctus Knight, tanneri Knight; vanduzeei Reuter = nigripubescens Knight; ventralis Van Duzee = contrastus Knight, ephedrae Knight, quadricinctus Knight; vinaceus Van Duzee = hyampon Bliven; yollabollae Bliven = albiclavus Knight, montanae Knight, taos Knight.

The majority of western Nearctic Phytocoris species inhabit trees and shrubs; a few breed on grasses and herbaceous plants. Diversity is greatest in shrub and steppe communities of the southwestern United States. Most species are associated with one host plant or several related plant species; many appear to be inhabitants of bark. Most Phytocoris species are believed to be predaceous both as nymphs and adults, feeding on small, soft-bodied insects and mites. Several Nearctic species have been identified as predators of forest and orchard pests.

A systematic study of the genus *Phytocoris* Fallén (Heteroptera: Miridae) in western North America

by

Gary Michael Stonedahl

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Commencement June 1983

APPROVED:

Redacted for Privacy

Professor of Entomology in charge of major

Redacted for Privacy

Head of Department of Entomology

Redacted for Privacy

Dean of Gradua

Date thesis is presented December 9, 1982

Typed by Julie A. Stonedahl for GARY MICHAEL STONEDAHL

ACKNOWLEDGEMENTS

I extend my thanks collectively to all persons involved with various aspects of this study; without their contributions much of the research could not have been completed. I express my warmest appreciation to Dr. John D. Lattin, my major professor, who suggested the study and provided guidance for its duration. His professional advice, constant encouragement and friendship are sincerely appreciated.

I thank the members of my committee, Drs. Kenton L. Chambers, Robert E. Frenkel, James D. Hall, and William P. Stephen, for their comments on the thesis. Special thanks is given to Dr. Paul W. Oman for his valuable advice during the final stages of preparation of the thesis, and for his friendship during the course of this study. His ideas and comments concerning many aspects of my research and systematics in general were especially helpful.

I am grateful to Mrs. Bonnie B. Hall for her comments regarding illustration techniques; to Dr. Ernst J. Dornfeld, Zoology Department, Oregon State University, for spending many hours with me translating German literature; and to Mrs. LaRea D. Johnston, Herbarium, Oregon State University, for providing plant identifications.

Special thanks are extended to Mr. Thomas J. Henry, National Museum of Natural History, Washington, D.C. and to Dr. Randall T. Schuh, American Museum of Natural History, New York, for graciously hosting me in their homes during visits to their respective museums. I am grateful for their advice and encouragement during the course of this study, and for their assistance in collecting numerous specimens on field trips in the western United States.

I especially thank the following individuals: Dr. Vincent P. Razafimahatratra for instructing me in the art of mirid genitalic dissection; Mr. Michael D. Schwartz for acquainting me with the operation of the Wagner 78 cladistics program, and for his advice and sincere encouragement during the course of this study; Ms. Kathy Phillips, Mr. Gerasimos Cassis, and Mr. Gary M. Cooper for their

valuable advice and moral support; and my parents, who have provided wisdom and continuous encouragement throughout my academic career.

Finally, to my wife Julie, I am indebted for recording and organizing the locality data and for her patience and constant encouragement throughout my graduate studies. I also thank Julie for her superb typing of the entire manuscript.

Type specimens were borrowed from the California Academy of Sciences, San Francisco (CAS), Dr. Paul H. Arnaud, Jr.; the Swedish Museum of Natural History, Stockholm, Sweden (SMNH), Dr. Per Lindskog; the National Museum of Natural History, Washington, D.C. (USNM), Mr. Thomas J. Henry and Dr. Richard C. Froeschner; and the Zoological Museum of the University, Helsinki, Finland (ZMH), Dr. Antti Jansson.

In addition to the above, the following institutions or private collections kindly loaned specimens for study: American Museum of Natural History, New York (AMNH), Dr. Randall T. Schuh; Arizona State University, Tempe (ASU), Dr. Frank F. Hasbrouck; Brigham Young University, Provo, Utah (BYU), Dr. Stephen L. Wood; California State Department of Food and Agriculture, Sacramento (CAF&A), Dr. Alan R. Hardy; Canadian National Collection, Ottawa (CNC), Dr. Leonard A. Kelton; Colorado State University, Fort Collins (CSU), Dr. Howard E. Evans; James Entomological Collection, Pullman, Washington (WSU), Dr. William J. Turner; Los Angeles County Museum of Natural History, California (LACM), Dr. Charles L. Hogue; Montana State University, Bozeman (MSU), Ms. Sharon D. Rose; Northern Arizona University, Flagstaff (NAU), Dr. Clarence D. Johnson; New Mexico State University, Las Cruces (NMS), Dr. James R. Zimmerman; Oregon State Department of Agriculture, Salem (OSDA), Mr. Kenneth Goeden; Oregon State University, Corvallis (OSU), Dr. John D. Lattin, Dr. Andrew P. Moldenke, Dr. Paul W. Oman, Dr. Loren K. Russell, Mrs. Becky L. Fichter, Mr. Gary M. Cooper, Mr. Michael D. Schwartz; Polhemus Collection, Englewood, Colorado (JTP), Dr. John T. Polhemus; San Diego Natural History Museum, California (SDNH), Mr. David K. Faulkner; Snow Entomological Collection, Lawrence, Kansas (KU), Dr. Peter D. Ashlock and Dr. George W. Byers; Texas A & M University,

College Station (T.A&M and SHF), Dr. Joseph C. Schaffner; University of Arizona, Tucson (UAZ), Dr. Floyd G. Werner; University of British Columbia, Vancouver (UBC), Dr. Geoffrey G.E. Scudder; University of California, Berkeley (UCB), Dr. Jerry A. Powell; University of California, Davis (UCD), Dr. Robert O. Schuster; University of California, Riverside (UCR), Dr. John D. Pinto and Mr. Saul I. Frommer; University of Idaho, Moscow (UID), Dr. William F. Barr; Utah State University, Logan (USU), Dr. Wilford J. Hanson; Western Washington University, Bellingham (WWU), Dr. Gerald F. Kraft.

Financial support was provided through a research assistantship in the Oregon State University Systematic Entomology Laboratory with funds made available by the Science Technical Advisory Fund. The Oregon State University Computer Center granted funds for computer services in unsponsored graduate student research. Funding for visits to the United States National Museum of Natural History and the American Museum of Natural History was provided by a grant from the Theodore Roosevelt Memorial Fund, American Museum of Natural History, New York. Additional support for museum visits and field work was provided by the Oregon State University Foundation (Systematic Entomology Laboratory Fund).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

A SYSTEMATIC STUDY OF THE GENUS PHYTOCORIS FALLÉN (HETEROPTERA: MIRIDAE) IN WESTERN NORTH AMERICA

INTRODUCTION

The Miridae, or plant bugs, is the largest family in the order Hemiptera. The majority of species are plant associates and phytophagous, but several groups are comprised primarily of predaceous or saprophagous species (e.g., Deraeocorinae, Isometopinae). Host plant associations include representatives from a wide variety of plant families. Different parts of the host plant (e.g., flowers, fruits, stems, foliage, bole, branches, cones) are often utilized by different plant bug species. Host plant specificity is variable, but most species are restricted to a single host or several related host plants. The Nearctic and Palearctic faunas are best known, but other regions have received increasing attention in recent years. Despite these efforts, the mirid fauna of some geographic regions remains poorly known. In addition to basic taxonomic research, biological and ecological studies are still needed for many groups. The higher classification of some groups needs to be reexamined in light of recent findings. In particular, the intrageneric and intergeneric relationships of many large, widely distributed taxa (e.g., Deraeocoris Kirschbaum, Dicyphus Fieber, Phytocoris Fallén) require further investigation.

Phytocoris is the largest genus in the subfamily Mirinae, being composed of well over 400 described species. The genus is represented in all major biogeographic regions of the world. The Nearctic, Palearctic, and Neotropical regions are well studied, but the faunal composition of other areas is still insufficiently known. In the Nearctic Region, the genus is represented by approximately 250 species. The fauna of eastern North America is well known; the keys given by Knight (1941) will adequately separate the majority of species. Over 160 species occur in western North America, 46 of which are described as new in the present study.

The majority of Phytocoris species are very poorly known biologically. The major sources of biological information deal exclusively with Palearctic species (Butler, 1923; Kullenberg, 1944; Southwood and Leston, 1959). Many species inhabit trees and shrubs, but a few are known to breed on grasses and herbs. Bark-inhabiting species are commmon on both coniferous and deciduous trees. Most species are associated with one host plant or several related hosts, but a few occur regularly on a variety of unrelated plant species. The members of this genus overwinter in the egg stage. One generation per year is assumed for most species, but some bivoltine populations have been reported in North America (Knight, 1941; Wheeler and Henry, 1977). Adults and nymphs are considered to be primarily predaceous, but phytophagous species have been reported by Knight (1927c), Southwood and Leston (1959), Wagner (1971), and Wheeler and Henry (1977). Small, soft-bodies insects (e.g., aphids, psocids, psyllids, scales) and mites have been reported as prey for Nearcitc and Palearctic species.

Phytocoris was selected for study because of my interest in taxonomy of Hemiptera, especially Miridae, and because the taxonomy of this genus is insufficiently known in many areas of the world. The basic problem with the systematic knowledge of Phytocoris is the poor understanding of intrageneric relationships on a worldwide scale. This is due in part to the large size of the genus and the widespread superficial similarities of many of its species. Also, the generic limits of Phytocoris seem to be inadequately defined. These basic problems cannot be solved until the faunal composition and interspecific relationships of Phytocoris are better known at the regional level. An improved knowledge of the systematics of Phytocoris also should help clarify some intergeneric relationships in the tribe Mirini.

The present study is limited to the Phytocoris species of western North America, excluding Mexico. Prior to this research, the only comprehensive treatment of the genus in western North America was by Knight (1968). Although Knight described many new taxa, his review of western species is far from complete; 46 additional species

are recognized in the present study. Knight's species-group classification is artificial and his keys are difficult to use, mainly because approximately one-third of the western species were not included. Also, the identity of some species described in the late nineteenth and early twentieth centuries by O.M. Reuter and P.R. Uhler are still confused in the current literature because of inadequate original descriptions and unavailability of type material.

The immediate goal of this research is to revise the genus Phytocoris in western North America and present a species-group classification based on more natural assemblages of species. Special attention will be given to the male genital structures, since they have proven to be especially valuable in defining infrageneric groups of Phytocoris in other geographic regions (Knight, 1941; Carvalho and Gomes, 1970; Wagner, 1971). External morphological features, as well as pertinent biological and distributional data also will be utilized in this effort. An improved knowledge of the systematics of Phytocoris in western North America will facilitate the acquisition of additional biological, ecological, and distributional information which may contribute to both applied and basic research in the future. From the present research, I hope to gain a better understanding of the classification of Phytocoris, particularly of higher categories, and form a data base for future studies of intrageneric and intergeneric relationships of the genus on a more comprehensive scale.

LITERATURE REVIEW

The genus Phytocoris (phyton, Greek, "plant," plus coris, Greek, "bug") was erected by Carl F. Fallén in 1814. Westwood (1840) designated Cimex populi Linnaeus as the type-species of the genus. Unlike many widely distributed taxa that were described early in the nineteenth century, Phytocoris does not have a particularly complex nomenclatural history. Three genera have been proposed as synonyms of Phytocoris; these are Callodemas Uhler, Compsocerocoris Reuter, and Dionyza Distant. The genus Compsocerocoris was described by Reuter (1876:70) (type-species: annulicornis Reuter, 1876 (monobasic)) based on specimens collected in "Texas." This genus was placed in synonymy with Phytocoris by Reuter (1909:14). Among the reasons for the proposed synonymy was Reuter's discovery that some of the diagnostic characters of Compsocerocoris also occurred in typical Phytocoris species. Reuter (1909) also refers to the extreme range of variation in the genus Phytocoris and the difficulty in recognizing distinct species-complexes because of taxa possessing intermediate combinations of characters. The genus Callodemas was described by Uhler (1895:33) (type-species: laevis Uhler, 1895 (monobasic)) based on specimens collected in Colorado and New Mexico. This genus also was synonymized with Phytocoris by Reuter (1909:14). The Neotropical genus Dionyza Distant (1891:113) (type-species: variegata Distant, 1893 (monobasic)) was placed in synonymy with Phytocoris by Carvalho (1952:91). I have not seen representatives of this genus and cannot comment on the validity of Carvalho's proposed synonymy.

Most of the early literature of the genus Phytocoris consists of species descriptions and faunal lists for the Nearctic and Palearctic regions (see Carvalho, 1959, for references). The first exclusively Nearctic species were described by Reuter (1876) based on collections made by Belfrage and Kumlien. The majority of remaining Nearctic species were described by Uhler (1894), Reuter (1909), Van Duzee (1910, 1912, 1914, 1918, 1920, 1923), Johnston (1930), Knight (1920, 1923, 1925a, 1926, 1927a, 1927c, 1928, 1934, 1941, 1961, 1968, 1974),

Bliven (1954, 1956, 1959, 1966), Henry (1974, 1979), Kelton (1979), and Stonedahl (1983a). Some of the species described by Reuter (1876, 1909), Uhler (1894), and Van Duzee (1910, 1912, 1914) are represented only by syntype series. Lectotypes and paralectotypes have been designated for the majority of these species by Henry and Stonedahl (1983). Neotype designations for the Uhler species P. interspersus and P. laevis also are reported in this paper.

Species of Phytocoris are often included in state and regional surveys of Heteroptera or Miridae; some of these are: Uhler (1894), Gillette and Baker (1895), Van Duzee (1903, 1908, 1914, 1917b, 1925), Knight (1923, 1925b, 1941, 1968), Blatchley (1926), Froeschner (1949), and Kelton (1980). Knight (1923) divided the Phytocoris species of the eastern United States into four large groups based on color patterns of the hemelytra and antennae, length of antennal segment I, and the shape of the sclerotized process of the vesica. The most comprehensive study of eastern North American species is by Knight (1941). The only inclusive treatment of western Nearctic species prior to the present study is by Knight (1968). In his review of western species, Knight defined five species-groups on the basis of color patterns of the second antennal segment. Regional studies of Palearctic species are by Southwood and Leston (1959), Wagner and Weber (1964), and Wagner (1971). A number of subgenera have been proposed for this genus in the Palearctic Region (see Wagner, 1971). The nature of these subgenera and their validity in other regions of the world are discussed more fully in the Classification section of this study.

The structures of the male and female genitalia of Phytocoris have been investigated by Slater (1950) and Kelton (1959). Slater (1950) included only one species of Phytocoris in his study of female genitalia; emphasis was placed on the posterior wall of the bursa copulatrix and the sclerotized rings of the dorsal labiate plate. Female genital structures have not been used in studies of interspecific relationships of the genus Phytocoris. However, structures of the male genitalia have proven to be extremely valuable taxonomic characters. Kelton (1959) included seven species of

Phytocoris in his study of male genitalia; only two were discussed and illustrated. Genital claspers were used as early as 1920 by both Knight and Van Duzee to distinguish Phytocoris species in North America. In addition to the claspers, Knight (1968) referred to the tubercles above the clasper bases in his keys to western North American species. Vesical appendages were used by Knight (1920, 1923, 1941) to distinguish species and species-groups of Phytocoris in eastern North America. More recently, these structures have been employed by Henry (1974, 1979), Kelton (1980), and Stonedahl (1983a) to assist in the identification of newly described species. Wagner and Weber (1964) and Wagner (1971) used male genitalic characters extensively to distinguish species-groups and species of Phytocoris in the Palearctic Region.

Biological studies of the genus Phytocoris are limited and consist primarily of host plant records and scattered reports of feeding habits. The majority of species are believed to overwinter in the egg stage. One generation per year is assumed for most species, but bivoltine populations have been reported by Knight (1941) and Wheeler and Henry (1977). The eggs and oviposition sites of several European species have been reported by Butler (1923), Collyer (1953), and Southwood and Leston (1959).

Little is known about the immature stages of most Phytocoris species. The fifth instars of several Nearctic and Palearctic species have been described and/or illustrated by Butler (1923), Kullenberg (1944), Wheeler and Henry (1977), and Cooper (1981). All five instars of the Palearctic species P. ulmi (L.) are described by Butler (1923). Cooper (1981) reported the duration of fourth and fifth nymphal stadia of P. neglectus Kngt. in Oregon.

The majority of Phytocoris species are believed to be predaceous both as nymphs and adults. Small, soft-bodied insects (e.g., aphids, psocids, psyllids, scales, early instar lepidopteran larvae) and mites have been reported as prey for a number of Nearctic and Palearctic species by Knight (1920, 1941), Collyer (1953), Southwood and Leston (1959), Wagner (1971), Wheeler and Henry (1977), Kelton (1980), and Cooper (1981). Several species of Phytocoris have been

identified as predators of important pests in forest and orchard situations (Collyer, 1953; Turnock, 1953; Southwood and Leston, 1959; LeRoux, 1960; Martin, 1966; Ives, 1967; Denton, 1979). Phytophagous species have been reported by Knight (1927c), Southwood and Leston (1959), Wagner (1971), and Wheeler and Henry (1977).

Host plant associations of North American species are included in many state and regional studies. The major sources of host plant records are Knight (1923, 1927a, 1941, 1968), Blatchley (1926), and Kelton (1980). Bark-inhabiting species have been reported by Knight (1920, 1941), Wheeler and Henry (1977) and Cooper (1981).

Several species of Phytocoris are reported as hosts of braconid parasites by Leston (1961) and Loan (1974).

MATERIALS AND METHODS

Materials and General Procedures

During the course of this study, approximately 15,000 specimens were examined from western North America. Specimens were borrowed from most university collections in the western United States and Canada, as well as other major collections in North America. The collections, curators, and institutional abbreviations used in the text are given in the Acknowledgements section.

Specimens also were acquired for study during several extended collecting excursions in the summers of 1979 and 1980. Numerous collecting trips were conducted in Oregon, Idaho, Washington, and northern California because the fauna of this region was least well known. A three-week collecting excursion through portions of California, Nevada, Utah, Colorado, and Idaho in July of 1980 also added many new distribution and host plant records.

The type specimens of the majority of species were examined during visits to the United States National Museum, Washington, D.C. and the California Academy of Sciences, San Francisco. Many paratypes and specimens identified by H.H. Knight, O.M. Reuter, and E.P. Van Duzee also were examined. Several Reuter types were borrowed from the Swedish Museum of Natural History, Stockholm and the University of Helsinki Zoological Museum, Helsinki, Finland. Some of the Reuter and Van Duzee species were represented only by a syntype series. Lectotypes and paralectotypes have been designated for these species by Henry and Stonedahl (1983). Neotypes and lectotypes for some of Uhler's species also are designated in this paper.

An institutional label was applied to every specimen to prevent confusion during sorting. The initial phase of sorting involved separating specimens according to state or province. The material representing each state was then sorted into preliminary species-level taxa based on my understanding and interpretation of the

external characters. This method of sorting has three distinct advantages: (1) the size of the group being sorted at any one time is considerably reduced; (2) it allows for repeated examination of taxa whose geographical distributions cover more than one state; and (3) it aids in visualization of distributions. The geographically arranged and sorted taxa were then combined into preliminary groupings of similar species based on their external characteristics. At this point, I systematically worked through the preliminary groups performing dissections of the male genitalia. Specimens were examined from different portions of the range of a species. The number of specimens dissected varied according to the availability of material, extent of distribution, and the variability observed in the genital structures. The dissection method used was established by Kelton (1959). The procedure is perfected and discussed in detail by Razafimahatratra (1980). After dissection and study, the genital structures were placed in a plastic microvial containing glycerine and attached to the pin bearing the specimen. Final decisions concerning the delimitation of species and species-groups were based on all available characters of the external morphology of both sexes, and the male genital structures.

The label data for each specimen were recorded on 5x8 cards and are kept on file at the Oregon State University Systematic Entomology Laboratory. Because of the large number of specimens examined, label data are given in the text only for those species described as new. Names of collectors were omitted. The distributional data for the remaining species are summarized in the Remarks section of the species treatments. Distributions are sometimes discussed with reference to the biogeographic provinces of Bailey (1978). The geographic ranges of these provinces are given in Maps 1-13. Host plant records and collection dates also are summarized in the Remarks section. Host plants collected in the field were identified by myself or the staff of the Oregon State University Herbarium. Host plant data given on labels of borrowed specimens were corrected according to Munz and Keck (1973).

All specimens that I have been able to identify satisfactorily have received my determination labels. Some females were identified to species-group only. New species were described only when at least one male specimen was available. The depositories of the types and any designated paratypes of new species are given in parentheses behind the locality data. A list of abbreviations used in recording locality data is found in the Appendices.

The illustrations were drawn using a Spencer AO stereomicroscope with an ocular grid. The figures were penciled on velum placed over a piece of grid paper, and later inked. The illustrations were drawn at two different scales depending on the average size of a species. All genital structures for a particular species were drawn to the same scale. Measurements were obtained with an ocular micrometer and are given in millimeters. Various magnifications were used depending on the structure being measured: 60X for head and genitalia, 30X for thorax and body width, and 10X for body length.

Species-group descriptions summarize the structural and color variation displayed by members of the group. Group-level distinctions not specified in the detailed generic description also are provided. Species descriptions are composite and take into account variation in size, color, and structure. These descriptions summarize specific differences not found in the generic and species-group descriptions. Complete descriptions are given only for those taxa described as new. Detailed diagnoses are provided for the remaining species. The diagnosis will distinguish a species from other members of the species-group. Polymorphic or polytypic variation in color and structure, as well as pertinent biological data (e.g., host plants, seasonality, distribution) are included in the Remarks section of the species-group and species treatments.

Methods of Classification

Species delimitations were based on conventional comparative studies of external morphology and characters of the male genitalia. Differences and similarities in geographical distributions, host

plant associations, and seasonality also were considered in the development of species concepts. Characters of the male genitalia were especially valuable in the formation of morphological species concepts because they are less variable than most external characters and allow for positive identification of closely related species.

Prior to this study, the majority of Phytocoris species in western North America were distinguished on the basis of external characteristics. The only previous author in this region to make significant use of the male genitalia as taxonomic characters was Knight (1968), but even he did not consider characters of the aedeagus. Because of the reliance in the present study on characters of the male genitalia, a number of nominal species of earlier authors have been suppressed as junior synonyms. In the selection of senior and junior synonyms of identical date, I have adhered to Recommendation 24A (Action of first reviser) of the International Code of Zoological Nomenclature. This recommendation states that a zoologist, in acting as "first reviser", should select the name that will best ensure stability and universality of nomenclature. If none of the names has an advantage of this sort, or any "special appropriateness", than the name having "precedence of position" (i.e., "page priority") in the work in question should be selected. The recommendation of "page priority" was adhered to in the present study except when a given synonym was decidedly more representative of the species than the other(s), or in cases where it was possible to select a male senior synonym rather than a female. In these cases, "page priority" was disregarded on the basis of "special appropriateness."

The species-groups were defined primarily on the basis of similarities and differences in the structure of the male genitalia. Although genitalic characters were not used to the exclusion of other morphological features, they allowed for a finer resolution in comparative studies and more accurate groupings of related species. Relationships in biological and distributional data were assessed before groupings were finalized.

The relationships between species-groups were analyzed using a cladistic program (Wagner 78 maximum parsimony program) developed by Dr. J.S. Farris, State University of New York, Stony Brook. General discussions of this method of analysis and examples of its use are found in Kluge and Farris (1969), Farris (1970), Lundberg (1972), Schuh and Polhemus (1980), and Wiley (1981). The algorithm produces a network (rooted network or tree if an outgroup is specified) based on the minimum number of character transformations for a given data set. The relationships between the terminal taxa (species-groups in this case) are determined on the basis of shared derived characters or synapomorphies. Sister groups stemming from the same node have a common hypothetical ancestor and share a set of derived characters relative to all groups to the left of that node on the tree. Besides the network, the Wagner 78 program produces a list of changes for each character and identifies the branch (stem) of the tree in which the character changes, as well as the state of the character at the end of the branch. The program also provides a list of synapomorphies for each terminal taxon and a table of the total number of character changes leading to each node or terminal taxon (the number of changes is the length of the stem). The total length of the tree is the sum of all stem lengths. The most parsimonious tree for a given set of data is the one with the smallest number of character transformations (the tree of shortest length). The Wagner algorithm operates on the working assumption that the best estimate of phylogenetic relationships among the members of a monophyletic group is depicted by the tree of shortest length (Wiley, 1981).

The characters of the male genitalia were analyzed separately from external characters to determine if different character sets produced similar trees of relationship for the species-groups. A list of characters comprising each data set and the trees depicting species-group relationships are included in the Appendices. The data sets were comprised primarily of binary characters and a few multistate characters. Both data sets had a high proportion of homoplasious characters (those exhibiting parallelism and reversals). Because several different trees are likely to be

produced with the inclusion of homoplasious characters, I have randomized the input of data and made multiple runs of the program to determine the most parsimonious tree. The final determination of species-group relationships was based on a summary data set including all characters of the male genitalia and external morphology. The same procedure was employed to find the most parsimonious tree for the summary set.

BIOLOGY

The biology and behavior of most Phytocoris species have not received detailed study. Published information consists primarily of host plant records and scattered reports of feeding habits. Little is known concerning mating behavior, oviposition, egg and larval development, feeding biology, host plant recognition, and other biological functions of members of this genus. In this section, the literature dealing with biology is reviewed and supplemented with findings from my research on western North American species.

The majority of Phytocoris species appear to overwinter in the egg stage. One generation per year is assumed for most species but few direct observations have been reported (Collyer, 1953; Southwood and Leston, 1959). The North American species, P. breviusculus, is suspected to be bivoltine in Missouri (Froeschner, 1949) and Pennsylvania (Wheeler and Henry, 1977). Knight (1941) reported a bivoltine life cycle for P. neglectus in New York, and Gut (1982: personal communication) suspects at least two generations per year for an unidentified species (nr. P. conspurcatus) in southwestern Oregon. Collection records compiled during this study suggest the possibility of bivoltine or multivoltine life cycles for other Phytocoris species in western North America. A number of species inhabiting arid regions in the southwestern United States have periods of occurrence ranging from April or May to September or October. These species often show peak periods of abundance in the spring and fall indicating the likelihood of at least two generations per year. Of course the number of generations per year may vary from one area to another in widely distributed species.

The eggs of Phytocoris are elongate and slightly curved. Collyer (1953) figured the eggs of P. reuteri Saunders and P. tiliae. The ova of P. longipennis Flor and P. tiliae are described by Butler (1923). Oviposition sites have not been reported for any Nearctic species of Phytocoris. In England, P. tiliae oviposits in young apple wood (Collyer, 1953) and the wood of other deciduous

trees such as ash, lime, and oak. Phytocoris ulmi (L.) inserts its eggs into the bark of trees and shrubs, and P. varipes oviposits in the stems of grasses and herbaceous plants (Southwood and Leston, 1959). In western North America, oviposition may occur as early as February or March for species inhabiting arid regions, or as late as October for montane species.

Phytocoris species pass through five nymphal instars before reaching the adult stage. Nymphs have a very characteristic appearance due to the large hind femora which are nearly vertical when the insect is stationary. The immature stages are usually mottled but the coloration is sometimes different from that of the adult. The last nymphal instars of several Nearctic and Palearctic species are described by Butler (1923), Wheeler and Henry (1977), and Cooper (1981). Butler (1923) described all five instars of the Palearctic species P. ulmi. Fifth instars have been illustrated by Wheeler and Henry (1977) and Cooper (1981). Kullenberg (1944) provided a color illustration of P. varipes, a Palearctic species which has been introduced into western Oregon. Little information is available on the time required for nymphal development. Cooper (1981) reported a fourth nymphal stadium of three to four days and fifth nymphal stadium of six to seven days for P. neglectus reared at 24°C. The total developmental time often can be approximated by sequential sampling of nymphs in the field. Males usually mature before females; the female is often the only sex encountered late in the season. Adult longevity is not known with certainty for any species of Phytocoris. Wheeler and Henry (1977) obtained differences in adult longevity for P. breviusculus reared on different food sources. Longevity was greatest (average - 15.3 days) when specimens were supplied with host plant foliage plus scales and mites, indicating the likelihood of predaceous tendencies in this species.

The genus is assumed to be comprised predominantly of predaceous species, but few direct observations or detailed studies of feeding habits are reported. Several Palearctic species are reported to be predaceous by Southwood and Leston (1959) and Wagner (1971). Small, soft-bodied insects such as aphids, psocids, psyllids, scales, and

early instar lepidopteran larvae seem to be the preferred prey of most species. Mites also have been reported as prey or potential prey for some Phytocoris species (Collyer, 1953; Wheeler and Henry, 1977). In North America, predaceous species or probable predators have been reported by Knight (1920, 1941), Wheeler and Henry (1977), and Kelton (1980). Phytocoris tricinctipes is the only predaceous species listed by Knight (1968) in his review of western North American species. Cooper (1981) observed nymphs and adults of P. neglectus feeding on live dipteran larvae and aphids in laboratory tests conducted in Corvallis, Oregon. I suspect the majority of western species to be predators, but further studies are needed to verify this assumption.

Several species of Phytocoris have been identified as predators of important pests in forests and orchards. Phytocoris reuteri, P. tiliae, and P. ulmi all are reported as predators of red spider mite, Metatetranychus ulmi (Koch), in England (Collyer, 1953; Southwood and Leston, 1959). Turnock (1953) observed P. neglectus feeding on eggs and newly hatched larvae of the larch sawfly in Saskatchewan and speculated that this species and other mirid predators may be fairly important in natural control. Ives (1967) reported an undetermined species of Phytocoris as an egg predator of larch sawfly. In caged tests, Ives found that nymphs of this predator consumed an average of 1.5 eggs per day and adults, 2.9 eggs per day. Martin (1966) found a correlation between declines in populations of the aphid, Schizolachnus pini-radiate (Davidson), on Pinus resinosa Aiton and increased numbers of the predaceous mirid, Phytocoris eximius Reuter (misidentified - probably P. canadensis Van Duzee). LeRoux (1960) reported P. conspurcatus as an important predator of apple aphid, Aphis pomi DeG., in Quebec, and Denton (1979) listed an undetermined species of Phytocoris as a predator of larch casebearer larvae in western larch forests. Fichter (1982: personal communication) has shown that nymphs and adults of P. calli and P. nigrifrons are predators of early instar douglas-fir tussock moth larvae in white fir forests of northern California. In enzyme-linked immunosorbent assay tests (ELISA), Fichter obtained between 47% and 87% positive

results for P. nigrifrons collected at three different localities. This species continued to test positive for tussock moth even when moth densities were extremely low (less than one larvae per 0.65 m^2 of foliage). Gut (1982: personal communication) found an undetermined species of Phytocoris (nr. P. conspurcatus) to be one of the most abundant predators of scales and pear psylla nymphs on pear trees in southwestern Oregon. Although the regulatory capabilities of Phytocoris predators in forests and orchards requires further investigation, existing studies and observations indicate that some species may play an important role in natural control of insect pests.

Several species of Phytocoris are reported to be phytophagous or at least facultatively phytophagous. Southwood and Leston (1959) reported that P. varipes feeds mostly on unripe fruits and flowers of small plants and probably on small insects as well. In Oregon, I have observed this species feeding on seed heads of grasses at night. The Palearctic species, P. ulmi, also is reported to be partially phytophagous, feeding on unripe fruits, buds, and young leaves of various plants (Southwood and Leston, 1959). Wagner (1971) reports several other phytophagous species from the Mediterranean Region. In North America, P. junipericola Knight has been suggested to be phytophagous (Knight, 1927c; Wheeler and Henry, 1977). I have observed several western species probing plant tissues but could not determine if feeding was actually taking place. The occurrence of mixed feeding in some species of Phytocoris is unexplained and requires further investigation. Razafimahatratra (1980) speculated that partial phytophagy in the predaceous genus Deraeocoris may be a means for recognizing breeding hosts in species where hatching of eggs must coincide with the appearance of host specific prey populations. It also is possible that plant nutrients are important dietary constituents even in species that are predominantly predaceous. Of course it is important to recognize the difference between simple probing of plant tissues and actual feeding. Wheeler and Henry (1977) suggest that probing is a part of the searching

behavior of P. breviusculus. Probing without feeding also may be related to some other aspect of behavior.

Members of the genus Phytocoris inhabit a wide variety of trees and shrubs. In some floristic associations, a different Phytocoris species can be found on nearly every kind of woody plant species. Some Phytocoris species also inhabit grasses and herbaceous plants. The host plant associations of western North American species are given in the Remarks section of the species treatments. Because the host plants of many species are still poorly known, I have included all available host records, realizing that some of these may be only incidental records (incidental records are not given for species with well established breeding hosts). Without a more complete data base, it is difficult to investigate general patterns of host plant association for Phytocoris species in western North America. In many cases, available records show that related species inhabit similar host plants. For example, members of the fraterculus and junceus species-groups are restricted to plants belonging to the family Pinaceae. Several species-groups, however, are composed of members that inhabit unrelated plants. Until the breeding hosts of western species are better known, one can only speculate with regard to general patterns of host plant association and relationships between host association and classification.

The degree of host plant specificity is extremely variable in the genus Phytocoris. The majority of western species seem to be restricted to a single host plant or several related plants, but some species are regularly collected from two or more unrelated hosts. The degree of specificity may be a function of preference for prey. Species with preferred diets would be restricted to plants offering the appropriate prey, while more generalized predators could inhabit many plants by feeding on different species of prey. Of course a specialized predator could inhabit more than one plant species if its preferred prey occurred on more than one host plant. Phytophagous or partially phytophagous species also are somewhat variable with regard to host plant specificity. For example, P. varipes inhabits and feeds on a variety of herbaceous plants (Southwood and Leston, 1959),

while P. junipericola is apparently restricted to plants belonging to the cypress family (Wheeler and Henry, 1977). Species showing little host plant specificity, whether phytophagous, predaceous, or mixed feeders, are often more easily associated with a particular type of habitat or floristic association than with specific plants.

When determining host plant associations it is important to recognize the difference between incidental hosts and actual breeding hosts. Host-specific species sometimes get separated from their breeding host and come to rest on non-host plants. In the case of a generalized predator, the insect may actually leave the breeding host in search of food. The breeding host of a species can be positively identified only by the discovery of eggs on the plant. However since nymphs of Phytocoris are relatively nonvagile, their occurrence on a particular plant species is strong evidence that it is a breeding host. Additional collections of nymphs on the same plant species will strengthen this assumption. Even the repeated association of adults with a particular plant species lends support to the assumption that the plant is a breeding host, especially if no other potential hosts are discovered.

Some host plants support two, three, or even four species of Phytocoris simultaneously. In many cases, co-occurrence appears to be the result of resource partitioning, whereby different species occupy different portions of the host plant (e.g., cones, foliage, branches, bole). In western North America, I have observed co-occurrence between closely related species as well as for taxa that appear to be only distantly related. A case of co-occurrence of two unrelated species was observed for P. fraterculus and P. stellatus on Pinus contorta Dougl. throughout much of the Cascade Range in Oregon and Washington. Although these species occur together during most of the season, they are actually well separated spatially because P. fraterculus is a bark-inhabiting species while P. stellatus seems to be restricted to the foliage and needle bases. A similar situation between the related species P. fraterculus and P. jucundus occurs throughout much of California, Oregon, and Washington on Pinus ponderosa Dougl. In some cases it appears that

co-occurring species are occupying the same portion of the host plant. Cooper (1981) found such a situation for two bark-inhabiting species, P. neglectus and P. nobilis, on Abies procera Rehder in Oregon. After careful study, Cooper discovered that these species were actually isolated temporally, and occurred together only for a brief period in mid-August. Temporal isolation is one way in which species with similar ecological and biological requirements can occupy the same habitat. However, it is not unreasonable to assume that some species of Phytocoris coexist on the same host plant because of undetected differences in microhabitat, food preference, or behavior.

Reference has been made in this and other sections to "bark-inhabiting species." Bark appears to be a very common habitat for Phytocoris, possibly more so than foliage. Bark-inhabiting species have been identified in the literature by Knight (1920, 1941), Southwood and Leston (1959), Wagner (1971), Wheeler and Henry (1977), and others. The dark, mottled color pattern of these species blends well with the habitat making them nearly invisible when at rest. Cooper (1981) found that the greenish white and fuscous coloration of P. nobilis was very similar to the color of lichens on the bole and branches of trees inhabited by this species. Bark-inhabiting species undoubtedly feed on soft-bodied insects and mites associated with the bark. I have observed and collected many species of Phytocoris directly from the bark of trees and shrubs in western North America (e.g., P. corticola, P. dumicola, P. fraterculus, P. populi, P. tiliae). Other species are assumed to be bark-inhabitants because they are collected in greater abundance on twigs and large branches away from the foliage.

Many species of Phytocoris are at least partially nocturnal in their habits. Nocturnalism is evidenced by the large number of species that are attracted to light. Approximately half of the species in western North America have been collected at night lights. Species inhabiting arid regions are more likely to be attracted to light, and males are more commonly collected than females. Many species that are attracted to light can be collected

with little effort from their respective host plants at night. These same plants often yield few to no specimens even with intense collecting during the day. Although the diurnal habits of nocturnal species are not known, it is possible that they retreat to the base of the host plant or nearby ground litter to avoid desiccation and possibly higher wind speeds during arid daylight hours.

No predators or parasites of *Phytocoris* were observed in this study. Leston (1961) listed *P. reuteri* and *P. ulmi* as host of Braconidae in Great Britain. *Peristenus dumestris* Loan is a known braconid parasite of an undetermined species of *Phytocoris* in Ontario, Canada (Loan, 1974).

DISCUSSION OF TAXONOMIC CHARACTERS

The characters considered in this study are those believed to be most useful in differentiating species-groups and species of Phytocoris in western North America. External characters are from adult specimens of both sexes; genitalic characters are examined only for males. Nymphal characters were not assessed. Measurement and ratio values are based on an average of 5-10 specimens when available.

TOTAL LENGTH OF BODY. The length is measured from the tip of the tylus to the posterior tip of the membrane, or in brachypterous specimens, to the apex of the abdomen. The measurement is taken in dorsal view. Total body length is extremely variable in some species, but the range is sometimes useful in separating species or clusters of species belonging to different groups.

TOTAL WIDTH OF BODY. Measured as the maximum width across the hemelytra in dorsal view. This measurement is of little taxonomic value due to variation in the resting position of the hemelytra.

HEAD. The morphology of the head is particularly useful in distinguishing species-groups. Measurements and ratios display only minor variation and in conjunction with other characters, are very useful for separation of certain species.

Width across eyes - maximum width between the lateral margins of the eyes in dorsal view.

Width of vertex - minimum width between the inner margins of the eyes in dorsal view.

Dorsal width of eye - maximum width between the inner and lateral margins of the eye. Measurement taken in dorsal view.

Eye length - measured as the maximum length (height) of the eye in lateral view.

Eye width: width of vertex - this ratio is useful in separating some species in groups with large eyes.

Eye length: width of vertex - this ratio is particularly useful in distinguishing several species-groups in which the members have small eyes and broad vertices.

Head shape - The shape of the head is quite variable within the genus. I am recognizing three basic head shapes for the cladistic analysis: elliptical, subquadrate, slightly elongate. However, because head shape is determined by a number of characters, all of which show variation, it is often difficult to recognize a particular head as belonging to one of these categories. The situation is further complicated by head types that are somewhat intermediate with regard to these categories, and by variation in head shapes within some species-groups. Because of these problems, I have given only minimal consideration to head shape in constructing the classification of species-groups.

Frons - weakly to strongly convex; usually evenly arched, but sometimes abruptly deflected apically, especially in species with elongate heads; meeting tylus along narrow to broad, shallow or deep indentation.

Tylus - indistinct to prominent, base sometimes strongly produced above the frons; usually of even thickness but sometimes tapering toward apex.

Size and shape of eyes - Eye size varies greatly between species. The length of the eye when compared to the width of the vertex produces a useful ratio for distinguishing certain species-groups. The eyes are subspherical, elliptical, or obovate. The posteroventral margin of the eye in lateral view is often slightly arcuate giving the eye a reniform appearance. The eyes of some species are closely appressed to the head, but more often they are strongly protuberant. The posterior margin of the eye is even with or slightly removed anteriorly from the posterior margin of the head.

Coloration - The coloration and markings of the head are variable. The ground color is usually white or pale yellow. The bucculae, lora, juga, tylus, and frons are often lightly to heavily marked or tinged with red to fuscous. The striae on the frons are usually darkened.

ROSTRUM. The length is measured from the junction of the epipharynx and tylus to the apex of the fourth segment. Rostrum length is extremely variable between species, and also shows considerable intraspecific variation in members of some species-groups. The length of the rostrum relative to the position of the tip when it is parallel to the long axis of the body will distinguish some species. The tip extends from between the mesocoxae in some species to beyond the anterior margin of the ninth abdominal segment in others.

ANTENNAE. The length of segment I is measured from the middle of the basal constriction to the apex. Lengths of segments II-IV are maximum measurements. The length of segment I is less variable than that of other segments. The following ratios are particularly useful in distinguishing species or groups of species: length of segment I to width of head across eyes; length of segment I to posterior width of pronotum; length of segment II to posterior width of pronotum. Segment I is linear, slightly enlarged on one or both ends, or rarely uniformly thickened. Segments II-IV are linear. The density and length of bristle-like setae on segment I are useful in separating some species, as is the color pattern on this segment. The general coloration of the antennae and banding patterns on segments II & III are particularly useful in distinguishing species and species-groups. Segments II & III often have a pale annulus at the base. Segment II sometimes has a narrow to broad, pale annulus medially.

PRONOTUM. - The posterior width of the pronotum is measured as the maximum distance between the posterolateral corners. Length of the pronotum is taken on the midline, from the anterior margin of the pronotal collar to the posterior margin of the disk. The shape of the pronotal disk is trapezoid or subconical. The disk is weakly to strongly convex; usually evenly arched but sometimes rising more abruptly behind the calli. The shape, size, and convexity of the pronotal disk are useful in distinguishing species-groups and species. The surface texture of the disk is smooth or finely roughened, but without distinct punctures. The presence of a transverse, fuscous line or 4-6 weakly developed, fuscous bullae on

the basal submargin of the disk are good diagnostic characters for some species-groups. The calli are distinct but vary in shape, size, and convexity. The depth of the impression behind the calli is useful for distinguishing some species. The junction of the disk and propleuron is rounded or rarely weakly marginate anteriorly. The color pattern of the propleuron is often useful in differentiating species or clusters of related species. The scutellum is weakly to strongly convex and may be declivous or abruptly deflexed apically.

HEMELYTRA. The embolar margin is straight or slightly arcuate. Color patterns of the hemelytra are variable within and between species. Once the range of variation is known, hemelytra coloration can be of great value in distinguishing species or groups of species. The hemelytra are either macropterous, submacropterous, or brachypterous. The hind wing and membrane of the forewing are greatly reduced in brachypterous specimens. The density and pattern of dark markings on the membrane are useful characters for distinguishing some species.

LEGS. The color patterns of the femora display great variation between species and offer good diagnostic characters especially at the species-group level. Color patterns are more stable within species, but color intensity is sometimes variable. The presence and number of dark annuli on the front and middle tibiae are good diagnostic characters at the species and species-group levels. The width of the tibial bands is a useful character for separating some species. The type and length of setae on the legs, and the color of the tibial spines are sometimes useful in distinguishing species. The relative lengths of the tarsal segments are diagnostic for several species-groups. The tarsal claws are slightly to moderately curved; pulvilli present but small.

COLORATION. Different degrees of interspecific and intraspecific color variation are displayed by members of the genus Phytocoris. Once the range of variation is known, coloration characters can be of great value in delimiting species or groups of species. Color patterns are usually less variable than color intensity, but both characters have application at the species and

species-group levels. See the previous sections for discussions of the utility of general coloration and color patterns in relation to specific areas of the body.

VESTITURE. The type, length, and density of setae on the dorsum are valuable characters for distinguishing species-groups and species. All Phytocoris species have two types of hair on the dorsum: (1) light or dark, suberect or rarely erect, simple setae; (2) white or silvery, recumbent, often sericeous, flattened setae. Some species also have narrow to broad, flattened, dark setae on the dorsal surface. The latter hairs, when narrowly flattened, are sometimes difficult fo distinguish from dark, simple setae, except that they are usually more recumbent. The flattened nature and more recumbent position of these hairs are most visible when the hemelytra are examined in lateral view. The hair types are usually evenly intermixed but the relative densities of different types are variable. The pale, sericeous hairs on the dorsum are sometimes grouped into clusters; rarely these hairs are replaced by broad, flattened, scale-like setae. The venter is sparsely to moderately clothed with appressed or upright simple setae; sometimes also with sparsely distributed sericeous hairs or rarely, more densely clothed with closely appressed, pale, scale-like setae. Because of the relative ease with which specimens lose their vestiture, it is sometimes necessary to examine a number of individuals to determine hair types. The terms hair and setae are used interchangeably in this study with the same intended meaning. Adjectives are used to describe different characteristics of the hairs.

MALE CLASPERS. The genital claspers of the male offer some of the most stable and useful characters for distinguishing species and species-groups. The claspers display little intraspecific variation and are invaluable in the recognition of closely related species. The terminology followed here is that of Kelton (1959) with some modification. The regions of the left clasper are: arm (region between basal attachment and angle); sensory lobe (variously developed dorsal region of arm); angle (curved, angle bearing region of clasper); shaft (remaining portion of clasper beyond angle);

apex. The left clasper is moderately to strongly curved; sensory lobe indistinct to prominent. The dorsal surface of the arm between the sensory lobe and the angle is rarely produced into a spine-like, angulate, or large knob-like process. The arm and base of the shaft are sometimes set with spines or tubercles. The shaft is subcylindrical or flattened laterally; preapical region usually slightly to greatly expanded in dorsal view. The apex is truncate or narrowly rounded, rarely acute. The right clasper is of lesser taxonomic value. It is usually elongate or narrowly to broadly lanceolate, but sometimes more complex and with distinct basal (arm) and apical (shaft) regions. The right clasper is sometimes set with spines or tubercles on the inner or dorsal surface. The apex is blunt or acute.

VESICA. This structure is of great taxonomic value at the species and species-group levels. The terminology is that of Kelton (1959) with some additions and distinctions between structures. In Phytocoris the vesica is a membranous, lobate structure that usually carries one or more sclerotized appendages or rows of heavy spines. The base of the vesica usually has a small membranous lobe arising on each side of the ductus seminis. I refer to these as the "basal lobes" to distinguish them from the large membranous sack (primary sack) that occupies the region behind and above the ductus seminis. The basal lobes and primary sack are confluent basally. The primary membranous sack is unilobed, bilobed, or multilobed. The lobes vary in size and shape, and may have smaller accessory lobes or one or more spinulate region(s); sometimes the lobes are weakly sclerotized in part. I have coined the term "basal process" to refer to a small, strap-like, sclerotized structure which arises behind the base of the expanded apical region of the ductus seminis. This structure is lightly to heavily sclerotized, sometimes obsolete, and usually extends to or slightly beyond the level of the gonopore. Since the basal process is usually broadly attached to the primary membranous sack, its function may be to lend support to the posterobasal region of the inflated vesica. The sclerotized appendages associated with the lobes of the vesica vary in number, size, shape, and position.

In the genus Phytocoris most of these structures appear to be sclerotized outgrowths of the membrane cuticle, but some are continuous with the basal process and may be prolongations of this structure. Kelton (1959) used the terms sclerite, sclerotized process, and spiculum in referring to the sclerotized structures of the vesica in the tribe Mirini. These terms were used interchangeably and it appears that Kelton was not attempting to define different types of structures. Clayton (1982) differentiated several types of vesical appendages in the genus Lygocoris Reuter on the basis of position and basal attachment. Further study is needed of the sclerotized appendages of the vesica in the subfamily Mirinae to determine structural differences and establish homologies between and within genera. In this study, I have distinguished two types of structures based on their position on the vesica: (1) sclerotized processes - these structures arise at or near the level of the gonopore and are sometimes continuous with the basal process; they are variously attached to the membranous portion of the vesica; (2) lobal sclerites - these structures arise at or near the apex of a membranous lobe and are always simple outgrowths of the membrane cuticle. In cases where it is difficult to distinguish between these types, the term sclerotized process is used. Several species lack a distinct sclerotized process; others have one or more row(s) of heavy spines in its place. All characters of the membranous lobes and sclerotized appendages of the vesica are useful in distinguishing species-groups and species. References to these characters are made from dissected preparations of the vesica with the gonopore facing the observer. In many cases the vesica will not fully inflate during preparation, making the comparison of membranous lobes difficult. However, the number, relative size and shape, and position of the lobes can be adequately determined in uninflated or partially inflated specimens, as can all characters of the sclerotized appendages. If the vesica does not inflate, it must be pulled out of the phallotheca with a fine pair of forceps. Care must be taken not to damage the sclerotized appendages during this procedure. When the vesica does not fully inflate, it is often necessary to manipulate

the lobes or change the position of viewing slightly to obtain a clear view of the sclerotized process(es). In these cases, the sclerotized processes were drawn in a position which I believe conveys the most information. Some repositioning may be necessary to obtain the configuration presented in the figures.

CLASSIFICATION

The classification presented here is based on a review of Nearctic species and is not expected to have broad application outside of this region. During the course of this study, many extralimital species of Phytocoris were examined, as well as representatives of several genera believed to be closely related to Phytocoris. The relationships between Phytocoris and other genera of the tribe Mirini are insufficiently known and require further investigation. This also is true of intrageneric relationships of Phytocoris on a worldwide scale. Although a comprehensive investigation of intrageneric relationships is beyond the scope of this study, the classification of western Nearctic species presented here should serve as a basis for more inclusive studies of Phytocoris classification.

Phytocoris is by far the largest genus in the subfamily Mirinae, being composed of well over 400 described species from all major biogeographic regions of the world. The Nearctic and Palearctic faunas are well known, and the Neotropical Region recently has been studied in considerable detail by J.C.M. Carvalho and co-workers. Other regions of the world are less thoroughly studied (see Table 1). Interspecific relationships appear to be complex both within and between different biotic regions, as is true of many large, cosmopolitan genera. The size of the genus alone hinders the global investigation of intrageneric relationships.

The tribe Mirini is characterized as follows: parempodia flattened, divergent apically; pronotum with well developed anterior collar, separated from remainder of pronotum by distinct furrow; vesica with rim of gonopore well developed, resembling a coiled spring; length of segment I of hind tarsi usually less the length of segments II & III combined; ostiolar peritreme prominent; species not myrmecomorphic; coloration not dull black with red markings; hemelytra not glassy or transparent. The key given by Carvalho (1955) adequately distinguishes Phytocoris from other Mirini genera of the world. However, several genera which appear to be closely

related to Phytocoris have since been described from the Neotropical Region (Carvalho and Gomes, 1969; Carvalho and Fontes, 1972). The validity and limits of these genera and other Phytocoris relatives need to be assessed on a worldwide basis in conjunction with a comprehensive review of the genus Phytocoris.

In the Nearctic Region, Phytocoris is distinguished from other genera of the tribe Mirini by the following combination of characters: lorae moderately to strongly swollen; antennae long, cylindrical, segments linear or nearly so; color pattern usually mottled; pronotum and hemelytra without distinct punctures; dorsum with at least two, sometimes three, types of pubesence; hind femora long and flattened, usually extending beyond apex of abdomen, broadest near bases and tapering distally; genital segment often with tubercles above clasper bases; vesica lobate and with one or more sclerotized appendage(s) or row(s) of heavy spines; ductus seminis often constricted before apex. Although the above set of characters defines a rather easily recognized subset of species within the Mirini, there is some question as to the monophyletic nature of this group. The heterogeneity in external and genitalic characters is so great on a worldwide scale that the inclusion of all species within the limits of one genus seems to greatly distort the generic concept of Phytocoris relative to that of other Mirini genera. Even in the Nearctic Region there are a number of Phytocoris species which may eventually be more appropriately placed in other genera. In the present study, I am retaining all species within the genus Phytocoris. When the intergeneric and intrageneric relationships of Phytocoris are better known on a worldwide scale and the limits of the genus are more naturally defined, some alteration may be necessary in the classification of western Nearctic species presented here, as well as for species representing other biogeographic regions.

The relationships between Phytocoris and other genera of the tribe Mirini are poorly known. In the absence of a comprehensive study of the classification of this tribe, it is often possible only to speculate about the relationships between genera. Kelton (1959)

suggested the possibility of a remote relationship between Phytocoris and Platylygus Van Duzee based on the structure of the male genitalia. The Phytocoris species of western North America display such a wide range of variation in characters of the male genitalia that there is some question regarding the usefulness of these characters for determining intergeneric relationships. Furthermore, the homologies of the vesical appendages of the Mirini are poorly understood and require further investigation. A comparative study of male genital structures in the Mirini is needed before the value of these structures to a generic classification can be fully assessed.

Slater (1950) grouped Phytocoris with a number of other Mirini genera (i.e., Coccobaphes Uhler, Garganus Stål, Horcias Distant, Lygidea Reuter, Lygus Hahn, Platylygus, Poecilocapsus Reuter) based on the structure of the female genitalia. The group is characterized by having the posterior wall of the bursa copulatrix with the portion of the 'B' structure that lies between the 'A' structures developed into a flattened disc. Within this group, Phytocoris is further differentiated by the absence of 'H' structures. I have not examined female genitalia in connection with this study and cannot comment as to the utility of these structures for distinguishing species or species-groups of Phytocoris, or their value for determining intergeneric relationships within the tribe.

Several of the diagnostic external features of Phytocoris (e.g., inflated lorae, flattened tapered hind femora, mottled color pattern) are shared with other genera of Mirini:

1) Adphytocoris Carvalho (Neotropical)
2) Alda Reuter (Neotropical)
3) Creontiades Distant (Cosmopolitan)
4) Eremobiellus Reuter (Palearctic)
5) Euphytocoris Poppius (Oriental)
6) Miridius Fieber (Palearctic, Ethiopian, Oriental, Australasian)
7) Pallacocoris Reuter (Nearctic)
8) Phytocoridea Reuter (Palearctic)

9) Phytocorisca Carvalho (Neotropical)
10) Quitocoris Carvalho (Neotropical)

Most of the above genera are comprised of less than five species (several are monotypic) and have rather limited geographical distributions. The characters distinguishing some of these genera from Phytocoris appear to be useful only at local or regional levels. In some cases, the values of diagnostic generic characters are unclear because they have not been considered in light of the full range of variation present within the genus Phytocoris. Even at the regional level the distinctions between Phytocoris and other genera are sometimes questionable. For example, I have examined several species of the genus Miridius from the Palearctic Region. The external features and male genitalia of these species closely resemble those of species belonging to several of Wagner's subgenera of Phytocoris (e.g., Ktenocoris, Leptophytocoris). The Miridius species appear to be more closely related to members of these subgenera than are the subgenera to other groups of Palearctic Phytocoris. Based on these observations, I feel that the genus Miridius would be more appropriately placed as a group within the genus Phytocoris. Because of the uncertain distinction between Phytocoris and some related genera, any attempt at an infrageneric classification for the genus should include a detailed study of these groups in addition to a worldwide review of Phytocoris.

The recognition of infrageneric categories within the genus Phytocoris is highly desirable because of the large number of included species. Although an infrageneric classification has not been attempted for the world species of Phytocoris, several workers have defined infrageneric groups at the regional level. Most notable are the ten subgenera proposed by Wagner for the Palearctic fauna (see Wagner, 1971 for descriptions of these subgenera). Wagner's subgenera are distinguished primarily on the basis of head morphology, color patterns of the hemelytra and antennae, and some genitalic characters. Wagner's subgeneric classification seems to define natural groups of species in the Palearctic Region, but the

applicability of these subgenera in other parts of the world needs to be assessed. Carvalho and Gomes (1970) refer to a distinct discrepancy between the diagnostic external features of Wagner's subgenera and the relationships of Neotropical species based on their interpretation of male genital characters. The Nearctic species of Phytocoris do not conform to the subgeneric classification proposed by Wagner. Many species do not satisfactorily fit any of the available subgenera, which is not surprising since most of these taxa probably were not examined by Wagner. Furthermore, closely related Nearctic species are often placed in different subgenera based on Wagner's classification. In my opinion, the subgenera proposed by Wagner would be more appropriately defined as species-groups since they are based on characters of Palearctic species and have limited or questionable application in other regions of the world. The species-group is an especially appropriate category for groupings at a regional level because it is flexible, informal, and does not burden the nomenclature with names that might be invalidated when infrageneric groupings are proposed at a more comprehensive level.

A number of species-groups have been defined for the Nearctic species of Phytocoris. Knight (1923) divided the species of eastern North America into four large groups based on color patterns of the hemelytra and antennae, length of antennal segment I, and the shape of the sclerotized process of the vesica. With the exception of "Group I", Knight's species-groups are quite homogeneous and appear to be natural assemblages of related species. Group I is more heterogeneous and contains a number of unrelated species. In a review of Phytocoris species of western North America, Knight (1968) distinguished five species-groups based on the number of pale annuli on antennal segment II. Unlike his earlier groups, Knight's western species-groups are very heterogeneous assemblages of species. The banding pattern on the second antennal segment is a useful character for distinguishing some species, but it is of limited value for determining natural groups of species. In addition, Knight's system is limited in overall usefulness for identification due to variation in antennal color patterns in some species.

The western North American species of Phytocoris have been divided into 20 species-groups in the present study. These groups range in size from two to twenty-two species. A description of each species-group is found in the Taxonomy section. A brief discussion of host plant associations, distribution, and suggested relationships with other species-groups is given in the Remarks section of each group treatment. Species-groups were defined primarily on the basis of similarities and differences in the male genitalia and external morphology. In some instances, a species included in one group also has affinities with species in other groups. Ambiguities of this nature were usually resolved by giving more weight to diagnostic genitalic characters. Some species could not be satisfactorily placed in any of the proposed species-groups. These species have been placed in a separate section entitled "Species of questionable group affinity."

The majority of species-groups defined in this study are recognizable only after the evaluation of several characters. In some cases, not every species in a particular group will possess all of the diagnostic characteristics. For these polythetic species-groups, diagnostic genitalic characters are usually more broadly distributed and reliable than external features. The diagnostic characters of each species-group are given in the Remarks section of the group treatments.

The results of the cladistic analysis of species-groups are given in Appendix D. A listing of characters comprising each data set is found in Appendix B. The distribution of correlated characters is shown on each of the resulting cladograms. From this listing of characters it is possible to determine the synapomorphies of each species-group (autapomorphies) or assemblage of species-groups. The distributions of homoplasious characters are not given.

When analyzed separately, the data sets for external morphology and male genitalia did not produce entirely similar assemblages of species-groups. Several smaller assemblages were the same in both cladograms, but overall the branching pattern and resulting assemblages of species-groups were different (compare Cladograms 1 &

2). This is probably a result of the inclusion of homoplasious characters in both data sets. It also may indicate a lack of congruence between external morphology and characters of the male genitalia. The final arrangement of species-groups was determined by combining both data sets into a single character matrix. The cladogram for the summary set reveals assemblages of species-groups similar to those produced by analysis of male genitalia alone. This suggests a greater importance of the genitalic characters in producing the final species-group assemblages. However, the greater proportion of genitalic characters in the summary set may be partially responsible for the observed similarities.

Since there are no cladistically derived classifications for the tribe Mirini, the selection of a sister group of the genus Phytocoris is highly speculative. I have chosen Creontiades as the sister group of Phytocoris for the purpose of the cladistic analyses performed in this study. The primary reason for selecting Creontiades is that I have seen representatives of this genus from different parts of the world and believe it to be a natural group distinct from Phytocoris. Other suspected "related" genera were either unavailable for study or, in my opinion, inadequately separated from Phytocoris. Creontiades is a cosmopolitan genus comprised of approximately 60 species. Its members resemble Phytocoris species externally, but are easily distinguished by the following characteristics: general coloration brownish orange or yellowish brown, never mottled; vertex with a longitudinal furrow medially; pronotum punctate or rugate; pronotum and hemelytra with a single type of pubescence; hind femora not or only slightly flattened and tapered. The male genital structures of Creontiades species differ from those of Phytocoris by the absence of tubercles above the clasper bases, apical notch or tooth on the left clasper, and by the absence of vesical appendages.

Because of the apparent composite nature of the plenus group (see Remarks section of plenus group treatment), it was divided into five separate subgroups for the purpose of cladistic analysis. The subgroups are distinguished primarily on the basis of similarities

and differences in the structure of the male genitalia. The species included in each subgroup are:

1) subgroup A - megatuberis, quadriannulipes.
2) subgroup B - bakeri, formosus.
3) subgroup C - conspicuus, hirsuticus, hirtus, ingens, plenus, roseus, seminotatus, stitti.
4) subgroup D - aridus, desertinus, longihirtus, reticulatus.
5) subgroup E - breviatus, electilis, solanoi, tenerum.

It is significant that subgroups A & B of the plenus group are not included in the same species-group assemblage as the remaining three subgroups (see Cladogram 3). This supports the assumption that the plenus group is a composite of several smaller species assemblages which may not be immediately related. However, I have maintained the plenus group as originally conceived because the majority of included species can be recognized on the basis of several correlated characters. Apparently, some of these diagnostic features are of no value in defining a natural group of species.

It is important to recognize that the relationships between species-groups of Phytocoris as determined by cladistic analysis are based on subjective taxonomic decisions and may not depict true genealogical relationships. The formation of species-groups, selection and interpretation of characters, and coding procedures are all subjective, and the results are a reflection of these choices.

DISTRIBUTION

Members of the genus Phytocoris are found in all major biogeographic regions of the world (Table 1), with the greatest diversity in the warm temperate zones of the Nearctic and Palearctic Regions. The greater abundance of species in these regions may be due in part to sampling bias. The genus now contains well over 400 species, many of which have been described within the past 20 years (see unpublished bibliography by Schuh and Massie, 1980). The number of species known from the Ethiopian and Neotropical Regions alone has more than doubled since publication of Carvalho's Catalogue of the Miridae of the World (1959).

In North America, 242 species are now recognized and of these, only six occur in other biogeographic regions. Phytocoris dimidiatus, P. populi, P. tiliae, P. ulmi (L.), and P. varipes are introduced Palearctic species and P. tibialis Reuter occurs in both Nearctic and Neotropical Regions. Presently, 162 species are recognized from western America north of Mexico. This is approximately twice the number of species that occur east of the Great Plains, and reflects the greater ecological diversity of the western Nearctic Region. Only seven species are known to occur in both eastern and western North America; two of these are introduced Palearctic species.

Table 2 summarizes the distributional data given in the species treatments. The data are presented as a group-level tally of species that occur in each of the biogeographic provinces of Bailey's (1978) Ecoregions of the United States. The geographic ranges of these provinces are presented in Maps 1 thru 13. One widespread distribution pattern which is not depicted in its entirety by Bailey's provincial analysis is the northern or boreal distribution (Map 14). This pattern is displayed by several species that have transcontinental distributions in southern Canada and the northern

Table 1. Distribution of the world species of *Phytocoris* by "biogeographic region."

Biogeographic Region	Number of species	Percent of total species	Source of information
Nearctic	242	53	Carvalho, 1959; Knight, 1974; Henry, 1974, 1979; Kelton, 1979; Present Study
Neotropical	49	11	Carvalho, 1959; Maldonado Capriles, 1969; Carvalho and Ferreira, 1969; Carvalho and Gomes, 1969, 1970
Palearctic	130	28	Carvalho, 1959; Wagner, 1971
Ethiopian	27	6	Carvalho, 1959; Linnavuori, 1973, 1974a&b, 1975
Oriental	7	1	Carvalho, 1959
Australasian	4	1	Carvalho, 1959

Table 2. Distribution of the species-groups of Phytocoris in western North America based on the biogeographic provinces of Bailey (1978).

Species-group	Number of species per biogeographic province												
	CC	SF	PF	CF	RMF	UGMF	CP	WB	IS	MHSS	AD	CD	GPSP
Cunealis (6)	6	3	3										
Lasiomerus[2] (3)			2	2	2								
Roseipennis (4)					1					3			1
Hopi (5)	2				3	2	2		1	1			1
Rostratus (22)	4	1			4	6	4		7	10	9	1	1
Pulchricollis (3)							1			2	3	1	
Candidus (3)									2	1	3		
Junceus (11)	1	3	5	2	2				1				
Listi (4)					2	1	2		1	4		3	1
Plenus (20)	7	1	1	1	1				5	2	9		1
Tiliae (3)			3										
Interspersus (4)			1	1	3	3	3			3			
Stellatus (3)		1	1	1	1	2	1			3			
Pulchellus (2)						1				2			
Gracillatus (2)	1				1	1	1	1	1	1	1		
Laevis (2)					2	1	1	2	2	1	2	1	2
Fraterculus (17)	4	5	5	5	12	8	8	2	4	12			1
Aurora (8)	2	5	4	1	5	1		1	2	1			
Juniperanus (15)	4	1	1			4	2		4	8	6	5	
Conspurcatus (11)	4	4	5	3	7	2	2		1	3	2	1	
Unplaced species (15)	4	2	4	1	4	2	4		3	5	1	1	
Totals (163)	39	26	35	17	50	34	31	6	34	62	36	13	8

[1]Key to biogeographic provinces: CC = California Chaparral, SF = Sierran Forest, PF = Pacific Forest (including Willamette-Puget Forest Province), CF = Columbia Forest, RMF = Rocky Mountain Forest, UGMF = Upper Gila Mountains Forest, CP = Colorado Plateau, WB = Wyoming Basin, IS = Intermountain Sagebrush, MHSS = Mexican Highland Shrub Steppe, AD = American Desert, CD = Chihuahuan Desert, GPSP = Great Plains - Shortgrass Prairie (see Maps 1-13 for geographic ranges of these provinces).

[2]One species of this group, P. rubropictus, is known only from Maine and New York.

( ) total number of species in group

United States (e.g., P. lasiomerus, P. neglectus). These species sometimes penetrate into the Cascade Range and Rocky Mountains. Western Canada is not treated by Bailey (1978). I have examined very little material from this region, mostly specimens from southern British Columbia. These specimens are distributed predominantly in forested regions analogous to the Pacific Forest, Columbia Forest, and Rocky Mountain Forest provinces of the western United States.

The data presented in Table 2 show distribution patterns at the species-group level. Detailed information on species distributions is provided in the Remarks section of the species treatments. It is important to recognize that the distributions of many species in western North America are still not fully known. Therefore, detailed comparisons at either the group or species level are often not possible. However, several general trends can be seen in the distribution patterns of western Phytocoris species. Firstly, species of the same group tend to be distributed predominantly in one to several, often contiguous, provinces (Table 2). Therefore distribution patterns at the group level, while broader than most species distributions, are often distinctly regionalized (e.g., Candidus Group, Cunealis Group, Interspersus Group). This trend is not as evident in groups having even a small proportion of widely distributed species. Another trend (Table 2) is that cladistically related groups often have similar distribution patterns (e.g., Rostratus - Hopi, Candidus - Pulchricollis, Aurora - Conspurcatus). Again, this trend is disrupted by ubiquitous species. Finally, the totals at the bottom of Table 2 give a rough indication of species diversity in the different provinces when all species-groups are considered.

Until the world classification of the genus Phytocoris is thoroughly studied and the faunas of other biotic regions are better known, the assessment of biogeographic relationships between North

America and other regions will be of little value. The Nearctic fauna seems to have ties with both the Palearctic and Neotropical Regions, but the extent of these relationships awaits further investigation.

TAXONOMY

Genus Phytocoris Fallén

Phytocoris Fallén, 1814:10, type species, Cimex populi Linnaeus, 1758:449 (fixed by Westwood 1840:12).
Compsocerocoris Reuter, 1876:70 (synonymy by Reuter 1909:14).
Callodemas Uhler, 1895:33 (synonymy by Reuter 1909:14).
Dionyza Distant, 1891:113 (synonymy by Carvalho 1952:91).

The following diagnosis and description are based entirely on characteristics of Nearctic species and may not encompass the full range of morphological variation display by the members of this genus on a cosmopolitan scale.

DIAGNOSIS. - Phytocoris is distinguished from other Nearctic genera of the tribe Mirini by the following combination of characters: lorum moderately to strongly swollen; antennae long, cylindrical, segments linear or nearly so; color pattern usually mottled; pronotum and hemelytra without distinct punctures; dorsum with two or sometimes three types of pubescence; hind femora long, usually extending beyond apex of abdomen, flattened, usually distinctly tapered, broadest near bases. Diagnostic features of the male genitalia are as follows: genital segment often with tubercles above clasper bases; left clasper with distinct sensory lobe; shaft slightly to greatly expanded preapically; right clasper narrowly to broadly lanceolate, sometimes more complex; vesica with one or more membranous lobes, basal process and sclerotized process(es) well developed, ductus seminis usually constricted medially.

Smaller species of Phytocoris are superficially similar to members of the genus Parthenicus (Miridae: Orthotylinae) but are easily distinguished by the following characters of the subfamily Mirinae: parempodia flattened, divergent apically; pronotum with well developed anterior collar, separated from remainder of pronotum by distinct furrow; genital aperature of male oriented dorsally; vesica

of male with rim of gonopore well developed, oval or circular, resembling a coiled spring.

DESCRIPTION. - Small to large, length 3.3-10.4 mm, variously colored and marked mirids; color pattern on hemelytra and legs often mottled. Body: suboval or elongate; dorsal surface smooth or finely roughened, impunctate; females sometimes submacropterous or brachypterous. Vestiture: dorsal surface with light or dark, suberect, simple setae intermixed with more recumbent, flattened, often sericeous, white or silvery hairs; dorsum sometimes also with narrow to broad, flattened, dark, setae; venter sparsely to moderately clothed with appressed or upright simple setae, sometimes also with sparsely distributed sericeous hairs or rarely more densely clothed with closely appressed, pale scale-like setae. Head: elliptical, subquadrate, or slightly elongate in lateral view; without basal carina; frons weakly to strongly convex, sometimes abruptly deflexed apically, meeting tylus along shallow to deep indentation; frons often with 4-8 darkened striae each side of middle; tylus prominent; vertex narrow to broad, usually with row of transverse, bristle-like setae; eyes small to large, subspherical, elliptical, or obovate, sometimes slightly reniform, even with or slightly removed from posterior margin of head; lora moderately to strongly swollen. Rostrum: length variable, reaching from between mesocoxae to 9th abdominal segment. Antennae: long, cylindrical, coloration and markings variable; inserted at or below line drawn through middle of eye; clothed with short, fine, closely appressed or suberect setae; segment I extremely variable in length, sometimes thicker at one or both ends, or rarely uniformly thickened, sparsely to moderately clothed with erect or suberect bristle-like setae; segments II-IV linear; segments II & III often with pale annulus at base; segment II sometimes with pale median annulus. Pronotum: pronotal disk trapezoid or slightly conical, weakly to strongly convex, usually evenly arched but sometimes rising more abruptly behind calli; anterior angles indistinct or broadly rounded; lateral and posterior margins straight or slightly to moderately arcuate,

posterior margin sometimes with distinct median notch; basal submargin of disk often with transverse, fuscous line or 4-6 weakly elevated fuscous points; collar well differentiated, forming a complete ring, usually with transverse series of bristle-like setae; calli distinct, smooth or finely asperate, narrowly to broadly joined anteriorly, reaching or nearly reaching lateral margins of pronotum; disk with shallow to deep impression behind calli; junction of disk and propleuron rounded, rarely weakly marginate anteriorly; mesoscutum narrowly to broadly exposed, gradually or steeply sloping to scutellum; scutellum weakly to strongly convex, declivous or abruptly deflexed apically. Hemelytra: variously colored and marked; lateral margins subparallel or slightly arcuate; embolium distinct; cuneus elongate, usually slightly deflected; apex of clavus and small patch bordering membrane above and below cuneal fracture with tuft of stout, bristle-like setae; membrane lightly to extensively conspurcate, or mottled with pale brown to fuscous, rarely uniformly infuscated; membrane slightly to moderately reduced in some species, females sometimes strongly brachypterous with membrane reduced to narrow flap. Legs: long; hind femora reaching or surpassing apex of abdomen, slightly to strongly flattened and usually distinctly tapered; variously colored and marked, femora often with mottled or reticulate pattern; tibiae with or without alternating light and dark annuli; femora with short to long, appressed or suberect, simple or rarely flattened setae, sometimes intermixed with erect, bristle-like setae especially along anterior margin of segment; tibiae with appressed or suberect simple setae, dorsal surface also with minute black or rarely pale, spine-like setae; some species with long, erect, pale hairs on femora and tibiae; tibiae with four rows of suberect, light or dark bristles, ventrolateral two rows restricted to apical 1/2-2/3 of segment; apices of tibiae with numerous bristles; tarsal segments broadly overlapping, length of segment I usually distinctly less than segment II but sometimes equal to or greater than II, segment III usually longer than segments I or II; claws slightly to moderately curved, pulvilli present but small. Male genitalia: genital segment with

or without tubercles above clasper bases. Left clasper: moderately to strongly curved; sensory lobe weak to prominent; dorsal surface of arm between sensory lobe and angle sometimes with spine-like, angulate, or knob-like process; arm and base of shaft sometimes with spines or tubercles dorsally; shaft subcylindrical or flattened laterally, usually expanded preapically in dorsal view; apex truncate or narrowly rounded, rarely acute. Right clasper: size and shape variable, usually smaller than left clasper; elongate, or narrowly to broadly lanceolate, occasionally more robust; sometimes with spines or tubercles on inner or dorsal surface; apex acute or blunt. Vesica: primary membranous sack of vesica unilobed, bilobed, or multilobed; lobes variable in size and shape, often with smaller accessory lobes, sometimes weakly sclerotized in part or with spinulate regions, rarely with apical or subapical sclerite(s); with or without well developed basal lobes; basal process lightly to heavily sclerotized, sometimes obsolete, usually extending to level of gonopore or beyond; vesica with 1 or 2 (rarely 3 or 4) sclerotized process(es), size and shape of process(es) variable, usually arising near level of gonopore, sometimes continuous with apex of basal process, variously attached to membranous portion of vesica; ductus seminis expanded apically, expanded region usually distinctly constricted medially or preapically; gonopore small to large.

Key to the Species - Groups of *Phytocoris* of Western North America

In the following key I have attempted to distinguish species-groups primarily on the basis of external characters. This was done to facilitate the identification of females at least to the group level, and to simplify species identifications in groups where positive recognition does not depend on examination of male genital structures. However, in certain parts of this key and many of the species keys an examination of male genitalia is necessary to attain accurate separations. Therefore, it is desirable to use male specimens in good condition when working the group and species keys.

Non-teneral specimens with a full complement of appendages are the best.

Because of the broad range of variation in external characters displayed by the members of some groups, operation of the following key often results in group subdivision. The group(s) and species associated with each couplet are listed in Appendix E. Use of this list can often reduce the amount of time spent on species identifications; for example, where only one to several species of a large group run to a particular couplet in the group key.

The following key also distinguishes species that could not be satisfactorily placed in any of the proposed species-groups. These taxa have been placed in a separate section entitled "Species of questionable group affinity". They are recognized in the key by association with the authors name.

1	Dorsal surface with uniformly distributed, dark brown or black, flattened setae intermixed with other types of pubescence	2
-	Pubescence otherwise; sometimes with small patches of dark, flattened setae associated with fuscous spots along basal submargin of pronotal disk, inner margin of cuneus, and at apex of clavus, but never uniformly distributed	37
2(1)	Hemelytra green or yellowish green; cuneus sometimes marked or tinged with red	3
-	Hemelytra otherwise colored	5
3(2)	Pronotal disk deep rose red . . . . <u>pulchellus</u> Group, p.	239
-	Pronotal disk otherwise colored	4

4(3) Pronotal disk grayish white with fuscous markings, basal submargin of disk with four distinct bullae; pronotal collar fuscous; length 6.0-7.0 mm . . . . . becki Knight, p. 348

- Pronotal disk green or yellowish green, basal submargin of disk without bullae; pronotal collar green; length 4.2-5.7 mm . . . . . juniperanus Group, p. 299

5(3) Hind femora uniformly dark red with pale spots; antennal segment II with pale, median annulus 6

- Hind femora not red, or marked with red only on apical 1/2-2/3 of segment; femora occasionally uniformly orange or reddish orange, if so antennal segment II without pale, median annulus . . . 7

6(5) Hemelytra uniformly dark red; genital segment of male with large tubercle above base of left clasper (fig. 161a); length 4.9-6.2 mm . . . . . vinaceus Van D., p. 373

- Hemelytra pale brownish gray, cuneus and inner margin of corium darker brown, outer margins of corium and cuneus marked with red; genital segment of male without tubercle above base of left clasper; length 4.5-5.3 mm . . . . . rostratus Group, p. 96

7(5) Venter moderately to densely clothed with closely appressed, flattened, pale setae 8

- Venter without closely appressed, flattened, pale setae, but sometimes with sparsely distributed sericeous hairs 9

8(7) Antennal segment II with pale, median annulus . . . . . pulchricollis Group, p. 139

- Antennal segment II without pale, median annulus . . . . . candidus Group, p. 146

9(7) Antennal segment I densely set with long, pale setae on ventral surface: length 3.8-5.1 mm . . . . *juniperanus* Group, p. 299

- Antennal segment I without dense brush of long, pale setae on ventral surface 10

10(9) Ratio of eye length to width of vertex 0.90:1 to 1.10:1 for males and 0.80:1 to 1.00:1 for females . . . 11

- Ratio of eye length to width of vertex greater than 1.10:1 for males and greater than 1.00:1 for females 15

11(10) Length of antennal segment I equal to or slightly greater than width of head across eyes - ratio 1.00:1 to 1.10:1 . . . . *pulchricollis* Group, p. 139

- Length of antennal segment I distinctly greater than width of head across eyes - ratio 1.20:1 or greater 12

12(11) Pronotal disk with pale, median line 13

- Pronotal disk without pale, median line 14

13(12) Genital segment of male with well developed tubercle above base of left clasper (figs. 14a-16a); females strongly brachypterous . . . . . *hopi* Group, p. 87

- Genital segment of male without tubercle above base of left clasper, or with small, upright tubercle well removed from clasper base (fig. 34a): females macropterous . . . . *rostratus* Group, p. 96

14(12) Vesica of male with a single sclerotized process . . . . *hopi* Group, p. 87

- Vesica of male with two sclerotized processes . . . . *rostratus* Group, p. 96

15(10) Body length 3.7-4.6 mm 16

- Body length usually greater than 4.6 mm 17

16(15) Ratio of length of antennal segment I to width of head across eyes 1.30:1 to 1.40:1 . . . . . *rostratus* Group, p. 96

- Ratio of length of antennal segment I to width of head across eyes less than 1.20:1 . . . . . *juniperanus* Group, p. 299

17(15) Hemelytra reddish orange or brownish orange: areole veins red 18

- Hemelytra otherwise colored, sometimes marked or tinged with red but never appearing orange 19

18(17) Antennal segment II reddish brown to black; genital segment of male with large tubercle above base of left clasper (fig. 124a) . . . . . *juniperanus* Group, p. 299

- Antennal segment II pale yellow to brownish yellow; male genital segment without tubercle above base of left clasper . . . *fraterculus* Group, p. 251

19(17) Front tibiae with alternating light and dark annuli; dark bands occasionally broken by pale spots 23

- Front tibiae without distinct annuli 20

20(19) Ratio of length of antennal segment I to width of head across eyes greater than 1.40:1 . . . . . *rostratus* Group, p. 96

- Ratio of length of antennal segment I to width of head across eyes less than 1.30:1 21

21(20) Ratio of length of antennal segment II to posterior width of pronotum greater than 1.50:1 22

- Ratio of length of antennal segment II to posterior width of pronotum less than 1.30:1 . . . . . *conspurcatus* Group, p. 327

22(21) Hemelytra grayish white with scattered fuscous spots; propleura fuscous, apical 1/3 and transverse median line pale; genital segment of male with small tubercle above base of left clasper (fig. 159a) . . . . . *varius* Knight, p. 370

\- Hemelytra pale brownish yellow or reddish brown, without fuscous spots; propleura otherwise colored; male genital segment without tubercle above base of left clasper . . . . . *fraterculus* Group, p. 251

23(19) Apical pale annulus of front tibiae much narrower than preceding dark annulus - ratio equal to or less than 0.50:1 24

\- Apical pale annulus of front tibiae about as broad or broader than preceding dark annulus - ratio distinctly greater than 0.50:1 27

24(23) Antennal segment II with pale, median annulus . . . . . *rostratus* Group, p. 96

\- Antennal segment II without pale median annulus 25

25(24) Length of antennal segment I less than width of head across eyes; hemelytra tinged or marked with red; length 4.6-5.8 mm . . . . . *juniperanus* Group, p. 299

\- Length of antennal segment I equal to or greater than width of head across eyes; hemelytra without red markings; length 5.5-9.2 mm 26

26(25) Length of suberect, simple setae on hemelytra mostly greater than 1.5X the thickness of antennal segment I at middle; arm of left genital clasper with large knob-like or spine-like protuberance arising from dorsal surface (figs. 113b-115b) . . . . . *aurora* Group, p. 281

\- Length of simple setae on hemelytra not much greater than medial thickness of antennal segment I; arm of left clasper without dorsal protuberance . . . . . *fraterculus* Group, p. 251

27(23) Antennal segment II with pale, median annulus 28

- Antennal segment II without pale, median annulus . . . 33

28(27) Pronotal disk with pale, median line bordered by fuscous . . . . . rostratus Group, p. 96

- Pronotal disk without pale, median line 29

29(28) Antennal segment I pale on ventral aspect, occasionally marked with small fuscous patches 30

- Antennal segment I fuscous on ventral aspect 32

30(29) Ratio of length of antennal segment II to posterior width of pronotum greater than 1.90:1 . . . . . junceus Group, p. 152

- Ratio of length of antennal segment II to posterior width of pronotum less than 1.80:1 31

31(30) Antennal segment II with narrow, fuscous annulus at base followed by pale annulus of similar width; genital segment of male with broad, flattened, tubercle above base of left clasper (fig. 152a) . . . . . mesillae Knight, p. 357

- Antennal segment II with pale annulus at base; male genital segment with cylindrical, often tapered tubercle above base of left clasper (figs. 136a-146a) . . . . . conspurcatus Group, p. 327

32(29) Hemelytra rusty red or reddish brown; areole veins tinged with red . . . . . fraterculus Group, p. 251

- Hemelytra grayish white with brown to fuscous markings; areole veins without reddish tinge . . . . . rostratus Group, p. 96

33(27) Ratio of length of antennal segment I to width of head across eyes equal to or less than 1.10:1 34

- Ratio of length of antennal segment I to width of head across eyes greater than 1.10:1 36

34(33) Antennal segment II reddish brown to fuscous . . . . *juniperanus* Group, p. 299

\- Antennal segment II pale yellow to yellowish brown 35

35(34) Dark markings on dorsal surface of front femora forming two longitudinal lines; genital segment of male with cylindrical tubercle above base of left clasper (fig. 140a) . . . . *conspurcatus* Group, p. 327

\- Dark markings on dorsal surface of front femora forming a reticulate pattern; genital segment of male without tubercle above base of left clasper . . . . *fraterculus* Group, p. 251

36(33) Arm of left genital clasper with large knob-like or spine-like protuberance arising from dorsal surface (figs. 113a-120a) . . . . *aurora* Group, p. 281

\- Arm of left clasper without dorsal protuberance . . . . *fraterculus* Group, p. 251

37(2) Hemelytra pale yellowish green to bright green, sometimes with dusky spots or reddish markings 38

\- Hemelytra not green 47

38(37) Antennal segment I dark red . . . . *vau* Van D., p. 372

\- Antennal segment I pale yellow to brownish yellow, or pale green; sometimes lightly mottled with brown or reddish brown 39

39(38) Antennal segment II pale with apical 1/4 and submedial 1/4 fuscous . . . . *plenus* Group, p. 181

\- Antennal segment II otherwise colored 40

40(39) Length of antennal segment I not exceeding width of head across eyes 41

\- Length of antennal segment I greater than width of head across eyes 42

41(40) Pronotal disk grayish white with fuscous markings; pronotal collar fuscous; length 6.0-7.0 mm . . . . . . *becki* Knight, p. 348

\- Pronotal disk pale green to bright green, sometimes with faint dusky flecks; pronotal collar green; length 4.2-5.7 mm . . . . . . *juniperanus* Group, p. 299

42(40) Scutellum with small, round, fuscous spot each side before apex . . . . *interspersus* Group, p. 220

\- Scutellum without round, fuscous spots before apex 43

43(42) Hind femora dark red or reddish brown, with pale spots; pronotal disk dark red or tinged with red . . . . . . *pulchellus* Group, p. 239

\- Hind femora pale yellow or pale greenish yellow, sometimes marked with brown or yellowish brown; pronotal disk without red markings 44

44(43) Clavus and corium marked with red . . . . . . *roseotinctus* Knight, p. 365

\- Clavus and corium without red markings 45

45(44) Hemelytra with faint dusky flecks, membrane lightly conspurcate; females macropterous or with membrane only slightly reduced 46

\- Hemelytra without dusky flecks, membrane uniformly infuscated; female strongly brachypterous . . . . . . *roseipennis* Group, p. 78

46(45) Hind tibiae with small, spine-like, black setae on dorsal surface . . . . *rostratus* Group, p. 96

\- Hind tibiae without small, black setae . . . . . . *plenus* Group, p. 181

47(37) Ratio of length of antennal segment I to width of head across eyes less than or equal to 0.90:1 for males and less than or equal to 1.00:1 for females 48

\- Ratio of length of antennal segment I to width of head across eyes greater than 0.90:1 for males and greater than 1.00:1 for females 58

48(47) Venter moderately clothed with closely appressed, flattened, silvery setae; abdominal sternites 2 thru 7 with shallow, median furrow . . . . . *pulchricollis* Group, p. 139

\- Venter without flattened setae or median furrow 49

49(48) Scutellum strongly convex, abruptly deflexed apically; pronotal disk deeply impressed behind calli . . . . . *plenus* Group, p. 181

\- Scutellum weakly to moderately convex, not abruptly deflexed apically; pronotal disk only slightly impressed behind calli 50

50(49) Front tibiae with alternating light and dark annuli, dark bands sometimes poorly defined 51

\- Front tibiae without distinct annuli 55

51(50) Antennal segment III yellowish brown or yellowish gray 52

\- Antennal segment III dark brown or black 54

52(51) Hemelytra with erect, bristle-like black setae intermixed with shorter, suberect simple setae; wing membrane uniformly infuscated; females strongly brachypterous . . . . . *listi* Group, p. 172

\- Simple setae on hemelytra mostly uniform in length; wing membrane mottled or conspurcate; females macropterous 53

53(52) Brown or reddish brown general coloration, hemelytra with some dark brown or black, simple setae; male genital segment with small tubercle above base of left clasper (figs. 126a&133a): length 3.3-4.6 mm . . . . . juniperanus Group, p. 299

- Pale brownish yellow general coloration, hemelytra without dark, simple setae; male genital segment without tubercle above base of left clasper; length 5.0-6.0 mm . . . . . fraterculus Group, p. 251

54(51) Antennal segment II yellowish brown, apical 1/4-1/3 fuscous; sclerotized process of vesica with 12-14 tooth-like serrations (fig. 155e). . radiatae n. sp., p. 363

- Antennal segment II uniformly dark brown; sclerotized process of vesica with three large teeth (fig. 87e) . . . . . stellatus Group, p. 231

55(50) Clavus and corium distinctly marked or tinged with red 56

- Clavus and corium without red markings; cuneus sometimes lightly marked with red 57

56(55) Pronotal disk with fuscous patches or spots, sometimes only along basal submargin . . . . . stellatus Group, p. 231

- Pronotal disk without fuscous patches or spots . . . . . fraterculus Group, p. 251

57(55) Membrane of fore wing mottled; length 6.7-8.1 mm . . . . . junceus Group, p. 152

- Membrane of fore wing uniformly infuscated or nearly so; length 5.4-6.0 mm . . . shoshoni n. sp., p. 366

58(47) Antennal segment III yellowish brown or yellowish gray, sometimes slightly darker apically 59

- Antennal segment III dark brown or black, sometimes with pale, median annulus 75

59(58) Antennal segment I greatly thickened and densely set with long, erect, bristle-like, dark setae; thickness at least twice that of antennal segment II . . . . . lasiomerus Group, p. 73

\- Antennal segment I more slender; rarely greatly thickened, if so erect setae pale 60

60(59) Pronotal disk yellow or brownish yellow with distinct fuscous spot behind inner angles of calli; frons strongly convex, almost conical in form; length 6.5-10.4 mm . . . . . laevis Group, p. 247

\- Pronotal disk without fuscous spot behind inner angles of calli 61

61(60) Scutellum with small, round, red to fuscous spot each side before apex . . . . . interspersus Group, p. 220

\- Scutellum without small, round spots before apex . . . 62

62(61) Front tibiae with 2-4 dark annuli 63

\- Front tibiae without dark annuli or with single dark band at apex only 69

63(62) Length of antennal segment I greater than width of pronotum at base . . . . . canescens Reuter, p. 349

\- Length of antennal segment I equal to or less than basal width of pronotum 64

64(63) Ratio of eye length to width of vertex less than or equal to 1.20:1 . . . . . varipes Boheman, p. 368

\- Ratio of eye length to width of vertex greater than 1.20:1 65

65(64) Basal submargin of pronotal disk with transverse, fuscous line or series of fuscous patches 66

\- Basal submargin of pronotal disk without fuscous markings 67

66(65) Basal submargin of pronotal disk with continuous fuscous line . . . . . maritimus Van D., p. 354

\- Basal submargin of pronotal disk with series of fuscous patches . . . . . plenus Group, p. 181

67(65) Hemelytra with dark brown or black, simple setae; genital segment of male with well developed tubercle above base of left clasper 68

- Hemelytra without dark brown or black, simple setae; genital segment of male without tubercle above base of left clasper . . . fraterculus Group, p. 251

68(67) Front tibiae with pale annulus at apex; length 4.8-6.5 mm . . . . . listi Group, p. 172

- Front tibiae with fuscous annulus at apex; length 6.5-9.1 mm . . . . . plenus Group, p. 181

69(62) Antennal segment I densely set with long, pale setae on ventral surface . . . . . candidus Group, p. 146

- Antennal segment I without dense brush of pale setae on ventral surface 70

70(69) Basal submargin of pronotal disk with 4-6 weakly elevated bullae; length 5.0-5.8 mm . . . . . rostratus Group, p. 96

- Basal submargin of pronotal disk without distinct bullae; length 5.0-9.0 mm 71

71(70) Ratio of eye length to width of vertex less than or equal to 1.00:1; females strongly brachypterous . . . . . roseipennis Group, p. 78

- Ratio of eye length to width of vertex greater than 1.00:1; females macropterous 72

72(71) Ratio of length of antennal segment I to posterior width of pronotum less than or equal to 0.85:1 73

- Ratio of length of antennal segment I to posterior width of pronotum equal to or greater than 0.90:1 . . . 74

73(72) Hemelytra white to pale grayish yellow, sometimes with limited brown to fuscous markings; areole veins pale; genital segment of male with well developed tubercle above base of left clasper . . plenus Group, p. 181

- Hemelytra brownish orange; areole veins red; male genital segment without tubercle above base of left clasper . . . . . fraterculus Group, p. 251

74(72) Antennal segment I clothed with short, dark setae; front tibiae fuscous at apex . . . . junceus Group, p. 152

– Antennal segment I clothed with long, pale setae; front tibiae uniformly pale yellow . . . . . cunealis Group, p. 62

75(58) Basal 1/2-2/3 of propleura fuscous, rarely with short pale stripe crossing anterior margin, apical region pale 76

– Propleura otherwise colored and marked; basal 1/2 always distinctly marked with pale, never uniformly fuscous 82

76(75) Antennal segment II with pale, median annulus . . . . . tiliae Group, p. 214

– Antennal segment II without pale, median annulus . . . 77

77(76) Genital segment of male with well developed tubercle above base of left clasper 78

– Genital segment of male without tubercle above base of left clasper 79

78(77) Apices of front tibiae pale; length 4.2-6.5 mm; female strongly brachypterous . . . . . listi Group, p. 172

– Apices of front tibiae darkened; length 6.5-9.3 mm; females macropterous . . . . . junceus Group, p. 152

79(77) Dorsal width of eye for males distinctly less than width of vertex; female strongly brachypterous . . . . . omani n. sp., p. 361

– Dorsal width of eye for males equal to or greater than width of vertex; females macropterous 80

80(79) Front tibiae with 1 or 2 poorly defined dark annuli; rostrum extending to or slightly beyond apices of hind coxae . . . . . stellatus Group, p. 231

– Front tibiae with three distinct fuscous annuli; rostrum extending well beyond apices of hind coxae . . 81

81(80) Wing membrane mottled with fuscous, margins of dark areas sometimes breaking into small spots; ratio of length of antennal segment I to width of head across eyes 1.10:1 to 1.25:1 for males . . . . . neglectus Knight, p. 358

- Wing membrane conspurcate; ratio of length of antennal segment I to width of head across eyes 0.95:1 to 1.05:1 for males . . . decurvatus Knight, p. 351

82(75) Front tibiae with 3-5 dark annuli 83

- Front tibiae with 1 or 2 dark annuli, or without dark bands 92

83(82) Front tibiae with four pale annuli; pale bands sometimes obscured on dorsal surface by dark spots . . . . . plenus Group, p. 181

- Front tibiae with three pale annuli 84

84(83) Antennal segment I red or reddish brown with broad pale annulus at middle . . . . . plenus Group, p. 181

- Antennal segment I otherwise colored 85

85(84) Antennal segment II with pale, median annulus 86

- Antennal segment II without pale, median annulus . . . 88

86(85) Hemelytra lightly to densely tinged or marked with red; basal margin of propleura pale . . . . . plenus Group, p. 181

- Hemelytra with brown to fuscous markings; basal margin of propleura fuscous 87

87(86) Antennal segment III with pale, median annulus; sclerotized process of vesica with three large teeth (fig. 150e) . . . . . histriculus Van D., p. 353

- Antennal segment III without pale, median annulus; sclerotized process with 20 or more small, tooth-like serrations (figs. 80e&82e) . . . . . tiliae Group, p. 214

88(85) Antennal segment II sparsely set with long, erect setae, length of setae more than three times thickness of segment; female strongly brachypterous . . . . . plenus Group, p. 181

- Antennal segment II without long, erect setae 89

89(88) Antennal segment I distinctly thicker on basal half; vesica of male without a sclerotized process . . . . . plenus Group, p. 181

- Antennal segment I not distinctly thicker on basal half; vesica with well developed sclerotized process 90

90(89) Cuneus tinged or marked with red . . . . . fraterculus Group, p. 251

- Cuneus without red markings 91

91(90) Ventral surface of antennal segment I uniformly pale; male genital structures distinctive (fig. 92); females macropterous . . . . . gracillatus Group, p. 242

- Ventral surface of antennal segment I pale with fuscous reticulations; male genital structures distinctive (fig. 148); female strongly brachypterous . . . . . canescens Reuter, p. 349

92(82) Frons mostly fuscous; length 7.3-8.5 mm . . . . . junceus Group, p. 152

- Frons pale, sometimes with darkened striae but never extensively infuscated; length 5.0-6.5 mm . . . . . gracillatus Group, p. 242

Cunealis Species - Group

DESCRIPTION. - Large, 6.5-8.6 mm, pale species with reddish to brownish markings; vestiture of dorsum composed of suberect, simple setae intermixed with white to golden brown, sericeous setae. Head: antennae pale yellow to brownish yellow; segment I equal to or longer than posterior width of pronotum, densely set with erect pale setae; frons moderately to strongly convex, meeting tylus along distinct indentation; eyes small, length rarely exceeding width of vertex X 1.2. Pronotum: pronotal disk lightly to extensively shaded with red or reddish brown, basal submargin sometimes with transverse fuscous line or series of dark spots; propleura tinged or marked with red or reddish brown, apical 3rd uniformly pale. Hemelytra: white or pale yellow with reddish orange to reddish brown markings, sometimes lightly tinged with brown; corium usually with large, oblique, reddish mark medially; apical 1/3-1/2 of cuneus densely marked with red; membrane conspurcate. Legs: femora pale yellow; hind femora moderately to extensively marked with red or reddish brown, sometimes with reticulate pattern, darkened regions often broken by pale spots; tibiae pale yellow, sometimes with reddish band at base. Male genitalia: genital segment with distinct tubercles above clasper bases (exception: genital tubercles indistinct in *P. rubrimaculatus*). Left clasper: sensory lobe moderately to strongly produced; shaft swollen basally, preapical region narrowly expanded, more broadly expanded in *P. fuscosignatus*, outer margin of expanded region flattened dorsoventrally; apex truncated or narrowly rounded. Right clasper: lanceolate or elongate, dorsal surface of arm sometimes with patch of small spines; shaft usually distinctly recurved just before apex; apex acute. Vesica: membranous portion of vesica, except in *P. rufoscriptus*, greatly reduced, basal lobes variable in size and shape; vesica with 3 or 4 sclerotized processes (exception: *P. rufoscriptus* has a single sclerotized process), variable in size and shape, middle left process sometimes very small; basal process well sclerotized, extending to or slightly beyond level of gonopore,

expanded apically, sometimes continuous with base of right sclerotized process.

REMARKS. - Members of the *cunealis* group are distributed throughout the Chaparral and Sierran Forest provinces of California and occur in the Pacific Forest Province of northwestern California and western Oregon as far north as Benton and Linn counties. With the exception of *P. hettenshawi* which is found on *Arctostaphylos*, all *cunealis* group species inhabit plants belonging to the family Fagaceae (i.e., *Castanopsis*, *Lithocarpus*, *Quercus*).

Species of the *cunealis* group are distinguished by their large size, pale yellow to brownish yellow general coloration with distinct reddish markings, and by the structure of the male genitalia. The most diagnostic genital feature is the reduction in size of the membranous portion of the vesica and the presence of 3 or 4 sclerotized processes.

Key to the Species of the *cunealis* Group

1 Basal submargin of pronotal disk with transverse series of fuscous spots that bear tufts of black setae; vesica with a single sclerotized process (fig. 1e) . . . . . *rufoscriptus* Van D., p. 65

\- Basal submargin of pronotal disk sometimes darkened, but without distinct fuscous spots; vesica with 3 or 4 sclerotized processes 2

2(1) Pronotal disk mottled with red or reddish orange, leaving spots and larger patches of white or pale yellow; genital segment of male swollen above base of left clasper but lacking a distinct tubercle (fig. 2a) . . . . . *rubrimaculatus* n. sp., p. 66

\- Pronotal disk variously marked with red, reddish brown, or brown but without distinct pale spots; genital segment of male with visible tubercle above base of left clasper 3

3(2) Left genital tubercle small, apex acute or narrowly rounded (fig. 3a); vesica with three sclerotized processes (figs. 3e-e'); claspers distinctive (figs. 3b-d) . . . . . *fuscosignatus* Knight, p. 68

\- Left genital tubercle large, apex broadly rounded; vesica with four sclerotized processes, middle left process sometimes very small 4

4(3) Right sclerotized process elongate (figs. 5e&6e), length greater than that of left process 5

\- Right sclerotized process shorter (fig. 4e), length less than that of left process . . . . . *sewardi* Bliven, p. 69

5(4) Middle left sclerotized process very small and narrow (fig. 5e); left genital tubercle as in figure 5a; inhabits *Arctostaphylos* . . . . . *hettenshawi* Bliven, p. 70

\- Middle left sclerotized process larger, broad at base and tapering distally (fig. 6e); left genital tubercle as in figure 6a; inhabits *Quercus* . . . . . *cunealis* Van D., p. 71

Phytocoris rufoscriptus Van Duzee

Figure 1

Phytocoris rufoscriptus Van Duzee, 1914:15-16, 1917a:319; Carvalho 1959:215; Knight 1968:215; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - Described from five males and one female taken near Alpine Heights, 8 June 1913 & 6 June 1914, and Mussey's, 13 April 1913, San Diego Co., California, E.P. Van Duzee. Van Duzee (1914) did not designate a type at the time of publication, but he did select a lectotype (No. 2007) and "allotype" (No. 2008) at a later date; the remaining specimens of the syntype series were tagged with orange "paratype" labels. Unfortunately, these type designations were never published. The male specimen selected as a lectotype by Van Duzee is designated as such by Henry and Stonedahl (1983). The lectotype and three paralectotypes are retained in the CAS collection and one paralectotype is deposited in the Knight Collection (USNM). The remaining specimen of the original syntype series was not located.

DIAGNOSIS. - Length 7.0-7.9 mm. Phytocoris rufoscriptus is distinguished from other species of the cunealis group by the setiferous, fuscous spots along the basal submargin of the pronotal disk; narrow left genital tubercle of the male (fig. 1a); and by the single sclerotized process of the vesica (fig. 1e). The right membranous lobe of the vesica is narrowly sclerotized apically, and the left basal lobe is set with a large patch of spinulae. The dorsal surface of P. rufoscriptus is mottled or reticulated with red as in P. rubrimaculatus, but the latter species is without dark basal spots on the pronotal disk.

REMARKS. - Phytocoris rufoscriptus is distributed in the chaparral zone of southwestern California from San Luis Obispo County to San Diego County. The host plant of this species is coast live

oak, Quercus agrifolia Nee. A single specimen also was taken on Rhamnus californica Esch. I have examined 30 specimens with collection dates ranging from April 13 to August 9.

Phytocoris rubrimaculatus new species

Figure 2

TYPES AND TYPE LOCALITY. - Holotype male: Mt. Palomar, San Diego Co., California, 18 July 1963, R.L. Langston (UCB). Paratypes: CALIFORNIA. Los Angeles Co.: 1 male and 2 females, Camp Baldy, 26 June 1950, W.C. Bentinck (UCB); 1 male, Camp Baldy, 14 June 1926, L.J. Muchmore (LACM); 1 female, Mt. Baldy, 21 June 1931 (LACM); Tanbark Flat, 1 male, 7 July 1950, H.L. Hansen (UCB) and 1 female, 24 June 1952, J.J. Menn (UCB). Riverside Co., San Jacinto Mts.: 1 male and 2 females, 21 July 1929, R.H. Beamer (KU); 1 male and 1 female, Dark Cyn., 21 June 1940, ex. Quercus sp., F.H. Rindge (UCB); 1 female, San Jacinto R., 915 m, 30 May 1940, R.L. Usinger (UCB). San Bernardino Co., San Bernardino Mts.: 1 female, Camp O-ongo, nr. Running Spgs., 1920 m, 7-14 August 1965, C.L. Hogue (LACM); 1 female, 19 July 1941, 1 female, 31 July 1951, 1 male, 26 July 1952, and 1 female, 17 July 1953, Mill Crk., 1920 m, ex. Quercus chrysolepis Liebm., Timberlake (UCR). San Diego Co.: 1 male, Cuyamaca Lk., 6 July 1929, R.H. Beamer (KU).

DIAGNOSIS. - Phytocoris rubrimaculatus is easily distinguished from other species of the cunealis group by the red or reddish orange mottled pattern on the pronotal disk and hemelytra, and by the absence of a distinct tubercle above the base of the left clasper (fig. 2a). Externally, this species closely resembles P. rufoscriptus, but differs by the absence of dark setiferous spots along the basal submargin of the pronotal disk.

DESCRIPTION. - Male. Length 6.53-7.40 mm, width 2.16-2.43; pale yellow ground color with red or reddish orange markings. Head:

width across eyes 0.98-1.04, vertex 0.42-0.45; pale yellow, lightly marked with red or reddish orange; frons moderately convex, set with long pale setae, sometimes with several faint reddish striae. Rostrum: length 3.28-3.47, extending to 6th or 7th abdominal segment. Antennae: brownish yellow; I, length 1.78-2.03, sparsely set with long, bristle-like, pale setae; II, length 3.36-3.73; III, length 1.93-2.23; IV, length 0.99-1.19. Pronotum: mesal length 0.97-1.08, posterior width 1.62-1.82; pronotal disk mottled with red or reddish orange but leaving distinct pale patches; collar extensively reddened, with pale spot medially; calli mostly pale; propleura pale yellow, often lightly marked with red. Scutellum: weakly convex; white or pale yellow, usually lightly marked or tinged with pale brownish orange. Hemelytra: white or pale yellow, mottled with reddish orange or pale brownish orange; corium with large, oblique red mark medially; cuneus moderately to densely sprinkled with small red spots; membrane conspurcate. Legs: femora pale yellow; sometimes lightly and irregularly tinged with darker brownish yellow; hind femora reticulated with red or reddish brown, mostly on apical half of segment; tibiae uniformly pale. Vesiture: dorsum with long, suberect, simple setae intermixed with sericeous, white setae. Genitalia: Figure 2.

Female. Similar to male in color and vestiture. Length 7.02-7.78 mm, width 2.39-2.65. Head: width across eyes 1.02-1.09, vertex 0.45-0.50. Rostrum: length 3.42-3.74, extending to 5th or 6th abdominal segment. Antennae: I, 1.98-2.29; II, 3.46-3.87; III, 2.11-2.32; IV, 1.17-1.35. Pronotum: mesal length 1.01-1.19, posterior width 1.62-1.91.

REMARKS. - This species is distributed in the southwestern mountain ranges of California from Los Angeles County to San Diego County. Adult specimens have been collected from canyon oak, *Quercus chrysolepis*. The range of occurrence is from May 30 to August 14.

Phytocoris fuscosignatus Knight

Figure 3

Phytocoris fuscosignatus Knight, 1928:45-46; Carvalho 1959:200; Knight 1968:216, fig. 258.

TYPES AND TYPE LOCALITY. - The original description of this species is based on a single female collected at Corvallis, Benton Co., Oregon, 26 June 1926, C.J. Drake. This specimen is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 6.8-8.6 mm. Phytocoris fuscosignatus is distinguished from other species of the cunealis group by the following combination of characters. The dorsal surface is not mottled with red or reddish orange as in P. rubrimaculatus and P. rufoscriptus. The left genital tubercle is small; apex acute or narrowly rounded (fig. 3a). The vesica has three sclerotized processes (figs. 3e-e'). Male genital claspers as in figures 3b-d.

REMARKS. - This species occurs at low to moderate elevations, 300 m - 1500 m, in coastal mountain ranges from Benton Co., Oregon to Napa Co., California; in the Siskiyou Mts. of southeastern Oregon and transverse mountain ranges of northern California; and along the western slopes of the Cascade Range and Sierra Nevada Mts. in California. The southernmost records are from the Tehachapi Mts., Kern Co. and the San Gabriel Mts. in Los Angeles County. Adult specimens have been collected from Quercus douglasii H.&A., Q. garryana Dougl. and Q. kelloggii Newb. I have examined 145 specimens with collection dates ranging from May 1 to August 1.

Phytocoris sewardi Bliven

Figure 4

Phytocoris sewardi Bliven, 1966:116-117.

TYPES AND TYPE LOCALITY. - Phytocoris sewardi was described from a single female collected at Blocksburg, Humboldt Co., California, 30 June 1957, on "tanbark oak", B.P. Bliven. The holotype (No. 13878) is retained in the collection of the CAS.

DIAGNOSIS. - Length 6.7-7.9 mm. Externally, this species is very similar to P. cunealis and P. hettenshawi, but is distinguished by the shorter, strongly curved right sclerotized process of the vesica and by the shape of the left sclerotized process (figs. 4e&e').

REMARKS. - Phytocoris sewardi is distributed in coastal mountain ranges of Oregon and California, and along the western slopes of the Cascade Range and the Sierra Nevada Mountains. The northernmost records are from Benton and Linn counties in Oregon. The distribution extends south to Kern and Los Angeles counties in California. Adults and nymphs of this species have been taken on Castanopsis chrysophylla (Dougl.). Several adult specimens also were collected from Lithocarpus densiflora (H.&A.) and Quercus chrysolepis Liebm. I have examined 98 specimens with collection dates ranging from April 26 to September 4.

Phytocoris hettenshawi Bliven

Figure 5

Phytocoris hettenshawi Bliven, 1956:18-19, pl. II, fig. 11.

TYPES AND TYPE LOCALITY. - This species was described from 16 specimens collected nr. the Hettenshaw Valley, Van Duzen Rd., Trinity Co., California, 4 July - 15 August, 1943, 1949-1951, ex. Arctostaphylos sp., B.P. Bliven. The holotype male (15 August 1951), allotype, and all 14 paratypes are deposited in the collection of the CAS.

DIAGNOSIS. - Length 6.7-8.5 mm. Phytocoris hettenshawi is very similar to P. cunealis and P. sewardi but can usually be distinguished from these species by the more reddish general coloration and shorter bristle-like setae on the legs and first antennal segment. Positive identification, however, depends on examination of male genital structures. The shape of the left and right sclerotized processes (figs. 5e&e') will readily separate P. hettenshawi from P. sewardi, and the small middle left sclerotized process will distinguish this species from P. cunealis. The left genital tubercle (fig. 5a) is usually distinctly smaller than for either P. cunealis or P. sewardi, but there is some variation in the size of this structure. The genital claspers of all three taxa are very similar.

REMARKS. - Phytocoris hettenshawi is distributed throughout the coastal mountain ranges, Cascade Range, and Sierra Nevada Mountains of California. The distribution extends north to Curry, Jackson, Josephine, and Klamath counties in southwestern Oregon; and east to Washoe Co., Nevada. I have examined 153 specimens with collection dates ranging from May 6 to September 9.

Phytocoris hettenshawi is the only member of the cunealis group that does not inhabit plants belonging to the family Fagaceae.

Adults and nymphs of P. hettenshawi have been collected only from Arctostaphylos, which may account for the more reddish coloration of this species. Besides genital characteristics of the male, habitat is perhaps the most reliable character for distinguishing both males and females of P. hettenshawi from other cunealis group species.

Phytocoris cunealis Van Duzee

Figure 6

Phytocoris cunealis Van Duzee, 1914:16-17, 1917a:319, 1917b:262; Carvalho 1959:196; Knight 1968:215, fig. 256; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - Phytocoris cunealis was described from a series of specimens collected in San Diego Co., California, 12 April - 6 June, 1913 & 1914 by E.P. Van Duzee. Nineteen specimens of this series are retained in the Van Duzee Collection (CAS), and one male specimen is deposited in the Knight Collection (USNM). These specimens are identified by "paratype" labels (orange) which Van Duzee apparently applied at a later date. Van Duzee also selected a lectotype (No. 2005) and "allotype" (No. 2006) from the syntype series but did not publish an account of these actions. The male specimen selected as a lectotype by Van Duzee is designated as such by Henry and Stonedahl (1983). This specimen is deposited in the CAS collection.

DIAGNOSIS. - Length 6.5-7.7 mm. This species is recognized by the following combination of characters: dorsal surface not distinctly mottled with red or reddish orange as in P. rubrimaculatus and P. rufoscriptus; left genital tubercle large, broadly rounded (fig. 6a); vesica with four sclerotized processes (figs. 6e-e'), right sclerotized process longer than left sclerotized process, middle left sclerotized process broad at base and tapering distally.

Phytocoris cunealis usually has longer bristle-like setae on the legs and first antennal segment than either *P. sewardi* or *P. hettenshawi*, but hair length is somewhat variable in all three taxa.

REMARKS. - *Phytocoris cunealis* is distributed in the chaparral zone of southwestern California. I have examined 104 specimens from Los Angeles, Riverside, San Bernardino, and San Diego counties. Collection dates range from April 12 to July 28. The majority of specimens with host plant data were collected from *Quercus dumosa* Nutt. Several specimens also were taken on *Ceanothus* sp., *Quercus agrifolia* Nee., and *Quercus* sp.

Lasiomerus Species - Group

DESCRIPTION. - Moderate to large-sized, 6.5-8.4 mm, yellowish red to yellowish brown, or reddish brown species; vestiture of dorsum composed of suberect, simple setae intermixed with silvery, sericeous setae. Head: antennae pale yellow to yellowish brown; segment I greatly thickened and marked with scattered reddish spots, densely set with erect, bristle-like, black setae, length of segment greater than width of head across eyes; segment II in P. lasiomerus with apical 1/4-1/3 fuscous; frons moderately and evenly convex, meeting tylus along shallow indentation, marked with 6 or 7 reddish striae either side of middle; eyes elliptical to slightly reniform. Pronotum: pronotal disk pale yellow to yellowish gray with red to fuscous markings; disk with deep furrow behind calli; calli prominent; propleura yellowish brown or reddish brown, apical 1/3 pale. Hemelytra: pale yellow with red to fuscous markings; apex and inner margin of cuneus marked with red, cuneus extensively reddened in P. rubropictus; membrane moderately to densely marbled with brown or fuscous, veins reddish. Legs: femora pale yellow to brownish yellow with limited reddish markings; hind femora with more extensive reticulate pattern of red or reddish brown; tibiae pale yellow, sometimes narrowly fuscous at apex; hind tibiae marked with reddish brown basally. Male genitalia: genital segment, except in P. pallidicornis, with distinct tubercle above base of left clasper. Left clasper: sensory lobe moderately produced; shaft slightly to moderately expanded preapically; apex narrowly rounded. Right clasper: elongate to narrowly lanceolate; shaft slightly expanded before apex when viewed dorsally; apex blunt, sometimes with short process. Vesica: multilobed, extreme right lobe extensively sclerotized and with row of heavy spines; outer surface of right basal lobe weakly sclerotized in part; basal process well sclerotized, extending slightly beyond level of gonopore, expanded apically; vesica lacking distinct sclerotized process.

REMARKS. - The lasiomerus group is comprised of three species. Phytocoris lasiomerus and P. pallidicornis have transcontinental

distributions in southern Canada and the northern United States; P. rubropictus is known only from Maine and New York. These species are reported to be inhabitants of herbaceous plants (Knight, 1923; Kelton, 1980), but specific host plant records are lacking.

Members of the lasiomerus group are easily recognized by the enlarged first antennal segment which is densely set with erect, bristle-like, black setae; and by the form of the male genitalia. Lasiomerus group species appear to be most closely related to members of the cunealis and roseipennis groups.

Key to the Species of the lasiomerus Group

1 Antennal segment II yellow or pale brownish yellow, apical 1/4-1/3 dark brown or black . . . . . lasiomerus Reuter, p. 75

\- Antennal segment II uniformly yellowish, sometimes darker yellowish brown at extreme apex but apical 1/4-1/3 never dark brown or black 2

2(1) Scutellum with red markings; genital segment of male swollen above base of left clasper but lacking a distinct tubercle (fig. 8a); length 6.5-7.4 mm . . . . . pallidicornis Reuter, p. 76

\- Scutellum uniformly pale yellow, without red markings; genital segment of male with large tubercle above base of left clasper (fig. 9a); length 7.4-8.2 mm . . . . . rubropictus Knight, p. 77

Phytocoris lasiomerus Reuter

Figure 7

Phytocoris lasiomerus Reuter, 1909:34; Van Duzee 1917a:316; Knight 1923:617-618; Blatchley 1926:702, fig. 167a; Knight 1941:185, fig. 173; Carvalho 1959:204 (see this catalogue for more complete listing of pre-1959 citations and misidentifications); Kelton 1980:167, figs. 114&116, map 49.

TYPES AND TYPE LOCALITY. - The original description lists the following locality data for P. lasiomerus: "Gold River, Long Lake, Huckleberry". The state, county, and date of collection are not given, but it is possible that this information was not available to Reuter. Also, there is no indication of the number of specimens in the type series, although it is clear from the description that both sexes were examined. According to Reuter (1909), the type series of P. lasiomerus is deposited in the Hungary National Collection in Budapest, but this remains to be verified.

DIAGNOSIS. - Length 7.1-8.4 mm. Phytocoris lasiomerus is easily distinguished from P. pallidicornis and P. rubropictus by the dark brown or black apical region on the second antennal segment. This species is further differentiated from P. pallidicornis by the distinct tubercle above the left clasper base (fig. 7a) and longer first antennal segment. The genital claspers and heavy spines of the vesica are very similar to those of P. pallidicornis and P. rubropictus.

REMARKS. - Phytocoris lasiomerus has a transcontinental distribution in the northern United States and southern Canada (Carvalho, 1959; Kelton, 1980). In western North America this species is known from Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming, Alberta, and British Columbia. Specimens have been collected as far south as Umatilla Co., Oregon; Utah Co., Utah;

and Douglas Co., Colorado. The northernmost record in British Columbia is at Quesnel. Kelton (1980) reports this species as far north as Peace River in Alberta. I have examined 69 specimens with collection dates ranging from June 18 to September 15. No host plant records were given with these specimens, but Knight (1923) and Kelton (1980) report this species from herbaceous plants. Blatchley (1926) lists "willows and weeds" as the habitat of P. lasiomerus in New York.

Phytocoris pallidicornis Reuter

Figure 8

Phytocoris pallidicornis Reuter, 1876:69; Uhler 1895:33; Reuter 1909:33-34 (misspelled pallicornis); Van Duzee 1917a:316; Knight 1923:618-619; Blatchley 1926:703; Knight 1941:185; Carvalho 1959:209 (see this catalogue for more complete listing of pre-1959 citations); Kelton 1980:169, fig. 117, map 50.

TYPES AND TYPE LOCALITY. - Phytocoris pallidicornis was described from a single specimen collected in Wisconsin by Kumlien (see Reuter, 1876, 1909). I have examined this specimen and it is a female bearing Reuter's hand-printed determination label. The holotype is deposited in the Swedish Museum of Natural History in Stockholm.

DIAGNOSIS. - Length 6.5-7.4 mm. Phytocoris pallidicornis is very similar to P. lasiomerus but differs by the unicolored second antennal segment and by the absence of a distinct tubercle above the base of the left clasper (fig. 8a). The small size, reddish markings on the scutellum, and absence of genital tubercles distinguish this species from P. rubropictus.

REMARKS. - The distribution of this species is very similar to that of P. lasiomerus; transcontinental in the northern United States

and southern Canada. I have examined 21 specimens from British Columbia, Colorado, Idaho, Montana, Oregon, and Washington. Specimens have been collected as far south as Union Co., Oregon and Routt Co., Colorado. The northernmost record is from Soda Crk. in British Columbia. Collection dates range from July 23 to September 4. Knight (1923) and Kelton (1980) give "herbaceous plants" as the habitat of this species.

Phytocoris rubropictus Knight

Figure 9

Phytocoris rubropictus Knight, 1923:619-620; Blatchley 1926:703-704; Carvalho 1959:215.

TYPES AND TYPE LOCALITY. - This species was described from two specimens: holotype female, Wanakena, Lawrence Co., New York, 12 August 1920, C.J. Drake; allotype male, Roque Bluffs, Washington Co., Maine, 15 Aug. 1907, J.A. Cushman. Both specimens are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.4-8.2 mm. This species closely resembles *P. lasiomerus* but differs by the more reddish general coloration, uniformly yellowish second antennal segment and scutellum, and by the much larger tubercle above the base of the left clasper (fig. 9a). Body size, the absence of reddish markings on the scutellum, and the large genital tubercle will distinguish this species from *P. pallidicornis*.

REMARKS. - *Phytocoris rubropictus* is known only from Maine and New York. Besides the type material, I have examined a single male of this species from Paul Smiths, Franklin Co., New York. The habitat of *P. rubropictus* is not known, but like other members of the *lasiomerus* group, it probably occurs on herbaceous plants. Collection dates are from July 29 to August 15.

Roseipennis Species - Group

DESCRIPTION. - Moderate to large-sized, 5.3-9.2 mm, pale species with limited reddish or brownish markings; females strongly brachypterous, membrane of fore wing greatly reduced; vestiture of dorsum composed of suberect, simple setae intermixed with silvery, sericeous setae. Head: elongate; antennae pale yellow to yellowish brown; segment I somewhat thickened, sparsely set with erect pale setae, sometimes reticulated with brown, ventral surface infuscated in darker specimens of P. fuscipennis; frons prominent, strongly deflexed apically, meeting tylus along deep indentation; tylus prominent; eyes small, elliptical to slightly reniform, length less than or equal to width of vertex. Pronotum: pronotal disk yellowish with limited red or brown markings, sometimes with pale longitudinal line(s); propleura uniformly pale or lightly marked with reddish brown to fuscous. Hemelytra: pale yellow to grayish yellow, sometimes lightly to moderately tinged or flecked with brown to fuscous especially in darker specimens of P. fuscipennis and P. planituberis; clavus and corium in P. roseipennis often with red to reddish brown, longitudinal bands; membrane lightly infuscated, sometimes with darker dusky flecks. Legs: femora white or pale yellow, usually with limited reddish to fuscous markings; hind femora often more extensively darkened and marked with pale spots; tibiae pale, sometimes with darker markings but never distinctly annulated. Male genitalia: genital segment, except in P. fuscipennis, with well developed tubercle above base of left clasper. Left clasper: sensory lobe weakly to moderately produced; shaft short, slightly expanded preapically; apex narrowly flattened, truncate. Right clasper: elongate to narrowly lanceolate, dorsal surface sometimes distinctly arcuate; apex acute or narrowly rounded. Vesica: multilobed, lobes slightly to moderately reduced, sometimes partially sclerotized basally or at apex; basal process, except in P. roseipennis, small and weakly sclerotized; vesica with 1 or 2 sclerotized process(es); right process sickle-shaped or

trough-shaped, margins strongly reflexed producing deep medial groove; left process, when present, variable in size and shape.

REMARKS. - The roseipennis group is comprised of four species, three of which are known only from the Mexican Highland Shrub Steppe Province of southeastern Arizona. The other member, P. validus, is distributed in the Great Plains-Shortgrass Prairie and Rocky Mountain Forest provinces of Colorado, Montana, South Dakota, and Wyoming. Phytocoris validus also is reported from eastern Alberta, Saskatchewan, and Manitoba (Kelton, 1980). Phytocoris fuscipennis and P. roseipennis have been collected from grasses in Arizona. Kelton (1980) lists "herbaceous plants" as the habitat of P. validus in Canada. The host plant association of P. planituberis is not known.

Members of the roseipennis group are recognized by the following combination of characters: pale general coloration; dorsal surface without flattened, dark setae; length of eye less than or equal to width of vertex; antennae pale, segment I somewhat thickened and sparsely set with erect, pale setae; tibiae without distinct dark annuli. The large size and elongate form of the males, and the strongly brachypterous condition of the females will further differentiate these species from other western members of the genus. The male genital structures also aid in the recognition of roseipennis group species.

Key to the Species of the roseipennis Group

1	Pronotal disk with short, dark, simple setae	2
-	Pronotal disk without dark, simple setae	3
2(1)	Ratio of length of antennal segment I to width of head across eyes 1.15:1 to 1.25:1 for males; left genital tubercle of male small (fig. 10a)	validus Reuter, p. 81

- Ratio of length of antennal segment I to width of head across eyes 1.30:1 to 1.50:1 for males; left genital tubercle large and distinctly flattened (fig. 11a) . . . . . *planituberis* n. sp., p. 82

3(1) Hemelytra tinged or marked with red; ratio of length of antennal segment I to posterior width of pronotum 0.90:1 to 1.10:1 for males; genital segment of male with small tubercle above base of left clasper (fig. 12a) . . . . . *roseipennis* Knight, p. 84

- Hemelytra without red markings; ratio of length of antennal segment I to posterior width of pronotum 0.65:1 to 0.85:1 for males; male genital segment without tubercle above base of left clasper (fig. 13a) . . . *fuscipennis* Knight, p. 85

Phytocoris validus Reuter

Figure 10

Phytocoris validus Reuter, 1909:31-32; Van Duzee 1917a:318; Carvalho 1959:220; Knight 1968:235; Kelton 1980:169, fig. 118, map 50; Henry and Stonedahl 1983: in press.

TYPES AND TYPE LOCALITY. - Reuter (1909) published a description of P. validus under the assumption that P.R. Uhler was in the process of describing this species in the genus Compsocerocoris. Reuter had apparently examined specimens bearing Uhler's manuscript name, Compsocerocoris validus, possibly in the collection of the USNM, Washington D.C. (see preamble and description of P. validus in Reuter, 1909). Since Reuter's description is headed by the title, "Phytocoris validus (Uhler)", it appears that he intended to credit Uhler for the new species but move validus to the genus Phytocoris. However, Uhler's treatment was never published so Reuter is credited for the original description of the species. Reuter's description is based on material collected by E.P. Van Duzee at Fort Collins, Larimer Co., Colorado in July. I have examined a pair of specimens that appear to be from the type series of this species. The male specimen, which bears Reuter's hand-printed determination label, was designated a lectotype by Henry and Stonedahl (1983). Both specimens are deposited in the collection of the CAS.

DIAGNOSIS. - Length: male 6.5-7.2 mm, female 5.3-5.9. This species closely resembles P. planituberis but is distinguished by the shorter first antennal segment, small tubercle above base of left clasper (fig. 10a), and by the sclerotized process of the vesica (fig. 10e). The ratio of length of antennal segment I to width of head across eyes ranges from 1.15:1 to 1.25:1 for males.

REMARKS. - Phytocoris validus has been collected in Montana, Colorado, South Dakota, and Wyoming. Kelton (1980) also reports

this species from eastern Alberta, Saskatchewan, and Manitoba. Specimens have been taken as far south as Montezuma Co., Colorado; west to Jefferson Co., Montana; and east to Custer Co., South Dakota. Kelton (1980) lists "herbaceous plants" as the habitat of *P. validus*. I have examined 14 specimens with collection dates ranging from June 27 to October 1.

Phytocoris planituberis new species

Figure 11

TYPES AND TYPE LOCALITY. - Holotype male: Texas Cyn., Chiricahua Mts., 1524-1829 m, Cochise Co., Arizona, 16 September 1927, J.A. Kusche (CAS). Paratypes: ARIZONA. Cochise Co.: 2 males, same data as holotype (CAS); 23 males, Texas Cyn., Chiricahua Mts., 1737 m, 23 September 1927, J.A. Kusche (CAS, USNM); 1 male, Cave Crk., Chiricahua Mts., 1646 m, 10 September 1958, taken at light, Timberlake (UCR); 1 male, 8 mi. SW Apache, 12 August 1973, J.D. Pinto (UCR); 1 male, 17 mi. E Douglas, 3 August 1967, taken at light, S. & S. Frommer (UCR); 2 males, 17 mi. E Douglas, 12 August 1975, taken at light, J.D. Pinto & S.I. Frommer (UCR). Unspecified Co.: 1 female, Mustang Mt., 22 August 1935, R.H. Beamer (KU). NEW MEXICO. Unspecified Co.: 1 male, Antelope Wells, 22 August 1963, R.D. Ohmart (ASU).

DIAGNOSIS. - *Phytocoris planituberis* is very similar to *P. validus* but differs by the longer first antennal segment; large, flattened tubercle above base of left clasper (fig. 11a); and by the more elongate sclerotized process of the vesica (fig. 11e). The ratio of length of antennal segment I to width of head across eyes ranges from 1.30:1 to 1.50:1 for males. This species is easily distinguished from *P. fuscipennis* and *P. roseipennis* by the short, dark, simple setae on the pronotum and hemelytra.

DESCRIPTION. - Male. Length 6.64-7.83 mm, width 1.84-2.23; pale grayish brown general coloration. Head: width across eyes 0.97-1.04, vertex 0.46-0.49; pale yellow to brownish yellow; buccula, jugum, and tylus often lightly flecked with red or reddish brown; frons abruptly deflexed apically, meeting tylus along deep indentation; tylus prominent; frons and vertex with reddish brown to fuscous markings. Rostrum: length 2.83-3.17, extending to between 4th and 6th abdominal segments. Antennae: I, length 1.30-1.48, white or pale yellow, reticulated with brown; II, length 2.39-2.84, yellowish brown; III, length 1.80-2.18, yellowish brown or brown; IV, length 1.26-1.53, yellowish brown or brown. Pronotum: mesal length 0.99-1.15, posterior width 1.62-1.80; pronotal disk grayish yellow, lightly tinged with brown particularly on calli and along basal submargin, sometimes with indistinct pale line medially; collar and calli often with limited red or reddish brown markings; propleura brownish yellow, sometimes lightly marked with reddish brown. Scutellum: weakly convex; pale grayish yellow with reddish brown to fuscous markings; median line pale. Hemelytra: pale grayish yellow, often lightly tinged with brown; membrane mottled with dusky flecks. Legs: femora white or pale yellow, lightly marked with brown to fuscous; hind femora more extensively darkened and marked with pale spots; tibiae pale with brown to fuscous markings; front tibiae sometimes with 3 or 4 obscured annuli. Vestiture: dorsal surface with light and dark, simple setae intermixed with silvery, sericeous setae. Genitalia: Figure 11.

Female. Strongly brachypterous, wing membrane reduced to narrow flap. Similar to male in color and vestiture. Length 5.40 mm, width 2.05. Head: width across eyes 1.03, vertex 0.53. Rostrum: length 2.91. Antennae: I, 1.55; II-IV, missing. Pronotum: mesal length 0.76, posterior width 1.21. The female of this species is known from a single specimen taken at Mustang Mt., Arizona.

REMARKS. - *Phytocoris planituberis* is known only from Cochise Co., Arizona and a single specimen taken at Antelope Wells, New Mexico. The host plant association is not known, but I expect this

species occurs on grasses and/or herbaceous plants. Several males of P. planituberis have been collected at light. The range of occurrence is from August 3 to September 23.

Phytocoris roseipennis Knight

Figure 12

Phytocoris roseipennis Knight, 1934:3-5; Carvalho 1959:214; Knight 1968:215.

TYPES AND TYPE LOCALITY. - This species was described from 25 specimens collected in Cochise and Santa Cruz counties, Arizona. The holotype male, allotype, and 11 paratypes were taken in Santa Cruz Co., 20 September 1928, "on grasses", A.A. Nichol. The type, allotype, and 11 paratypes are retained in the Knight Collection (USNM). Seven paratypes are deposited in the collection of the CAS; five paratypes were not located.

DIAGNOSIS. - Length: male 8.1-8.8 mm, female 7.1-7.5. Phytocoris roseipennis is distinguished from other species of this group by the reddish tinge on the hemelytra, especially in the male; long first antennal segment, ratio of length to posterior width of pronotum 0.90:1 to 1.10:1 for males; absence of dark, simple setae on the pronotum; and by the male genital structures. The genital segment of the male has a small tubercle above the base of the left clasper (fig. 12a), and the vesica has two sclerotized processes (figs. 12e&e').

REMARKS. - Phytocoris roseipennis is known from Cochise, Pima, and Santa Cruz counties in Arizona. I have examined 38 specimens with collection dates ranging from September 9 to October 11. Some of this material was collected on grama grass, Bouteloua hirsuta Lag. Knight (1934) lists Aristida, Hilaria and Velota as other potential grass hosts of this species.

Phytocoris fuscipennis Knight

Figure 13

Phytocoris fuscipennis Knight, 1934:5; Carvalho 1959:200; Knight 1968:216.

Phytocoris longirostris Knight, 1934:6; Carvalho 1959:205; Knight 1968:216 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris fuscipennis was described from 28 male specimens collected in Cochise Co., Arizona. The holotype and 26 paratypes were taken in Texas Cyn., Chiricahua Mts., 1737 m, 16 & 23 September 1927, "in light trap", J.A. Kusche. The holotype and 15 paratypes are retained in the collection of the CAS and seven paratypes are deposited in the Knight Collection (USNM). The remaining five paratypes were not located.

The junior synonym, P. longirostris, was described from five specimens collected in Cochise and Pima counties, Arizona. The holotype male, allotype, and two paratypes were taken at Tucson, Pima Co., 19 September 1928, A.A. Nichol. The holotype, allotype, and one paratype are retained in the Knight Collection (USNM); two paratypes were not located.

DIAGNOSIS. - Length: male 7.0-9.2 mm, female 6.0-6.3. This species is similar to P. roseipennis but differs by the shorter first antennal segment, absence of reddish markings on the hemelytra, and by the structure of the male genitalia. The ratio of length of antennal segment I to posterior width of pronotum is 0.65:1 to 0.85:1 for males. The genital segment of the male lacks a distinct tubercle above the base of the left clasper (fig. 13a), and the right clasper (fig. 13d) lacks the dorsal protuberance seen in P. roseipennis. The vesica has two sclerotized processes (figs. 13e&e').

REMARKS. - In addition to type material, I have examined 35 specimens of P. fuscipennis from Cochise and Pima counties in

Arizona, and a single specimen from 2.5 mi. S Gage, Luna Co., New Mexico. Collection dates are from August 12 to September 30. The habitat of this species is uncertain, but Knight (1934) states that some of the type specimens of the junior synonym, P. longirostris, were taken on grasses. Males of P. fuscipennis are attracted to light.

Phytocoris longirostris was placed in synonymy with P. fuscipennis on the basis of identical genital structures of the males. I have not seen the differences in the right clasper discussed by Knight (1934). The general coloration of P. fuscipennis is quite variable; some specimens are almost uniformly pale yellow, while others are extensively darkened with fuscous. Knight (1934) used differences in coloration, body size, and rostrum length to separate P. fuscipennis and P. longirostris. After examining the material at hand, I have concluded that the differences observed by Knight are due to intraspecific variation and do not represent species specific characteristics. The identical genital structures of the males supports this conclusion.

Hopi Species - Group

DESCRIPTION. - Moderate to large-sized, 5.2-8.6 mm, brownish or grayish species; females strongly brachypterous, membrane of fore wing greatly reduced; vestiture of dorsum composed of suberect, simple, black setae intermixed with sericeous, white setae and narrow, flattened, black setae. Head: antennae yellowish brown to fuscous; segment I equal to or greater than posterior width of pronotum, dorsal surface with scattered pale spots; segment II with pale, median annulus; frons strongly convex, abruptly deflexed apically, meeting tylus along deep indentation; frons with 6-8 fuscous striae either side of middle; tylus prominent; eyes small, subspherical to elliptical, length less than width of vertex. Pronotum: pronotal disk grayish white or pale grayish yellow, marked with brown to fuscous, sometimes with pale median line; basal submargin of disk with wavy, fuscous line or 4-6 weakly elevated, fuscous points; calli swollen, especially in females; propleura fuscous, apical 1/4-1/3 and sometimes transverse median line pale (exception: propleura white with 1 or 2 fuscous stripes in *P. nigrolineatus*). Hemelytra: pale with brown to fuscous markings particularly along veins and on inner apical angle of corium; membrane conspurcate. Legs: femora white or pale yellow, with reddish brown to fuscous markings, dark areas often broken by pale spots; dorsal surface of hind femora sometimes extensively darkened; tibiae pale with 4 or 5 dark annuli, dark bands sometimes obscured by pale spots. Male genitalia: genital segment with well developed tubercles above clasper bases. Left clasper: sensory lobe weakly to strongly produced, somewhat conical in *P. sonorensis*; dorsal surface of arm sometimes with small spines; shaft slightly expanded preapically, expanded region broad and strongly flattened in *P. cinereus*; apex rounded or truncate. Right clasper: shape variable; dorsal surface sometimes with spinulate knob or hump; apex acute or narrowly truncate. Vesica: membranous portion of vesica slightly to moderately reduced; lobes sometimes with spinulate region(s); basal lobes sometimes weakly sclerotized in part; vesica with 1 or 2

sclerotized process(es), right process often sickle-shaped or trough-shaped and with deep longitudinal furrow, left process when present variable; basal process well sclerotized, extending to level of gonopore or beyond.

REMARKS. - Members of the hopi group are widely distributed in the southwestern United States, but do not occur in the American Desert Province. Phytocoris apache, P. cinereus, and P. hopi are distributed in Arizona, Colorado, New Mexico, and Utah; P. sonorensis is restricted to the Chaparral Province of California; and P. nigrolineatus is distributed throughout much of the Chaparral and Intermountain Sagebrush provinces, north to Deschutes Co., Oregon and Owyhee Co., Idaho. Phytocoris hopi and P. nigrolineatus have been collected from shrubby plants such as Artemisia, Cercocarpus, and Chrysothamnus. The host plant associations of other members of the group are not known.

Hopi group species are recognized by the following combination of characters: brownish or grayish general coloration; dorsal surface with narrow, flattened, dark setae; length of antennal segment I equal to or greater than posterior width of pronotum; eye length less than width of vertex; females strongly brachypterous. Externally, these species are very similar to members of the rostratus group, but differ by the larger size, strongly brachypterous condition of the females, less reduced membranous region of the vesica, and by the shape of the right sclerotized process. Also, the left sclerotized process of the vesica is lacking in three of the five hopi group species.

Key to the Species of the hopi Group

1	Pronotal disk with pale, median line	2
-	Pronotal disk without pale, median line	4
2(1)	Antennal segment I with 1 or 2 full length, pale lines; propleura pale with two fuscous stripes; vesica with two narrow sclerotized processes (figs. 14e&e') . . . nigrolineatus Knight, p. 90	

- Antennal segment I brown to fuscous, marked with white spots but lacking full length pale line(s); propleura fuscous, apical 1/4-1/3 pale, sometimes with incomplete pale line medially 3

3(2) Ratio of length of antennal segment I to posterior width of pronotum 0.85:1 to 1.00:1 for males and 1.40:1 to 1.55:1 for females; shaft of left clasper broadly expanded preapically (fig. 15c); vesica with two sclerotized processes (figs. 15e&e') . . . . . *cinereus*, n. sp., p. 91

- Ratio of length of antennal segment I to posterior width of pronotum 1.00:1 to 1.35:1 for males and 1.55:1 to 1.80:1 for females; shaft of left clasper only slightly expanded preapically (fig. 16c); vesica with a single trough-shaped sclerotized process (fig. 16e) . . . . . *hopi* Knight, p. 93

4(1) Ventral surface of antennal segment I mostly pale; sensory lobe of left clasper strongly produced (fig. 17b); distributed in southwestern California . . . . . *sonorensis* Van D., p. 94

- Ventral surface of antennal segment I fuscous with small pale spots; sensory lobe of left left clasper weakly produced (fig. 18b); distributed in Arizona and western New Mexico . . . . . *apache* Knight, p. 95

Phytocoris nigrolineatus Knight

Figure 14

Phytocoris nigrolineatus Knight, 1968:224-225, fig. 262.

TYPES AND TYPE LOCALITY. - Described from 11 specimens collected in Nye and Washoe counties, Nevada. The holotype male was taken in Area 6M, Nevada Test Site, Nye Co., Nevada, 17 June 1965, ex. Salazaria mexicana Torr., H.H. Knight & J.M. Merino. The holotype, allotype, and six paratypes are retained in the Knight Collection (USNM); one male paratype each is deposited in the collections of BYU and UCB; and one paratype was not located.

DIAGNOSIS. - Length: male 6.5-7.7 mm, female 5.2-6.4. Phytocoris nigrolineatus is distinguished from other species of the hopi group by the full length pale line(s) on the first antennal segment, pale propleuron with two fuscous stripes, and by the pale median line on the pronotal disk. The sensory lobe of the left clasper is weakly produced (fig. 14b); shaft short and broad (fig. 14c). The right clasper is strongly arched dorsally (fig. 14d), and the vesica has two, narrow sclerotized processes (figs. 14e&e').

REMARKS. - Phytocoris nigrolineatus is widely distributed in the Intermountain Sagebrush Province of the central western United States. Specimens have been collected from Clark Co., Nevada; north and west to Deschutes Co., Oregon; and east through southern Idaho to the Wasatch Plateau of central Utah. This species also occurs in the Chaparral Province of California; records ranging from the San Jacinto Mts., Riverside County to Coalinga in Fresno County. The primary host plant of this species is Artemisia tridentata Nutt. but specimens also have been collected on Chrysothamnus viscidiflorus (Hook.), Ephedra nevadensis Wats., Eriogonum fasciculatum Benth., and Salazaria mexicana Torr. Males are attracted to light. I have

examined 61 specimens with collection dates ranging from May 11 to September 9.

Phytocoris cinereus new species

Figure 15

TYPES AND TYPE LOCALITY. - Holotype male: Mt. Capulin Nat. Mon., Union Co., New Mexico, 20 July 1968, taken at light, J.C. Schaffner (SHF). Paratypes: COLORADO. Chaffee Co.: 1 female, Salida, 24 July 1900, E.P. Van Duzee (CAS). Douglas Co.: Head of Highline Canal: 3 males and 1 female, 3 July 1978, J.T. Polhemus (JTP); 2 females, 18 July 1978, J.T. Polhemus (JTP). Fremont Co.: 1 male, Royal Gorge, 3 July 1949, R.H. Beamer (KU). NEW MEXICO. Lincoln Co.: 1 male, Valley of Fires St. Pk., 6 June 1977, Knowlton & Hanson (USU). Union Co.: 1 male, same data as holotype (SHF).

DIAGNOSIS. - *Phytocoris cinereus* is very similar to *P. hopi* but differs by the shorter first antennal segment and form of the male genitalia. The ratio of length of antennal segment I to posterior width of pronotum is 0.85:1 to 1.00:1 for males and 1.40:1 to 1.55:1 for females. The sensory lobe of the left clasper is strongly produced (fig. 15b) and the shaft is broadly expanded and flattened preapically (fig. 15c). The right clasper is larger and more strongly arched dorsally than for *P. hopi*, and the apex is blunt rather than acute (fig. 15d). The vesica has two sclerotized processes (figs. 15e&e'); left process large and trough-shaped.

DESCRIPTION. - Male. Length 7.18-8.00 mm, width 1.91-2.34; brownish gray general coloration. Head: width across eyes 1.07-1.14, vertex 0.50-0.54; white or pale yellow; base of jugum, dorsal margin of lorum, base of buccula, and tylus marked with reddish brown to fuscous; frons extensively infuscated, marked with pale stripe or series of spots medially; vertex tinged with brown, usually with pale stripe medially. Rostrum: length 3.25-3.58,

extending to between 5th and 7th abdominal segments. Antennae: dark brown or fuscous; I, length 1.45-1.85, with scattered pale spots; II, length 2.82-3.38, with narrow pale annulus just beyond base and at middle; III, length 1.87-2.10, narrowly pale basally; IV, length 1.15-1.39. Pronotum: mesal length 1.00-1.17, posterior width 1.66-1.94; pronotal disk grayish white or pale grayish yellow, lightly to moderately tinged with brown, median line pale; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated, setiferous tubercles, extreme basal margin pale; collar fuscous with pale spot medially and at lateral margins; calli moderately to extensively infuscated; propleura fuscous, apical 1/4-1/3 white, usually with incomplete pale line medially. Scutellum: grayish white or pale yellow, with brown to fuscous markings, often with narrow pale line medially bordered by fuscous, apex broadly pale either side of dark mesal area. Hemelytra: grayish white, moderately to extensively darkened with brown to fuscous particularly along veins, outer half of clavus, inner margin and apical angles of corium, and on cuneus; clavus mostly pale mesad of vein; corium usually with distinct pale region medially and at apex; membrane densely conspurcate, outer margin with two pale spots. Legs: femora white or pale yellow, moderately to extensively darkened with reddish brown to fuscous, dark areas with small pale spots; hind femora mostly darkened on dorsal aspect and with fewer pale spots; tibiae pale with 4 or 5 fuscous annuli; dark annuli on hind tibiae less distinct. Vestiture: dorsum with short, simple, black setae intermixed with narrow, flattened, black setae and sericeous white setae. Genitalia: Figure 15.

Female. Strongly brachypterous, abdomen extending well beyond apex of hemelytra, wing membrane reduced to narrow flap. Similar to male in color and vestiture. Length 5.45-6.70 mm, width 2.09-2.30. Head: width across eyes 1.09-1.15, vertex 0.52-0.57. Rostrum: length 3.43-3.67, extending to or slightly beyond base of ovipositor. Antennae: I, 1.96-2.05; II, 3.40-3.67; III, 2.05-2.25; IV, 1.44-1.48. Pronotum: mesal length 0.79-0.88, posterior width 1.31-1.40.

REMARKS. - *Phytocoris cinereus* is known only from the type material collected in Colorado and New Mexico. The only host plant record comes from a single specimen taken on *Rhus trilobata* Nutt. in Douglas Co., Colorado. Collection dates are from June 6 to July 24.

Phytocoris hopi Knight

Figure 16

Phytocoris hopi Knight, 1928:42-44; Carvalho 1959:201; Knight 1968:249.

TYPES AND TYPE LOCALITY. - This species was described from 17 specimens collected in Arizona, Colorado, and New Mexico. The holotype male and allotype were taken at Dolores, Montezuma Co., Colorado, 15 August 1925, H.H. Knight. All type material is deposited in the Knight Collection (USNM) except five paratypes that were not located.

DIAGNOSIS. - Length: male 6.3-8.3 mm, female 5.5-6.8. *Phytocoris hopi* is distinguished from other species of the *hopi* group by the following combination of characters. Antennal segment I is fuscous with pale spots; ratio of length of segment to posterior width of pronotum ranges from 1.00:1 to 1.35:1 for males and 1.55:1 to 1.80:1 for females. The propleuron is fuscous with the apical 1/4-1/3 pale. The pronotal disk is marked with a pale, median line. The vesica has a single trough-shaped sclerotized process (fig. 16e) and the shaft of the left clasper is only slightly expanded preapically (fig. 16c).

REMARKS. - This species is widely distributed in Arizona, Colorado, New Mexico, and Utah but has not been collected in the Sonoran Desert region of Arizona, the Intermountain Sagebrush section of western Utah, or the eastern prairie regions of Colorado and New Mexico. Adults and nymphs have been taken on *Artemisia tridentata*

Nutt. and Cercocarpus montanus Raf. Males are attracted to light. I have examined 95 specimens with collection dates ranging from June 14 to October 14.

Phytocoris sonorensis Van Duzee

Figure 17

Phytocoris sonorensis Van Duzee, 1920:342-343; Carvalho 1959:217; Knight 1968:249, fig. 305.

TYPES AND TYPE LOCALITY. - Phytocoris sonorensis was described from four specimens collected in San Diego Co., California. The holotype male (No. 692) and a single male paratype were taken at Alpine, 7 June 1913, E.P. Van Duzee. The allotype (No. 2004) and one female paratype were collected at Descanso, Cuyamaca Mts., 1524 m, 5 October 1913, E.P. Van Duzee. I have examined the female types of P. sonorensis and they are not conspecific with the holotype. They are correctly identified as P. ceanothicus and bear my identification label for this species. All type specimens of P. sonorensis are retained in the Van Duzee Collection (CAS) except the male paratype which is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length: male 6.2-7.0 mm. This species is easily recognized by the pale ventral surface of antennal segment I and by the absence of a pale, median line on the pronotal disk. The genital segment of male has a large, vertical tubercle well removed from the base of the left clasper (fig. 17a). The sensory lobe of the left clasper is strongly produced (fig. 17b), and the right clasper has a distinct concave region dorsally (fig. 17d). The vesica has a single sclerotized process (fig. 17e).

REMARKS. - Phytocoris sonorensis occurs in the Chaparral Province of southwestern California. I have examined seven specimens; all males from Los Angeles and San Diego counties. The

host plant association is not known, but I expect this species inhabits a shrubby plant such as Ceanothus. The range of occurrence is from June 7 to July 24.

Phytocoris apache Knight

Figure 18

Phytocoris apache Knight, 1928:41-42; Carvalho 1959:191; Knight 1968:249.

TYPES AND TYPE LOCALITY. - Phytocoris apache was described from 11 specimens collected in Coconino and Yavapai counties in Arizona, and a single male specimen taken in Grant Co., New Mexico. The holotype male and one paratype were taken at Williams, Coconino Co., Arizona, 2134 m, 24 June 1925, A.A. Nichol. All type material is retained in the Knight Collection (USNM) except six paratypes that were not located.

DIAGNOSIS. - Length: male 7.5-8.6 mm, female 7.0-7.3. Phytocoris apache is very similar to P. cinereus and P. hopi but is easily distinguished by the absence of a pale, median line on the pronotal disk, and by the male genital structures. The genital tubercle is large and well removed from the base of the left clasper (fig. 18a). The sensory lobe of the left clasper is weakly produced and without distinct spines on inner surface (fig. 18b). The right clasper is long and narrow (fig. 18d) and the sclerotized process of the vesica is sickle-shaped (fig. 18e).

REMARKS. - The distribution of P. apache ranges across much of the Gila Mountains Forest Province of central Arizona and west central New Mexico. Specimens have been taken from Silver City, New Mexico, north and west to Williams, Arizona. The host plant of this species is not known. In addition to type material, I have examined eight specimens of P. apache with collection dates ranging from April 29 to June 21.

Rostratus Species - Group

DESCRIPTION. - Small to moderate-sized, 4.0-7.8 mm, brown or grayish species (exception: P. consors and P. geniculatus are pale green species with entirely pale vestiture. Except for the faint dusky flecks on the hemelytra, these species lack the distinctive dark markings that characterize other members of the rostratus group); vestiture of dorsum composed of simple, dark setae intermixed with sericeous, white setae and narrow, flattened, black setae. Head: antennae brown to dark brown, except reddish brown in P. nicholi; segment I with pale spots on dorsal aspect, ventral surface uniformly darkened; segment II usually with pale, median annulus, dark basal half of segment sometimes broken by 1-3 pale spots on dorsal aspect; frons prominent, strongly deflexed apically, meeting tylus along deep indentation; frons usually with 6-8 fuscous striae each side of middle; tylus strongly produced at base. Pronotum: basal submargin of pronotal disk with transverse, fuscous band or 4-6 weakly elevated, fuscous points; propleura pale to broadly fuscous basally, at least apical 1/3 pale; propleura sometimes divided by 1 or 2 dark lines. Hemelytra: grayish white or grayish yellow with brown to fuscous markings particularly along veins, costal margin, inner margin and outer apical angle of corium, and on cuneus; membrane moderately to densely conspurcate, spots often coalescing to form larger fuscous patches. Legs: femora white to pale yellow with reddish brown to fuscous markings, particularly on apical half of segment; dark markings on outer surface of front femora usually forming two parallel lines; hind femora often extensively darkened and marked with pale spots; tibiae pale with reddish brown to fuscous markings; front tibiae usually with four dark annuli including narrow band at base; middle and hind tibiae sometimes with dark annuli. Male genitalia: genital segment usually without distinct tubercles, but left margin of genital aperture often swollen and somewhat ridge-like above base of clasper; tubercles when present cylindrical and narrowly produced, rarely somewhat larger and more broad. Left clasper: sensory lobe

indistinct to prominent; shaft slightly to moderately expanded preapically; ventral region of shaft distinctly flattened laterally; apex rounded or truncated. Right clasper: elongate to broadly lanceolate; apex acute. Vesica: membranous portion of vesica greatly reduced; basal process weakly sclerotized, not extending beyond level of gonopore; basal lobes sometimes with spinulate or sclerotized region(s); vesica with two sclerotized processes; right process strongly curved, elongate to lanceolate, often with 2-4 ridges arising from central shaft; left process variable in shape, often a thin plate-like structure with poorly defined, reflexed margins and membranous apical region; left process sometimes more heavily sclerotized, with distinct margins and lacking membranous region at apex.

REMARKS. - Members of the *rostratus* group are widely distributed in western North America but predominate in the Intermountain Sagebrush and American Desert provinces of the southwestern United States. This group also is well represented in the chaparral zone of California, the Mexican Highland Province of southeastern Arizona and across the Colorado Plateau. Geographical and vegetational similarities between these regions and adjacent portions of Mexico suggest that certain species of the *rostratus* group also occur and may be widely distributed in northern Mexico; in particular those species occurring in the California Chaparral, American Desert, and Mexican Highland provinces.

Host plant records indicate that the majority of species in the *rostratus* group inhabit shrubby plants mostly in the families Compositae (e.g., *Artemisia*, *Chrysothamnus*), Chenopodiaceae (e.g., *Atriplex*, *Grayia*), and Leguminosae (e.g., *Acacia*, *Prosopis*). Species found on widely distributed plants such as *Artemisia* and *Atriplex* often occur throughout much of the distribution range of the respective host(s), but further collecting is needed to determine the host plant relationships, distribution, and seasonal occurrence of a number of species in this group.

Many rostratus species are attracted to light, suggesting that nocturnalism may be widespread in this group. I have taken several species in large numbers at night, often from the same plants that yielded few to no specimens during daylight hours. Although the diurnal habits of these species are not known, it is possible that they seek shelter during arid daylight hours, possibly near the base of the host plant or in nearby ground litter.

Members of the rostratus group are remarkably similar externally, and it is often necessary to examine male genital structures to obtain accurate species identifications. Characters that are particularly useful for separating species included the development of ridges or tubercles on the genital segment above the left clasper, the size and armature of the basal lobes of the vesica, and the shape of the sclerotized processes.

Key to the Species of the rostratus Group

The following key relies heavily on characteristics of male specimens and in many instances, it is not possible to identify females without associated males.

1 Hemelytra pale green with dusky flecks 2

\- Hemelytra not green 3

2(1) Cuneus and areole veins tinged or marked with red; left sclerotized process of vesica with small membranous region apically . . . . . geniculatus Van D., p. 104

\- Cuneus and areole veins without red markings; left sclerotized process without apical membranous region, apex of process strongly deflexed . . . . . consors Van D., p. 105

3(1) Femora red or extensively marked with red . . . . . nicholi Knight, p. 106

\- Femora not red or with only limited red markings 4

4(3) Ratio of eye length to width of vertex ranging from 0.90:1 to 1.10:1 in the male 5

- Ratio of eye length to width of vertex equal to or greater than 1.15:1 in the male 18

5(4) Left sclerotized process of vesica with apical membranous region or small membranous lobe arising near apex 6

- Left sclerotized process of vesica without apical membranous region or lobe, but sometimes weakly sclerotized near apex 14

6(5) Length of first antennal segment equal to or greater than posterior width of pronotum 7

- Length of first antennal segment less than posterior width of pronotum 10

7(6) Right sclerotized process narrow, expanding only slightly beyond basal angle (figs. 22e&23e) 8

- Right sclerotized process broad, distinctly expanded beyond basal angle (figs. 24e&25e) 9

8(7) Right clasper elongate over 4X as long as greatest width (fig. 22d); right sclerotized process at least twice as long as right clasper (fig. 22e) . . . . . *beameri* n. sp., p. 107

- Right clasper broad, length rarely exceeding the greatest width X 3 (fig. 23d); length of right sclerotized process approximately equal to length of right clasper (fig. 23e) . . . . . *maricopae* n. sp., p. 108

9(7) Dark basal region of antennal segment II broken by 2 or 3 pale spots on dorsal aspect; male genital segment with narrow, cylindrical tubercle above base of left clasper (fig. 24a) . . . . . *baboquivarii* n. sp., p. 110

- Dark basal region of antennal segment II without pale spots on dorsal aspect; male genital segment with broad, weakly produced, ridge-like tubercle

above base of left clasper (fig. 25a) . . . . . .
. . . . . purshiae n. sp., p. 112

10(6) Genital segment of male with well developed tubercle above base of left clasper (figs. 23a&26a) 11

\- Genital segment of male without tubercle above base of left clasper, but sometimes with small ridge-like protuberance (figs. 27a-29a) 12

11(10) Propleuron pale with two transverse, fuscous lines; genital tubercle of male narrowly produced, cylindrical (fig. 26a); length of right sclerotized process distinctly greater than length of right clasper (fig. 26e) . . . . . .
. . . . . minituberculatus Knight, p. 115

\- Basal two thirds of propleuron fuscous, sometimes broken by pale median line, apical 3rd of propleuron pale; genital tubercle of male broad and ridge-like (fig. 23a); length of right sclerotized process approximately equal to length of right clasper (fig. 23e) . . . maricopae n. sp., p. 108

12(10) Antennal segment II yellowish brown to brown, usually with poorly defined, pale band medially; membranous region at apex of left sclerotized process with small patch of spinulae . . . . . .
. . . . . sublineatus Knight, p. 116

\- Antennal segment II dark brown or black with distinct pale band medially, edges of band sharply defined; membranous region at apex of left sclerotized process without patch of spinulae . . 13

13(12) Dark basal region of antennal segment II broken by 1 or 2 pale spots on dorsal aspect; arm of right clasper with well developed protuberance on inner surface; length 4.0-5.5 mm . . . . . .
. . . . . rostratus Knight, p. 117

- Dark basal region of antennal segment II without pale spots on dorsal aspect; arm of right clasper without or with a poorly developed protuberance on inner surface; length 4.5-6.5 mm . . . . . *deserticola* Knight, p. 118

14(5) Right sclerotized process with 3 or 4 large teeth (fig. 30e); outer surface of left sclerotized process set with small spines (fig. 30e') . . . . . *arizonensis* n. sp., p. 120

- Right sclerotized process without teeth; outer surface of left sclerotized process without small spines 15

15(14) Left sclerotized process abruptly twisted before apex (figs. 32e'&33e'); right basal lobe of vesica with small patch of spinulae 16

- Left sclerotized process not strongly twisted preapically; right basal lobe of vesica without spinulae 17

16(15) Genital tubercle of male a small, knob-like protuberance (fig. 32a); basal lobes of vesica small, left basal lobe with small patch of spinulae; left sclerotized process as in figure 32e' . . . . . *coronadoi* n. sp., p. 124

- Genital tubercle of male broad and ridge-like (fig. 33a); basal lobes of vesica large, left basal lobe with large patch of stout spines; left sclerotized process as in figure 33e' . . . . . *yavipaii* n. sp., p. 126

17(15) Pronotal disk with pale, median line; genital segment of male without tubercle above base of left clasper (fig. 40a); right and left sclerotized processes as in figures 40e&e'; distributed in Arizona, Colorado and southern Utah . . . . . *lineatus* Reuter, p. 137

- Pronotal disk without pale, median line; genital segment of male with small left tubercle (fig. 31a); right and left sclerotized processes as in figures 31e&e'; distributed in southern California . . . . . *ejuncidus* n. sp., p. 122

18(4) Pronotal disk with pale median line, bordered each side by fuscous; genital tubercle above base of left clasper well developed (fig. 34a) . . . . . *strigosus* Knight, p. 128

- Pronotal disk without pale median line; genital tubercle above base of left clasper small or absent (figs. 35a-39a) 19

19(18) Antennal segment II with pale, median annulus 20

- Antennal segment II without pale, median annulus . . . . . *pintoi* n. sp., p. 129

20(19) Pale annuli of front tibiae distinctly broader than dark annuli; scutellum usually with pale median line . . . . . *yuma* Knight, p. 131

- Pale annuli of front tibiae equal to or less than width of dark annuli; scutellum without pale median line 21

21(20) Propleuron predominantly pale, basal margin and incomplete median line fuscous; scutellum strongly deflexed apically . . . . *difformis* Knight, p. 132

- Propleuron fuscous, apical 3rd pale, sometimes with poorly defined pale line across middle; scutellum evenly convex, not strongly deflexed apically 22

22(21) Genital segment of male with small knob-like protuberance above base of left clasper (fig. 38a); right basal lobe of vesica with small patch of spinulae; length 5.7-7.9 mm . . . . . .*borregoi* n. sp., p. 133

- Genital segment of male without tubercle above base of left clasper (fig. 39a); right basal lobe of vesica without spinulae; length 5.3-6.2 mm . . . . . *catalinae* n. sp., p. 135

Phytocoris geniculatus Van Duzee

Figure 19

Phytocoris geniculatus Van Duzee, 1918:286, 1923:149; Carvalho 1959:200; Knight 1968:216.

Phytocoris blackwelli Bliven, 1966:119-120, pl. X, figs. 16 & 17 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - This species was described from 32 specimens taken at Coachella and Palm Springs, Riverside Co., California, 14-19 May 1917, ex. Atriplex sp., E.P. Van Duzee. The holotype male (No. 402), allotype (No. 403), and 27 paratypes are retained in the Van Duzee Collection (CAS). The remaining three paratypes are deposited in the Knight Collection (USNM).

The junior synonym, P. blackwelli, was described from a holotype male and allotype female collected at Lost Hills, Kern Co., California, 7 May 1961, ex. Atriplex sp., B.P. Bliven. Both specimens are retained in the collection of the CAS (type number 13871).

DIAGNOSIS. - Length 4.3-7.3 mm. Phytocoris geniculatus is easily distinguished from other species of the rostratus group by the pale greenish general coloration and red markings on the cuneus and areole veins. The left sclerotized process of the vesica differs from that of P. consors by the presence of a small membranous region apically.

REMARKS. - This species has been collected in Arizona, California, Nevada, and southeastern Oregon. Specimens have been taken as far north as Harney Co., Oregon and Elko Co., Nevada; east to Graham Co., Arizona; and south to the US-Mexico border in Arizona and California. The western boundary of the distribution is formed by the Sierra Nevada and coast ranges of southern California. Phytocoris geniculatus is most frequently taken on Atriplex.

Specimens also have been reported from Franseria acathicarpa (Hook.) (Van Duzee, 1923) and Grayia spinosa (Hook.) (Knight, 1968). Males of this species are attracted to light. I have examined 135 specimens with collection dates ranging from December 17 to October 17.

Phytocoris consors Van Duzee

Figure 20

Phytocoris consors Van Duzee, 1918: 287; Carvalho 1959: 195; Knight 1968: 216.

TYPES AND TYPE LOCALITY. - Phytocoris consors was described from nine specimens collected at Coachella and Palm Springs, Riverside Co., California, 14-21 May 1917, ex. "whitish vegetation", E.P. Van Duzee. The holotype male (No. 404), allotype (No. 405), and five paratypes are retained in the Van Duzee Collection (CAS). Two paratypes are deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 4.8-6.8 mm. Phytocoris consors is very similar to P. geniculatus but differs by the absence of reddish markings on the cuneus and areole veins, and the left sclerotized process of the vesica lacks an apical membranous region.

REMARKS. - The distribution of P. consors is very similar to that of P. geniculatus. Specimens have been taken as far north as Harney Co., Oregon and Sevier Co., Utah; east to Dona Ana Co., New Mexico; and south to the US-Mexico border in Arizona and California. The Sierra Nevada and coast ranges of southern California form the western boundary of the distribution. The host plant of P. consors is Atriplex; adult specimens have been taken on A. canescens (Pursh), A. confertifolia (Torr. & Frem.), and A. lentiformis (Torr.). Although P. consors and P. geniculatus occur in the same or similar habitats, they are rarely collected together on the same plant. Males of P. consors are attracted to light, but both sexes are

nocturnal and can be collected in large numbers from Atriplex foliage after dark. I have examined 182 specimens with collection dates ranging from December 17 to October 17.

Phytocoris nicholi Knight

Figure 21

Phytocoris nicholi Knight, 1928:29-30; Carvalho 1959:207; Knight 1968:249.

TYPES AND TYPE LOCALITY. - This species was described from six specimens collected in southeastern Arizona. The holotype female, allotype, and three male paratypes were taken in the Santa Rita Mts., 1372 m, 9 September 1925, A.A. Nichol. All type material is retained in the Knight Collection (USNM) except one paratype deposited in the collection of the UAZ and one paratype that was not located.

DIAGNOSIS. - Length 4.5-5.3 mm. Phytocoris nicholi is easily distinguished from other species of the rostratus group by the reddish general coloration, particularly on the legs, venter, and first antennal segment.

REMARKS. - Phytocoris nicholi has been collected in the following counties in Arizona: Cochise, Pima, Santa Cruz. I have examined eight specimens with collection dates ranging from April 30 to September 9. One specimen was taken on Phacelia distans Benth. and another was swept from Calliandra sp. Several specimens also were collected at light.

Phytocoris beameri new species

Figure 22

TYPES AND TYPE LOCALITY. - Holotype male: Lockwood, Monterey Co., California, 24 July 1935, R.H. Beamer (KU). Paratypes: CALIFORNIA. 1 male, same data as holotype (KU). Los Angeles Co.: 2 males, Tanbark Flat, 23 July 1952, B. Tinglof (LACM). Santa Barbara Co.: 1 male, Quatay, 19 July 1941, R.H. Beamer (KU). Santa Clara Co.: 1 male, Los Gatos, 15 August 1933, J.A. Kusche (CAS).

DIAGNOSIS. - This species is easily recognized by the elongate right clasper (fig. 22d) and narrow right sclerotized process which is at least twice as long as the right clasper (fig. 22e). The left sclerotized process has a small membranous lobe arising from the posterior surface near apex. The ratio of eye length to width of vertex is less than or equal to 1.10:1 in the male, and the first antennal segment is longer than the posterior width of the pronotum.

DESCRIPTION. - Male. Length 6.21-6.64 mm, width 1.73-1.89; brownish general coloration. Head: width across eyes 0.90-0.94, vertex 0.45-0.48; whitish or pale yellow; jugum, lorum, and tylus marked with fuscous; frons with 6-8 fuscous striae. Rostrum: length 3.19-3.25. Antennae: brown to black; I, length 1.64-1.89, marked with pale spots on dorsal aspect; II, length 2.92-3.47, with pale annulus medially; III, length 2.21-2.63; IV, length 1.25-1.33. Pronotum: mesal length 0.81-0.88, posterior width 1.49-1.57; pronotal disk grayish yellow, basal submargin with wavy, fuscous line and 4-6 weakly elevated points; collar and calli marked with reddish brown to fuscous; propleura fuscous, apex and narrow median line pale. Scutellum: fuscous with pale spots, apex sometimes broadly pale. Hemelytra: pale gray; moderately tinged with brown; marked with fuscous along veins, costal margin, and inner margin of corium; posterolateral angle of corium and apex of cuneus broadly fuscous; membrane densely conspurcate, outer margin with two pale spots.

Legs: femora white or pale yellow, reticulated with dark brown; hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with simple, black setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 22.

Female. The female of this species is not known.

REMARKS. - *Phytocoris beameri* is known only from the type material collected in southwestern California. This species most closely resembles *P. purshiae* but is distinguished by the pale, median line on the propleuron and the narrow right sclerotized process (fig. 22e). *Phytocoris beameri* also resembles *P. maricopae* but differs by the characters given in couplet 8 of the *rostratus* group key. The host plant of *P. beameri* is not known.

Phytocoris maricopae new species

Figure 23

TYPES AND TYPE LOCALITY. - Holotype male: Salt R. Cyn., Apache Lk., Maricopa Co., Arizona, 28 April 1981, D.A. & J.T. Polhemus (JTP). Paratypes: ARIZONA. 3 males, same data as holotype (JTP); 4 males, Santa Rita Mts., 13 & 15 May 1937, W. Benedict (KU). IDAHO. Oneida Co.: 1 male, Holbrook, 11 August 1971, G.F. Knowlton (USU). UTAH. Cache Co.: 1 male, Blacksmith Fork Cyn., 10 September 1964, taken in malaise trap, W.J. Hanson (USU). Iron Co.: 2 males and 1 female, Cedar City, 13 August 1929, R.H. Beamer (KU). Tooele Co.: 1 male, Dugway Proving Grounds, SE end Cedar Mts., 7 July 1953, taken at light, H.E. Cott (BYU). Washington Co.: 3 males, Leeds Cyn., 28 July 1965, W.J. Hanson & D.W. Davis (USU).

DIAGNOSIS. - *Phytocoris maricopae* is distinguished from other brownish species of the *rostratus* group by the short, narrow right sclerotized process; length of process about equal to length of right

clasper (fig. 23e). The left sclerotized process has a large membranous lobe arising from right margin near apex. The ratio of eye length to width of vertex is less than or equal to 1.10:1 in the male. The ratio of length of first antennal segment to posterior width of pronotum ranges from 0.90:1 to 1.08:1 for males.

DESCRIPTION. - Male. Length 5.02-5.94 mm, width 1.58-1.87; brownish general coloration. Head: width across eyes 0.85-0.91, vertex 0.42-0.48; white or pale yellow; jugum, lorum, and tylus marked with reddish brown to fuscous; frons with 6-8, poorly developed, dark striae; vertex infuscated except for pale, median stripe. Rostrum: length 2.59-3.08, extending to 5th or 6th abdominal segment. Antennae: dark brown or black; I, length 1.19-1.57, with white spots and patches on dorsal aspect; II, length 2.38-3.13, with pale annulus medially; III, length 1.73-2.32; IV, length 1.19-1.26. Pronotum: mesal length 0.72-0.85, posterior width 1.24-1.46; pronotal disk grayish yellow, often tinged with brown, lightly to extensively marked with fuscous particularly behind calli and along lateral margins; basal submargin of disk with wavy, fuscous line and 4-6 slightly elevated points; propleura fuscous, apical 3rd pale, sometimes with incomplete pale stripe medially; collar brown to fuscous with pale, median spot; calli with brownish to fuscous markings. Scutellum: pale gray, moderately to extensively mottled with fuscous. Hemelytra: grayish white or grayish yellow with brown to fuscous markings particularly along veins, costal margin, inner margin of corium, and on cuneus; membrane moderately to densely mottled with fuscous, outer margin with two pale spots. Legs: femora white, reticulated with fuscous particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and with numerous pale spots; tibiae pale with fuscous markings; front tibiae with four fuscous annuli including narrow band at base. Vestiture: dorsum with simple, black setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 23. Genital tubercle broad and ridge-like (fig. 23a).

Female. Similar to male in color and vestiture. Length 5.45 mm, width 1.85. Head: width across eyes 0.93, vertex 0.50. Rostrum: length 3.06, extending to 7th abdominal segment. Antennae: I, 1.62; II, 3.17; III, 2.16; IV, missing. Pronotum: mesal length 0.76, posterior width 1.39. Hemelytra: wing membrane slightly abbreviated. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris maricopae* is known only from the type material collected in Arizona, Utah, and southern Idaho. This species is very similar to other members of the *rostratus* group, and is positively identified only by examining male genital structures. The short, narrow right sclerotized process will readily identify *P. maricopae*. The host plant of this species is not known; males have been taken at light.

Phytocoris baboquivarii new species

Figure 24

TYPES AND TYPE LOCALITY. - Holotype male: Baboquivari Mts., Pima Co., Arizona, 19 July 1932, R.H. Beamer (KU). Paratypes: ARIZONA. Pima Co.: 1 male and 1 female, same data as holotype (KU); 1 male, Baboquivari Mts., F.H. Snow (KU); 1 male, Baboquivari Cyn., W side Baboquivari Mts., 25-27 July 1952, H.B. Leech and J.W. Green (CAS); 1 male, Tucson, 11 August 1924, E.P. Van Duzee (CAS); 1 male, 3.7 mi. NW Arivaca, 29 August 1954, taken at light, Timberlake (UCR). Santa Cruz Co.: 1 male, Madera Cyn., Santa Rita Mts., 28 August 1966, taken at light, R.S. Beal (NAU). NEW MEXICO: 1 male, Huachuca Mts., 30 July 1941, R.H. Beamer (KU). MEXICO. Chihuahua: 2 males, 35 mi. W Moctezuma, 27 April 1981, taken at light, D.A. & J.T. Polhemus (JTP).

DIAGNOSIS. - *Phytocoris baboquivarii* is distinguished from other brownish species of the *rostratus* group by the following combination

of characters. The ratio of eye length to width of vertex in the male is between 0.90:1 and 1.10:1. The length of the first antennal segment is equal to or greater than the posterior width of the pronotum. The dark basal region of antennal segment II is broken by 2 or 3 pale spots not including pale annulus at base. The genital tubercle above base of left clasper is narrow and cylindrical (fig. 24a). The right sclerotized process is distinctly expanded beyond basal angle (fig. 24e), and the left sclerotized process has a membranous lobe arising from each lateral margin.

DESCRIPTION. - Male. Length 5.13-5.67 mm, width 1.58-1.80; brownish general coloration. Head: width across eyes 0.85-0.90, vertex 0.41-0.44; white or pale yellow; jugum, lorum, and tylus with reddish brown to fuscous markings; frons and vertex moderately to extensively marked or tinged with brown or fuscous; frons with pale median markings bordered by 6-8, sometimes obscured, dark striae. Rostrum: length 2.43-2.75, extending to between 5th and 7th abdominal segments. Antennae: brown to black; I, length 1.40-1.55, dorsal aspect with pale markings; II, length 2.47-2.79, with pale annulus medially, dark basal region broken by 2 or 3 white spots not including pale annulus at base; III, length 1.75-1.98; IV, length 0.99-1.22. Pronotum: mesal length 0.77-0.81, posterior width 1.35-1.48; pronotal disk grayish white or grayish yellow, moderately to extensively tinged with brown; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points, collar and calli with reddish brown to fuscous markings; propleura fuscous, apical 3rd pale. Scutellum: dark brown with pale markings, apex and anterolateral angles always pale. Hemelytra: grayish white or grayish yellow, moderately to extensively tinged with brown; veins, costal margin, inner margin of corium, and cuneus usually with darker fuscous markings; membrane densely mottled with fuscous, outer margin with two distinct pale spots. Legs: femora white or pale yellow with reddish brown to fuscous markings particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and marked with pale

spots; pale spots on dorsal surface of hind femora mostly restricted to posterior margin of segment; tibiae pale with reddish brown to fuscous markings; front tibiae with four, somewhat obscured, dark annuli including narrow band at base. Vestiture: dorsum with dark, simple setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 24. Genital tubercle above base of left clasper narrow and cylindrical (fig. 24a).

Female. Similar to male in color and vestiture. Length 5.72 mm, width 1.80. Head: width across eyes 0.86, vertex 0.41. Rostrum: length 2.61, extending to 6th abdominal segment. Antennae: I, 1.58; II, 2.75; III, 2.14; IV, 1.30. Pronotum: mesal length 0.72, posterior width 1.30. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris baboquivarii* is known only from the type material collected in southeastern Arizona; the Huachuca Mts., New Mexico; and northern Chihuahua Province, Mexico. Several males of this species have been taken at light, but the host plant association is not known.

Phytocoris purshiae new species

Figure 25

TYPES AND TYPE LOCALITY. - Holotype male: 16 mi. NW Cambridge on St. Hwy. 71, Washington Co., Idaho, 27 July 1981, ex. *Purshia tridentata* (Pursh), G.M. Stonedahl (USNM). Paratypes: 1 male and 26 females, same data as holotype (OSU, USNM). Three males and 11 females, Oregon, Baker Co., Wallowa-Whitman Nat. For., T8S-R45E-Sec. 14, 26 July 1981, ex. *Purshia tridentata*, G.M. Stonedahl (AMNH, CAS, OSU).

DIAGNOSIS. - *Phytocoris purshiae* is distinguished from other species of the *rostratus* group by the following combination of characters. The general coloration is grayish with fuscous

markings. The ratio of eye length to width of vertex in the male is less than or equal to 1.10:1. The first antennal segment is longer than the posterior width of the pronotum, and the dark basal region of antennal segment II is without pale spots on the dorsal aspect. The genital tubercle of the male is broad, weakly produced, and ridge-like (fig. 25a). The right sclerotized process is broad and distinctly expanded beyond basal angle (fig. 25e), and the left sclerotized process has an apical membranous region.

DESCRIPTION. - Male. Length 5.62-6.48 mm, width 1.69-1.98; grayish ground color with fuscous markings. Head: width across eyes 0.92-0.95, vertex 0.45-0.47; white or pale yellow; jugum, lorum, and tylus with reddish brown to fuscous markings; frons and vertex extensively infuscated, frons with 6-8 dark striae either side of pale, median stripe. Rostrum: length 2.74-3.11, extending to 7th or 8th abdominal segment. Antennae: dark brown or black; I, length 1.48-1.80, marked with pale spots and patches on dorsal aspect; II, length 2.72-3.31, with pale annulus medially; III, length 1.98-2.43; IV, length 1.13-1.30. Pronotum: mesal length 0.79-0.90, posterior width 1.39-1.60; pronotal disk grayish white or grayish yellow, moderately to extensively infuscated, sometimes entirely darkened; basal submargin of disk with 4-6 weakly elevated points; collar brownish with pale median spot; calli with reddish brown to fuscous markings; propleura fuscous, apical 3rd pale. Scutellum: weakly convex; extensively infuscated but usually with pale markings at apex and basal angles. Hemelytra: pale gray, densely marked and tinged with brown to fuscous; clavus mostly pale between commissure and darkened claval vein; corium often with distinct pale region medially and at apex; membrane densely conspurcate, outer margin with two pale spots. Legs: femora white with reddish brown to fuscous markings particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with black, simple setae intermixed

with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 25.

Female. Similar to male in color and vestiture; wing membrane slightly reduced. Length 5.29-5.83 mm, width 1.71-1.84. Head: width across eyes 0.88-0.95, vertex 0.47-0.51. Rostrum: length 2.84-3.08, extending to 6th or 7th abdominal segment. Antennae: I, 1.58-1.87; II, 3.01-3.33; III, 2.34-2.43; IV, 1.33-1.48. Pronotum: mesal length 0.72-0.79, posterior width 1.35-1.49.

REMARKS. - *Phytocoris purshiae* has been collected in California, Idaho, and Oregon. Two specimens also were taken in Washoe Co., Nevada. The northernmost records come from the type specimens collected in Baker Co., Oregon and Washington Co., Idaho. Specimens have been taken as far south as Lake Arrowhead, San Bernardino Co., California. The host plant of this species is *Purshia tridentata*.

SPECIMENS EXAMINED. - Besides type material, 25 specimens were examined from the following localities: CALIFORNIA. San Bernardino Co.: Lk. Arrowhead (CAS). Santa Barbara Co.: 6 mi. SW New Cuyama (UCB). Shasta Co.: 1 mi. W Fall R. Mills, 1030 m (AMNH). Siskiyou Co.: Yreka (CAF&A). Tehema Co.: Dales (KU); 10 mi. W. Mineral (UCB). Tulare Co.: Giant Forest (KU). NEVADA. Washoe Co.: 4 mi. SE Jct. US Hwy. 395 on St. Hwy. 341 (OSU). OREGON. Harney Co.: 18 mi. N. Burns (OSU). Jackson Co.: Colestin (CAS). Josephine Co.: T41S-R7W-Sec.30 (OSU); 13.5 mi. SW Grants Pass on US Hwy. 199 (OSU). Klamath Co.: Bly Mt. (AMNH, OSU). Collection dates for this material range from June 27 to September 20.

Phytocoris minituberculatus Knight

Figure 26

Phytocoris minituberculatus Knight, 1968:252-253, fig. 307.

TYPES AND TYPE LOCALITY. - Phytocoris minituberculatus was described from a single male collected in Area 5M, Nevada Test Site, Nye Co., Nevada, 14 June 1961. This specimen is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.1-6.5 mm. This species is very similar to P. deserticola, but males are easily distinguished by the narrow genital tubercle above base of left clasper (fig. 26a) and the narrower shaft of the right clasper (fig. 26d). I have been unable to separate females of P. minituberculatus and P. deserticola except by association with males. Phytocoris minituberculatus runs to couplet 11 in the rostratus group key where it is separated from P. maricopae by the predominantly pale propleura, narrowly produced genital tubercle, and long right sclerotized process (fig. 26e).

REMARKS. - In addition to the holotype, I have examined 21 specimens of P. minituberculatus from the following counties in California: Kern, Riverside, San Bernardino. Most of these were males taken at light, but one female from Lucerne Valley, San Bernardino Co. was collected on Franseria dumosa Gray. The range of occurrence is from March 16 to May 13. Females of this species have the wing membrane abbreviated; just covering apex of abdomen.

Phytocoris sublineatus Knight

Figure 27

Phytocoris sublineatus Knight, 1968:254-255, fig. 312.
Phytocoris subcinctus Knight, 1968:254, fig. 311 (NEW SYNONYMY).
Phytocoris tanneri Knight, 1968:257-258, fig. 317 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris sublineatus was described from two male specimens collected in Utah. The holotype was taken at Richfield, Sevier Co., 8 July 1930, light trap and the paratype was collected at Soldier Summit, Wasatch Co., 13 August 1906. The holotype is retained in the Knight Collection (USNM); the paratype was not located.

The junior synonym, P. subcinctus, was described from six specimens taken in a light trap at Richfield, Sevier Co., Utah, 15 August 1929, E.W. Davis. The holotype and three paratypes are retained in the Knight Collection (USNM) and one paratype is deposited in the collection of BYU. One specimen from the paratype series was not located.

The junior synonym, P. tanneri, was described from nine male specimens collected in Utah and New Mexico. The holotype and six paratypes were taken in a light trap at Richfield, Sevier Co., Utah, 15 July 1929, E.W. Davis. All type material is retained in the Knight Collection (USNM) except one paratype deposited in the collection of BYU and one paratype that was not located.

DIAGNOSIS. - Length 4.3-6.8 mm. Phytocoris sublineatus is very similar to P. deserticola and P. rostratus but differs by the lighter, yellowish brown to brown second antennal segment with poorly defined, median annulus and the small patch of spinulae on the apical, membranous region of the left sclerotized process. The propleuron of P. sublineatus is transversed by a single fuscous line, while in P. deserticola and P. rostratus, there are usually a pair of fuscous lines crossing the propleuron (lower line often incomplete).

REMARKS. - Phytocoris sublineatus is widely distributed in Arizona, Colorado, New Mexico, and Utah. Specimens also have been collected in White Pine Co., Nevada and Seward Co., Kansas. Adult specimens have been taken on Artemisia, Atriplex, and Chrysothamnus. Fifty-eight specimens were examined with collection dates ranging from June 6 to September 7.

I have examined the holotypes and available paratypes for both P. subcinctus and P. tanneri and found these specimens to be conspecific with P. sublineatus. The types of P. subcinctus and P. tanneri are larger than the average-sized specimen of P. sublineatus, but the genital structures of these three taxa are identical. The antennal features used by Knight (1968) to separate P. subcinctus, P. sublineatus, and P. tanneri are highly variable and do not represent species specific characters. Phytocoris sublineatus was selected as the senior synonym of this complex because the type is most representative of the material examined.

Phytocoris rostratus Knight

Figure 28

Phytocoris rostratus Knight, 1968:253-254, fig. 310.

TYPES AND TYPE LOCALITY. - Phytocoris rostratus was described from 68 specimens collected in Nye Co. and Washoe Co., Nevada. The holotype male was collected in Area 18M(TB), Nevada Test Site, Nye Co., 22 July 1965, taken at black light, E. Beck and J. Merino. The holotype, allotype, and six paratypes are retained in the Knight Collection (USNM). Nine paratypes are deposited in the collection of the UCB and one paratype is in the collection of BYU. The remaining 50 paratypes were not located.

DIAGNOSIS. - Length 4.0-5.5 mm. This species is distinguished from other members of the rostratus group by the following combination of characters. The general coloration is grayish with

fuscous markings. The ratio of eye length to width of vertex is less than or equal to 1.10:1 in the male. The length of antennal segment I is less than the posterior width of the pronotum. The second antennal segment is dark brown or black with a sharply defined, white annulus medially; dark basal region of second antennal segment with one or two pale spots on dorsal aspect. The male genital segment lacks a distinct tubercle above base of left clasper (fig. 28a) and the right clasper has a well developed protuberance on the inner surface of the arm. Finally, the left sclerotized process is membranous apically but lacks the small patch of spinulae seen in *P. sublineatus*.

REMARKS. - I have examined 83 specimens of *P. rostratus* from the following states: California, Colorado, Idaho, Nevada, Oregon, and Utah. Specimens have been collected as far north as Baker Co., Oregon and Lemhi Co., Idaho and east to Saguache Co., Colorado. The southernmost records are from San Juan Co., Utah; Nye Co., Nevada; and Inyo Co., California. The Cascade Range and Sierra Nevada Mountains form the western boundary of the distribution in California and Oregon. Adult specimens have been collected from *Artemisia tridentata* Nutt., *Chrysothamnus nauseosus* (Pall.), and *C. viscidiflorus* (Hook.). The range of occurrence is from June 8 to October 20. Females of *P. rostratus* have the wing membrane much reduced; extending only slightly beyond apex of cuneus.

Phytocoris deserticola Knight

Figure 29

Phytocoris deserticola Knight, 1968: 251-252, fig. 313.
Phytocoris lineatellus Knight, 1968: 250-251, fig. 309 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris deserticola* was described from 10 specimens collected near Mercury, Nye Co., Nevada (Nevada

Test Site). The holotype male and two male paratypes were taken in Area CT, Nevada Test Site, 20 June 1965, H. Knight and J. Merino. Four specimens from the paratype series were omitted from the original description; label data for these specimens are Mercury, Nevada, N.T.S.: 1 female, Area 6M, 17 June 1965, H. Knight and J. Merino; 1 female and 1 nymph, Area 17M, 12 June 1965, H. Knight and J. Merino; 1 female, Area 4DB(B), 5 June 1961. All type material is retained in the Knight Collection (USNM) except one female paratype deposited in the collection of BYU.

The junior synonym, P. lineatellus, was described from three specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male was taken in Area JAA9, Nevada Test Site, 6 June 1961, "taken in a can pit-trap". The holotype and allotype are retained in the Knight Collection (USNM); the single female paratype was not located.

DIAGNOSIS. - Length 4.5-6.5 mm. Phytocoris deserticola most closely resembles P. rostratus but differs by the larger size, absence of pale spots on the dark basal region of antennal segment II, and the poorly defined protuberance on the inner surface of the arm of the right clasper. Phytocoris deserticola also resembles P. sublineatus but is distinguished by the darker second antennal segment with sharply defined, white annulus medially and the absence of spinulae on the apical membranous region of the left sclerotized process.

REMARKS. - This species is widely distributed in the Mojave and Sonoran desert regions of southern California from the US-Mexico border to Panamint Springs in Inyo County. Specimens also have been taken in Nye Co., Nevada; San Juan Co., Utah; and Washington Co., Utah. Adult specimens have been collected from Artemisia tridentata Nutt., Franseria dumosa Gray., Lycium sp., and Salazaria mexicana Torr. Males are attracted to light and the females have the wing membrane somewhat reduced; just covering apex of abdomen. I have examined 67 specimens with collection dates ranging from March 17 to June 22.

The external characteristics of the type and allotype of P. lineatellus are well within the range of variation displayed by P. deserticola. Furthermore, the genital structures of these two species are essentially identical. On the basis of this information, I have placed P. lineatellus in synonymy with P. deserticola. The latter was chosen as the senior synonym because it best represents the material examined. Also, the holotype of P. lineatellus is teneral and badly distorted.

Phytocoris arizonensis new species

Figure 30

TYPES AND TYPE LOCALITY. - Holotype male: McCleary Cyn. (Sec. 30), N. end Rosemont Area, Santa Rita Mts., Pima Co., Arizona, 1585 m, 15 July 1975, taken at light, J. Busacca and C. Olson (UAZ). Paratypes: ARIZONA. Cochise Co.: 1 male, 5 mi. W Portal, 1646 m, 12 July 1957, M. Statham (AMNH); 2 males, Stewart Cmp., nr. Portal, 18-25 July 1971, taken at light, J.T. Doyen (UCB); Huachuca Mts.: 1 male, Carr Cyn., 24 June 1932, E.G. Linsley (UCB); 1 male, Carr Cyn., 9 August 1940, taken at light, Timberlake (UCR); 1 male, Sunnyside, 22 August 1975 (UAZ). Gila Co.: 3 males and 2 females, Miami, 22 July 1932, R.H. Beamer (KU). Pima Co.: 1 male, same data as holotype (UAZ); 1 male, same data as holotype except Ridge Area (Sec. 24), 1646 m, 11 July 1975, "general collecting" (UAZ); 1 male, Mud Spgs., Santa Catalina Mts., 1981 m, 17-20 July 1916 (AMNH); 1 male, Santa Catalina Mts., 15 July 1950, R.H. Beamer (KU). Santa Cruz Co.: 1 male, Madera Cyn., 1487 m, 14 July 1963, Y.L. Vesterby (CSU); 2 males, Mt. Washington, Nogales, 1829 m, 10&11 July 1919, E.C. Van Dyke (CAS). Yavapai Co.: 1 male, Yarnell, 4 July 1967, ex. Ceanothus, W.F. Barr (UID).

DIAGNOSIS. - Phytocoris arizonensis is easily distinguished from other species of the rostratus group by the large genital tubercle above base of left clasper (fig. 30a), coarse teeth on the right

sclerotized process (fig. 30e), and small spines on the outer surface of the left sclerotized process (fig. 30e'). The ratio of eye length to width of vertex in the male is less than or equal to 1.10:1. The left sclerotized process is totally sclerotized; without membranous apical region.

DESCRIPTION. - Male. Length 4.70-6.16 mm, width 1.49-1.93; grayish or brownish general coloration. Head: width across eyes 0.82-0.95, vertex 0.39-0.47; white or pale yellow; jugum, lorum, and tylus with reddish brown to fuscous markings; vertex and frons lightly to moderately tinged with brown; frons with 6-8 dark striae, sometimes with 1 or 2 pale spots medially. Rostrum: length 2.07-2.77, extending to between 4th and 6th abdominal segments. Antennae: yellowish brown to dark brown; I, length 1.08-1.64, dorsal surface with large white patches and smaller pale spots; II, length 1.94-2.92, with pale annulus medially; III, length 1.49-1.98; IV, length 0.72-1.19. Pronotum: mesal length 0.72-0.90, posterior width 1.30-1.55; pronotal disk grayish white or pale brownish yellow; basal submargin of disk with wavy, fuscous line and 4-6 weakly elevated points, collar and calli lightly marked with red or reddish brown; propleura fuscous, apical 3rd pale. Scutellum: grayish white or grayish yellow with brown to fuscous markings, sometimes extensively darkened but anterolateral angles and apex always pale. Hemelytra: grayish white, often lightly tinged with brown; veins, costal margin, inner margin of corium, and cuneus with fuscous markings; membrane densely mottled with fuscous, outer margin with two pale spots. Legs: femora white with reddish brown to fuscous markings particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and marked with pale spots; tibiae pale with reddish brown to fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with simple, dark setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 30. Genital tubercle above base of left clasper large and cylindrical (fig. 30a).

Female. Similar to male in color and vestiture. Length 5.02-5.13 mm, width 1.46-1.57. Head: width across eyes 0.86, vertex 0.41. Rostrum: length 2.18-2.29, extending to 4th or 5th abdominal segment. Antennae: I, 1.21-1.39; II, 2.20-2.47; III, 1.53-1.71; IV, 0.99-1.08. Pronotum: mesal length 0.70-0.76, posterior width 1.35-1.37.

REMARKS. - *Phytocoris arizonensis* has been collected in the following counties in Arizona: Cochise, Gila, Pima, Santa Cruz, Yavapai. The only host plant record comes from a single male specimen taken at Yarnell, Yavapai Co. on *Ceanothus* sp. The males of *P. arizonensis* are readily identified by the large teeth on the right sclerotized process (fig. 30e) and the spinulate outer surface of the left sclerotized process (fig. 30e'). The shape of the right sclerotized process and number of teeth (3 or 4) varies somewhat over the distribution range of this species.

Phytocoris ejuncidus new species

Figure 31

TYPES AND TYPE LOCALITY. - Holotype male: Lone Pine, Inyo Co., California, 27 July 1947, R.H. Beamer (KU). Paratypes: CALIFORNIA. Inyo Co.: 1 male, Westgard Pass, 13 mi. E Big Pine, 3 August 1962, taken at light, D.R. Smith (OSU). Los Angeles Co.: 1 male, Bouquet, 21 June 1937, N. Westerlund (LACM). Mono Co.: 3 males, 1 mi. SW Tom's Place, 13 August 1963 & 1 September 1965, C.A. Toschi and M.J. Tauber (UCB). Riverside Co.: 1 male, Desert Spgs., 7 June 1959, taken at light, Timberlake (UCR); 1 male and 1 female San Jacinto R. Cyn., San Jacinto Mts., 30 May 1940, ex. *Adenostoma*, H.T. Reynolds (UCB).

DIAGNOSIS. - *Phytocoris ejuncidus* is distinguished from other grayish or brownish species of the *rostratus* group by the following combination of characters. The ratio of eye length to width of

vertex is less than or equal to 1.10:1 in the male. The pronotal disk is without a pale, median line. Genital segment of male with a small tubercle above base of left clasper (fig. 31a). The right sclerotized process lacks teeth (fig. 31e). The left sclerotized process is without an apical membranous region (fig. 31e') and lacks the small spines seen in P. arizonensis; process not twisted preapically as is P. coronadoi and P. yavipaii. Finally, the right basal lobe of the vesica is without a small patch of spinulae.

DESCRIPTION. - Male. Length 6.16-6.59 mm, width 1.66-1.75; grayish white ground color with brown to fuscous markings. Head: width across eyes 0.87-0.90, vertex 0.44-0.48; white or pale yellow with reddish brown to fuscous markings; frons with 6-8 dark striae; vertex infuscated, median stripe pale. Rostrum: length 2.92-3.01, extending to 5th or 6th abdominal segment. Antennae: brown to fuscous; I, length 1.60-1.69, marked with pale spots on dorsal aspect; II, length 2.95-3.37, with pale annulus medially; III, length 1.94-2.23; IV, 1.08-1.21. Pronotum: mesal length 0.83-0.85, posterior width 1.42-1.48; pronotal disk grayish white or grayish yellow, lateral margins and basal submargin infuscated, sometimes broadly so; basal submargin of disk with 4-6 weakly elevated points; calli and collar with reddish brown or brown markings, median spot on collar pale; propleura fuscous, apex narrowly pale. Scutellum: extensively infuscated, anterolateral angles and apex pale; weakly convex. Hemelytra: grayish white with brown to fuscous markings particularly along veins, costal margin, inner margin of corium, and on cuneus; posterolateral angle of corium with large, fuscous patch; membrane moderately to densely conspurcate, outer margin with two pale spots. Legs: femora white or pale yellow with reddish brown to fuscous markings particularly on apical half of segment; hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with simple, dark setae intermixed with narrow, flattened, black setae and sericeous, white setae.

Genitalia: Figure 31. Genital segment with weakly developed, ridge-like tubercle above base of left clasper (fig. 31a).

Female. Brachypterous, wing membrane greatly reduced. Similar to male in color and vestiture. Length 5.24 mm, width 1.69. Head: width across eyes 0.93, vertex 0.48. Rostrum: length 3.10, extending to 7th abdominal segment. Antennae: I, 1.93; II, 3.37: III, missing; IV, missing. Pronotum: mesal length 0.74, posterior width 1.22. The female of this species is presently known from a single specimen.

REMARKS. - *Phytocoris ejuncidus* is known only from the type material collected in southern California. It closely resembles several other species of the *rostratus* group (e.g., *P. beameri*, *P. purshiae*) and is difficult to identify without examining genital structures of the male. The only host record for this species comes from two specimens collected in the San Jacinto Mts., Riverside Co. on *Adenostoma* sp.

Phytocoris coronadoi new species

Figure 32

TYPES AND TYPE LOCALITY. - Holotype male: Portal, Cochise Co., Arizona, 1500 m, 15 June 1980, taken at light, R.T. Schuh, K&R Schmidt (AMNH). Paratypes: ARIZONA. Cochise Co.: 1 male and 1 female, same data as holotype (AMNH); 2 males and 2 females, Portal 1432 m, 1-28 June 1964, taken at light (OSU, UID); 1 male, Portal, 6 August 1972, S.I.&S.L. Frommer (UCR); 1 male, Portal, 29 August 1974, M.&T.M. Favreau (AMNH); 1 male, 0.5 mi. E Portal, 1450 m, 12 June 1980, R.T. Schuh, K&R Schmidt (AMNH). Santa Cruz Co.: 1 male, Santa Rita Mts., 17 July 1932, R.H. Beamer (KU); 1 male, Sycamore Cyn., 15 August 1966, H.K. Court (CSU).

DIAGNOSIS. - This species is very similar to *P. yavapaii* but differs by the small, knob-like genital tubercle (fig. 32a); smaller

basal lobes of vesica, left lobe with minute spines; and left sclerotized process which is abruptly twisted just beyond middle (fig. 32e').

DESCRIPTION. - Male. Length 5.29-5.78 mm, width 1.62-1.85; dark brown general coloration. Head: width across eyes 0.86-0.90, vertex 0.43-0.45; white; jugum, lorum, and tylus marked with fuscous; frons and vertex extensively marked or tinged with brown to fuscous and with pale, median markings; frons with 6-8, often obscured, striae. Rostrum: length 2.59-2.83, extending to 7th or 8th abdominal segment. Antennae: dark brown or black; I, length 1.26-1.49, with pale spots on dorsal aspect; II, length 2.39-2.72, with pale annulus medially; III, length 1.73-2.11; IV, length 1.10-1.24. Pronotum: mesal length 0.79-0.86, posterior width 1.40-1.51; pronotal disk grayish or brownish, usually with darker fuscous markings behind calli; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points; collar and calli moderately to extensively tinged or marked with brown to fuscous; propleura fuscous, basal 3rd pale. Scutellum: fuscous with limited pale markings; weakly convex. Hemelytra: grayish white, moderately to extensively tinged with brown, sometimes almost entirely darkened; veins, costal margin, inner margin of corium, and cuneus with fuscous markings; membrane mottled with fuscous, outer margin with two pale spots. Legs: femora white with reddish brown to fuscous markings particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; apical two thirds of hind femora fuscous with scattered pale spots; tibiae pale with fuscous markings; front tibiae with four pale annuli including narrow band at base. Vestiture: dorsum with black, simple setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 32. Genital tubercle above base of left clasper small, narrowly produced, and knob-like (fig. 32a).

Female. Similar to male in color and vestiture. Length 5.40-5.72 mm, width 1.78-1.91. Head: width across eyes 0.87-0.92, vertex 0.46-0.48. Rostrum: length 2.56-2.79, extending to 5th or

6th abdominal segment. Antennae: I, 1.44-1.51; II, 2.68-2.84; III, 1.73-2.02; IV, 1.04-1.08. Pronotum: mesal length 0.72-0.79, posterior width 1.33-1.46.

REMARKS. - *Phytocoris coronadoi* presently is known only from Cochise Co. and Santa Cruz Co., Arizona. The host plant of this species is not known, but both males and females have been taken at light. The genital structures of the male will readily separate *P. coronadoi* from other species of the *rostratus* group.

Phytocoris yavapaii new species

Figure 33

TYPES AND TYPE LOCALITY. - Holotype male: Prescott, Yavapai Co., Arizona, 8 July 1917, C.A. Hill (CAS). Paratypes: ARIZONA. Yavapai Co.: 1 male, Prescott Nat. For., Indian Crk. Cmp., 27 June 1957, G.H. Nelson (UCD); 2 males, Yarnell, 29 July 1933, R.H. Beamer (KU); 1 male, Yarnell, 4 July 1967, ex. *Ceanothus*, W.F. Barr (UID).

DIAGNOSIS. - *Phytocoris yavapaii* is distinguished from other brownish species of the *rostratus* group by the following combination of characters. The ratio of eye length to width of vertex is less than or equal to 1.10:1 in the male. The genital tubercle above base of left clasper is broad and ridge-like (fig. 33a). The right sclerotized process is simple (fig. 33e), without large teeth as in *P. arizonensis*. The left sclerotized process is totally sclerotized and abruptly twisted just before apex (fig. 33e'); outer surface of process without small spines as in *P. arizonensis*. The right and left basal lobes of the vesica are extremely large and each lobe is set with a patch of spines; spines on left lobe very stout.

DESCRIPTION. - Male. Length 5.62-5.72 mm, width 1.67-1.85; brownish general coloration. Head: width across eyes 0.85-0.93, vertex 0.43-0.46; white or pale yellow; jugum, lorum, and tylus

marked with reddish brown to dark brown; frons with 6-8 fuscous striae; vertex moderately infuscated except for pale, median stripe. Rostrum: length 2.79-2.86, extending well beyond apices of hind coxae. Antennae: brown to black; I, length 1.44-1.51, with pale markings on dorsal aspect; II, length 2.75-2.95, with pale annulus medially; III, length 1.87-2.07; IV, length 1.21. Pronotum: mesal length 0.74-0.81, posterior width 1.33-1.53; pronotal disk brownish yellow or grayish yellow, sometimes with limited fuscous markings behind calli and along lateral margins; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points; propleura fuscous, apical 3rd pale, sometimes with incomplete pale stripe medially. Scutellum: dark brown with scattered pale spots; weakly convex. Hemelytra: grayish white; moderately tinged with brown; marked with fuscous particularly along veins, costal margin, inner margin of corium, and on cuneus; posterolateral angle of corium broadly infuscated; membrane densely conspurcate, outer margin with two pale spots. Legs: femora white or pale yellow, reticulated with reddish brown to dark brown; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and marked with pale spots; tibiae pale with reddish brown to fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with simple, black setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 33. Genital tubercle above base of left clasper broad and somewhat ridge-like (fig. 33a).

Female. The female of this species is not known.

REMARKS. - *Phytocoris yavapaii* is known only from the type material collected in Yavapai Co., Arizona. This species most closely resembles *P. coronadoi* but differs by the broad genital tubercle (fig. 33a), shape of left sclerotized process (fig. 33e'), and extremely large basal lobes of the vesica. The only host plant record for *P. yavapaii* comes from a single specimen collected at Yarnell on *Ceanothus* sp.

Phytocoris strigosus Knight

Figure 34

Phytocoris strigosus Knight, 1925a:51-52; Carvalho 1959: 217; Knight 1968:250.

Phytocoris flavellus Knight, 1968:234, fig. 279 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris strigosus was described from 14 specimens collected in Cochise Co., Arizona; Pima Co., Arizona; and Luna Co., New Mexico. The holotype male, allotype, and four male paratypes were taken at Tucson, Pima Co., Arizona, 19 April 1924, A.A. Nichol. The holotype, allotype, and five paratypes are retained in the Knight Collection (USNM); two paratypes are deposited in the collection of the UAZ; and one paratype is in the collection of the CAS. The remaining four paratypes were not located.

The junior synonym, P. flavellus, was described from 21 specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male, allotype, and three paratypes were taken in Area 16M, Nevada Test Site, 11 June 1965, ex. Grayia spinosa (Hook.), H. Knight and J. Merino. All type material is retained in the Knight Collection (USNM) except two paratypes deposited in the collection of BYU. One male specimen from the paratype series was omitted from the original description; label data: Mercury, Nevada, M (TB), VIII-5-1965, Joe Merino.

DIAGNOSIS. - Length 4.4-6.0 mm; pale yellow to brownish general coloration. Phytocoris strigosus is easily recognized by the narrow vertex (see couplet 4 in key); pale, median line on the pronotal disk with fuscous borders; and the well developed genital tubercle of the male (fig. 34a).

REMARKS. - Phytocoris strigosus is widely distributed in the western United States except for the extreme northern region.

Specimens have been collected as far north as Umatilla Co., Oregon and Cassia Co., Idaho; east to Sandoval Co., New Mexico and Brewster Co., Texas; and south to the US-Mexico border in Arizona and California. The western boundary of the distribution is formed by the Cascade Range, Sierra Nevada, and the coast ranges of southern California. I have examined 260 specimens with collection dates ranging from March 9 to December 17. Much of this material, both males and females, was taken at light, but several specimens were collected from Gutierrezia, Hymenoclea, and Prosopis.

The general coloration of P. strigosus is somewhat variable, ranging from pale yellow to specimens that are extensively marked with brown or fuscous. In lighter specimens, the pale, median line on the pronotal disk is often indistinct, but the well developed genital tubercle will readily identify the male.

I have examined the type series of P. flavellus and found these specimens to be conspecific with P. strigosus. Except for the pale yellow coloration, all other features of the flavellus specimens, including genital structures of the male, are typical of P. strigosus. On the basis of this information, I am placing P. flavellus in synonymy with P. strigosus.

Phytocoris pintoi new species

Figure 35

TYPES AND TYPE LOCALITY. - Holotype male: Menifee Valley (hills on W. end) 33°39'N 117°13'W, 550 m, Riverside Co., California, 3 June 1978, taken at light, J.D. Pinto (UCR). Paratypes: CALIFORNIA. Riverside Co.: 7 males, same data as holotype (UCR); 3 males, Quail Valley, Coastal Sage Scrub Comm., 4 June 1973 and June 1975, taken at light, J.D. Pinto (UCR).

DIAGNOSIS. - Phytocoris pintoi is easily recognized by the brownish general coloration; narrow vertex, ratio of eye length to width of vertex equal to or greater than 1.15:1 in the male; and

absence of a pale, median annulus on antennal segment II. Males lack a distinct tubercle on genital segment above base of left clasper (fig. 35a).

DESCRIPTION. - Male. Length 5.51-6.26 mm, width 1.46-1.62; brownish general coloration. Head: width across eyes 0.86-0.92, vertex 0.36-0.40; yellow or brownish yellow with fuscous markings; frons with 6-8 dark striae. Rostrum: length 2.45-2.57, extending to 4th or 5th abdominal segment. Antennae: brown to black; I, length 1.26-1.37, with scattered pale spots on dorsal aspect; II, length 2.56-2.74; III, length 1.67-1.85; IV, length 0.92-1.08. Pronotum: mesal length 0.74-0.83, posterior width 1.21-1.30; pronotal disk grayish yellow; basal submargin of disk with wavy, fuscous line and 4-6 weakly elevated points; propleura pale with dark anteromedial stripe. Scutellum: yellowish, moderately to extensively marked with fuscous, apical half strongly convex. Hemelytra: grayish white or grayish yellow with fuscous markings along veins, inner and outer margins of corium, apex of corium, and on cuneus; membrane densely conspurcate, with two pale marks on outer margin. Legs: femora grayish yellow, reticulated with brown to fuscous particularly on apical half of segment; hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous markings; front tibiae with white spots but lacking distinct pale annuli. Vestiture: dorsum with black, simple setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 35. Genital segment lacking a distinct tubercle above base of left clasper (fig. 35a).

Female. The female of this species is not known. It is likely that the females are brachypterous, since they were not taken with males at light.

REMARKS. - *Phytocoris pintoi* is known only from the type material collected in Riverside Co., California. The host plant of *P. pintoi* is not known, but I expect this species breeds on a shrubby

plant, possibly restricted to the chaparral region of southwestern California.

Phytocoris yuma Knight

Figure 36

Phytocoris yuma Knight, 1961:479-480, fig. 2, 1968:250, fig. 308.

TYPES AND TYPE LOCALITY. - This species was described from 12 male specimens collected at light in Yuma Co., Arizona, 4 November 1939, L.L. Stitt. The holotype and eight paratypes are retained in the Knight Collection (USNM). The remaining three paratypes were not located.

DIAGNOSIS. - Length 5.7-6.5 mm. Phytocoris yuma is distinguished from other species of the rostratus group by the following combination of characters. The hemelytra are pale grayish yellow with brown to fuscous markings. The ratio of eye length to width of vertex is equal to or greater than 1.15:1 in the male. The second antennal segment is marked with a pale, median annulus and the pale annuli on the front tibiae are distinctly broader than the dark annuli. Genital segment of the male lacks a tubercle above base of left clasper (fig. 36a).

REMARKS. - Phytocoris yuma is known only from Yuma Co., Arizona and Imperial Co., California. I have examined 22 male specimens with collection dates ranging from April 2 to November 4; all taken at light. Females of this species are probably brachypterous since they have not been collected at light.

Phytocoris difformis Knight

Figure 37

Phytocoris difformis Knight, 1934:8-9; Carvalho 1959:196; Knight 1968:239, fig. 287.

TYPES AND TYPE LOCALITY. - This species was described from 25 specimens collected in southeastern Arizona. The holotype male, allotype, and one female paratype were taken at Texas Pass, 19 July 1917, "on a tent trap light", H.H. Knight. All type material is retained in the Knight Collection (USNM) except 10 paratypes that were not located. Two specimens from the paratype series were omitted from the original description; label data for these specimens are: Bonita, Arizona, Gowdy Cr. Canyon, July 18, 1917, H.H. Knight and Santa Rita Mts., Aug. 29, 1924, Ariz., A.A. Nichol, Alt. 4000-5000.

DIAGNOSIS. - Length 5.0-6.2 mm. Phytocoris difformis is distinguished from other brownish species of the rostratus group by the following combination of characters. The ratio of eye length to width of vertex is equal to or greater than 1.15:1 in the male. The second antennal segment is marked with a pale, median annulus. The pale annuli on the front tibiae are equal to or less than the width of the dark annuli. The scutellum is strongly deflexed apically and lacks the pale, median line seen in P. yuma. The propleuron is pale, except basal margin and incomplete, median line fuscous. Males have a very small, knob-like tubercle on the genital segment above base of left clasper (fig. 37a).

REMARKS. - Phytocoris difformis has been collected in the following counties in Arizona: Cochise, Graham, Maricopa, Pima, Pinal, Santa Cruz, Yavapai. Adult specimens have been taken on Acacia greggii Gray., Condalia globosa Jtn., and Prosopis sp. Both

males and females are attracted to light. I have examined 22 specimens with collection dates ranging from May 8 to September 6.

Phytocoris borregoi new species

Figure 38

TYPES AND TYPE LOCALITY. - Holotype male: Borrego, San Diego Co., California, 24 April 1955, taken at light, Timberlake (UCR). Paratypes: CALIFORNIA. San Diego Co.: 8 males and 6 females, same data as holotype except 24&28 April 1955 (UCR); 2 males, Borrego, 23 April 1955, R. Schuster (UCB). ARIZONA. Maricopa Co.: 3 males and 2 females, Gila Bend, 260 m, 7-8 May 1978, taken at light, R.T. Schuh (AMNH, OSU). Pima Co.: 6 males, Organ Pipe Cactus Nat. Mon., 11 April 1965, taken at light, G.L. Jensen and W.J. Turner (UCB). Pinal Co.: 3 males and 1 female, Maricopa, 17 October 1927, J.A. Kusche (CAS).

DIAGNOSIS. - *Phytocoris borregoi* is distinguished from other brownish or grayish species of the *rostratus* group by the following combination of characters. The ratio of eye length to width of vertex in the male is equal to or greater than 1.15:1. The second antennal segment has a pale, median annulus. The pronotal disk is grayish; without a pale, median line. The propleuron is fuscous, except apical 3rd and usually incomplete, median line pale. The scutellum is evenly convex; not strongly deflexed preapically as in *P. difformis*. The pale annuli on the front tibiae are distinctly narrower than the dark annuli. The genital segment of the male has a small, knob-like protuberance above base of left clasper (fig. 38a). The left sclerotized process is without a membranous region along right margin, and the right basal lobe of the vesica is set with a small patch of spinulae.

DESCRIPTION. - Male. Length 5.72-7.88 mm, width 1.84-2.50; grayish ground color with brown to fuscous markings. Head: width

across eyes 1.03-1.17, vertex 0.32-0.40; white or pale yellow; jugum, lorum, and tylus with reddish brown to fuscous markings; frons and vertex tinged with brown; frons with several pale spots medially, bordered each side by 6-8 fuscous striae. Rostrum: length 2.57-2.90, extending to between 3rd and 6th abdominal segments. Antennae: brown to black; I, length 1.22-1.48, dorsal surface with pale markings; II, length 2.73-3.62, with pale annulus medially; III, length 1.80-2.16; IV, length 0.94-1.28. Pronotum: mesal length 0.79-0.95, posterior width 1.40-1.84; pronotal disk grayish, often tinged with brown behind calli, along laterial margins, and medially; basal submargin of disk with wavy, fuscous line and 4-6 weakly elevated points; collar brown with pale, median spot; calli with reddish brown to fuscous markings; propleura brown to fuscous, apical 3rd and usually incomplete median line pale. Scutellum: evenly convex; fuscous, mottled with grayish white; apex often broadly pale with dark, median stripe. Hemelytra: grayish white, moderately to extensively mottled with brown to fuscous especially along veins, inner margin of corium, and on cuneus; membrane densely conspurcate, outer margin with two large, pale areas. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with simple, dark setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 38. Genital segment above base of left clasper with small knob-like protuberance (fig. 38a).

Female. Similar to male in color and vestiture. Length 6.37-7.02 mm, width 2.07-2.29. Head: width across eyes 1.05-1.13, vertex 0.48-0.51. Rostrum: length 2.75-2.99, extending to 4th or 5th abdominal segment. Antennae: I, 1.44-1.60; II, 2.99-3.53; III, 1.89-2.27; IV, 1.03-1.22. Pronotum: mesal length 0.85-0.95, posterior width 1.62-1.76.

REMARKS. - *Phytocoris borregoi* is widely distributed in the Mojave and Sonoran deserts. Specimens have been collected as far north as Llano, Los Angeles Co., California and Wickenburg, Maricopa Co., Arizona; east to Tucson, Arizona; and south to the US-Mexico border. The western boundary of the distribution is formed by the coast ranges of southwestern California. The only host plant record comes from a single male taken at Papago Well, Pima Co., Arizona on *Prosopis juliflora* (Sw.). Both males and females have been taken at light.

SPECIMENS EXAMINED. - In addition to the type material, 11 specimens were examined from the following localities: ARIZONA. Maricopa Co.: Wickenburg (UCD). Pima Co.: Organ Pipe Cactus Nat. Mon. (UAZ); Papago Well, 40 mi. SW Ajo (UAZ); Santa Cruz Village, Comobabi Mts. (AMNH); Tucson (KU, UAZ). CALIFORNIA. Los Angeles Co.: Llano (CAF&A). Riverside Co.: Banning (CAF&A). Collection dates range from April 7 to September 30.

Phytocoris catalinae new species

Figure 39

TYPES AND TYPE LOCALITY. - Holotype male: Sabino Basin, Santa Catalina Mts., Pima Co., Arizona, 1158 m, 8-20 July 1916 (AMNH). Paratypes: ARIZONA. Cochise Co.: 1 male, Cochise Stronghold, 2 October 1954, taken at light, Butler and Werner (UAZ). Pima Co.: 2 males, Kits Peak Rincon, Baboquivari Mts., 1234 m, 1-4 August 1916 (AMNH, OSU). Santa Cruz Co.: 1 male, Canelo, 15 August 1956, taken at light, Morley (UAZ); Madera Cyn., Santa Rita Mts.: 1 male, 1487 m 14 July 1963, Y.L. Vesterby (CSU); 1 male, 5-6 September 1970, taken at light, E.A. Kane (CAF&A); 1 male, 1402-1707 m, 4 August 1975 (UAZ).

DIAGNOSIS. - *Phytocoris catalinae* most closely resembles *P. borregoi* but differs by the smaller average size; absence of a pale,

median line on the propleuron; and the genital structures of the male. The genital segment lacks a distinct tubercle above base of left clasper (fig. 39a). The left sclerotized process of the vesica is membranous along the right margin, and the right basal lobe lacks the small patch of spinulae seen in P. borregoi. Phytocoris catalinae also resembles P. difformis but is distinguished by the predominantly fuscous propleuron, evenly convex scutellum, and narrow vertex.

DESCRIPTION. - Male. Length 5.35-6.16 mm, width 1.69-1.89; brownish general coloration. Head: width across eyes 1.02-1.09, vertex 0.25-0.32; white or pale yellow; jugum, lorum, and tylus with reddish brown to fuscous markings; frons weakly convex, not strongly deflexed apically as in most members of rostratus group; frons with reddish brown to fuscous markings especially near apex, often broadly pale medially and lacking distinct dark striae. Rostrum: length 2.29-2.56, extending to 4th or 5th abdominal segment. Antennae: brown to black; I, length 1.12-1.30, with scattered pale spots and 2 or 3 larger pale patches on dorsal aspect; II, length 2.57-2.95, with pale annulus medially; III, length 1.44-1.66; IV, missing in all specimens examined. Pronotum: mesal length 0.77-0.85, posterior width 1.44-1.53; pronotal disk grayish yellow, lightly to extensively darkened with brown to fuscous especially behind calli and along lateral margins; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points; collar and calli with reddish brown to fuscous markings, collar with pale spot medially; propleura fuscous, apical 3rd pale. Scutellum: moderately and evenly convex; pale with lateral margins, triangular basal region, and spot on apex fuscous. Hemelytra: grayish white, moderately to extensively tinged with brown; veins, costal margin, inner margin and posterior angles of corium, and cuneus with fuscous markings; membrane mottled with fuscous, outer margin with two pale spots. Legs: femora white or pale yellow, reticulated with reddish brown to fuscous particularly on apical half of segment; dark markings on outer surface of front femora forming two parallel lines; tibiae pale with reddish brown to

fuscous markings; front tibiae with four dark annuli including narrow band at base. Vestiture: dorsum with dark, simple setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 39. Genital segment lacking a distinct tubercle above base of left clasper (fig. 39a).

Female. The female of this species is not known.

REMARKS. - *Phytocoris catalinae* is known only from the type material collected in southeastern Arizona. The host plant of this species is not known but several specimens have been taken at light.

The large eyes, narrow vertex, and weakly convex frons of *P. catalinae* and *P. borregoi* are not characteristic of most species in the *rostratus* group. These taxa are included here because the genital structures of the males are typical of the *rostratus* group. Also, the occurrence of species with somewhat intermediate head morphology (e.g., *P. yuma*, *P. pintoi*, *P. difformis*) helps to bridge the gap between *P. catalinae* and *P. borregoi*, and the remaining species of the *rostratus* group.

Phytocoris lineatus Reuter

Figure 40

Phytocoris lineatus Reuter, 1909:30-31; Van Duzee 1917a:318; Carvalho 1959:204; Henry and Stonedahl (1983).

TYPES AND TYPE LOCALITY. - *Phytocoris lineatus* was described from Rifle, Garfield Co., Colorado, 25 July 1900. Reuter (1909) did not designate a type or indicate the number of specimens he examined. I have seen a single male specimen that appears to be from the original type series. This specimen was designated a lectotype by Henry and Stonedahl (1983) and is deposited in the collection of the CAS.

DIAGNOSIS. - Length 5.6-6.2 mm. *Phytocoris lineatus* is distinguished from other grayish or brownish species of the *rostratus* group by the following combination of characters. The ratio of eye length to width of vertex is less than or equal to 1.10:1 for males. The pronotal disk is marked with a pale line medially. Genital segment of male with a small tubercle above base of left clasper (fig. 40a). The right sclerotized process of the vesica is narrow and broadly curved (fig. 40e); not expanded basally as in most members of this group. The left sclerotized process lacks an apical membranous region (fig. 40e') and is not strongly twisted preapically as in *P. coronadoi* and *P. yavapaii*.

REMARKS. - Besides the lectotype, I have examined only five male specimens of *P. lineatus* from the following localities: ARIZONA. Cochise Co.: Chiricahua Mts. (KU); Huachuca Mts., Sunnyside (UAZ); 5 mi. W Portal, 1646 m (AMNH). Santa Cruz Co.: Santa Rita Mts. (KU). UTAH. Washington Co.: Leeds (UID). Collection dates are from July 2 to August 22. The host plant association of this species is not known.

Pulchricollis Species - Group

DESCRIPTION. - Small, 4.0-5.1 mm, somewhat ovate, pale species with reddish brown to fuscous markings; vestiture of dorsum composed of suberect, simple setae intermixed with narrow, flattened, white or golden setae; darker species also with flattened, black setae; venter moderately to densely clothed with narrow, flattened, white or golden setae. Head: antennae yellowish brown to fuscous; segment I with pale spots on dorsal aspect; segment II, except in *P. torridus*, with pale, median annulus and 2 or 3 pale spots dorsally on darkened basal half of segment; frons prominent, deflexed apically, meeting tylus along deep indentation; tylus strongly produced at base; eyes elliptical to slightly reniform. Pronotum: pronotal disk uniformly pale yellow to extensively infuscated, sometimes with pale, median stripe; basal submargin of disk in darker species with transverse, fuscous line; propleura pale, basal submargin sometimes with narrow, fuscous stripe. Hemelytra: white or pale yellow; except in *P. torridus*, marked with fuscous along veins, inner margins of corium and cuneus, outer apical angle of corium, and at apices of clavus and cuneus; membrane conspurcate, spots coalescing apically. Legs: femora white or pale yellow with red to fuscous markings, sometimes extensively darkened on apical 1/3; tibiae pale with reddish brown to fuscous markings, front pair with 3 or 4 dark annuli. Male genitalia: genital segment with cylindrical, posteriorly directed tubercle above base of left clasper. Left clasper: sensory lobe prominent; shaft laterally flattened, upper margin strongly reflexed so shaft appears swollen in dorsal view. Right clasper: broadly lanceolate, apex acute. Vesica: membranous region of vesica somewhat reduced, with 2 or 3 indistinct lobes, basal lobes small; vesica with two sclerotized processes; right process ladle-shaped, cup broadly opened, handle flattened; left process a simple, elongate strap; basal process well sclerotized, expanded apically, extending above level of gonopore, apex well removed from bases of sclerotized processes.

REMARKS. - Members of the *pulchricollis* group are widely distributed in the American Desert and Mexican Highland provinces of the southwestern United States. *Phytocoris albidopictus* also occurs in the Chihuahuan Desert Province of southern New Mexico and western Texas. The host plant associations of these species are poorly known, but both sexes are frequently taken at light.

Pulchricollis group species are readily recognized by their small size, 4.0-5.1 mm; distinct medial groove on abdominal sternites 2 thru 7; flattened, pale setae on the venter; and by the form of the male genitalia. These species are closely allied to members of the *candidus* group but differ by the absence of densely distributed, long, pale setae on the ventral surface of antennal segment I; more sparsely set, flattened setae on the venter; and by the male genital structures, in particular the cylindrical, posteriorly directed tubercle above the base of the left clasper.

Key to the Species of the *pulchricollis* Group

1 Dorsal surface with fuscous markings particularly on pronotum, scutellum, and along veins of hemelytra; hemelytra with some narrow, flattened, dark brown or black setae 2

\- Dorsal surface pale brownish yellow to yellowish brown, sometimes lightly marked with red or reddish brown but without fuscous markings; hemelytra without flattened, dark setae . . . . . *torridus* n. sp., p. 141

2(1) Ratio of length of antennal segment I to width of head across eyes 0.90:1 to 1.10:1 . . . . . *albidopictus* Knight, p. 143

\- Ratio of length of antennal segment I to width of head across eyes 1.20:1 to 1.60:1 . . . . . *pulchricollis* Van D., p. 144

Phytocoris torridus new species

Figure 41

TYPES AND TYPE LOCALITY. - Holotype male: 4 mi. SE Casa Grande, Pinal Co., Arizona, 18 June 1964, taken at black light, D.R. Smith & C.W. Baker (USNM). Paratypes: CALIFORNIA. Kern Co.: 1 female, Mojave, 6 June 1930, R.L. Usinger (UCB). Imperial Co.: 1 male and 2 females, Glamis, 29 May 1971, taken in pit trap, M.S. Wasbauer (CAF&A); 1 male, 7 mi. W Glamis, 16 March 1976, ex. Larrea divaricata Cav., J.D. Pinto (UCR); 1 male, Seely, 15 April 1970, ex. Dalea spinosa Gray., F.L. Blanc (CAF&A). Inyo Co.: 1 male, 6 June 1929; 1 female, 7 June 1929; 1 male, 8 June 1929, Little Lk., R.L. Usinger (CAS); 3 males and 1 female, site 15, NW end Saline Valley sand dunes, 366 m, 6 June 1976, D. Giuliani (CAS, LACM); 2 males and 1 female, Stove Pipe Wells, Death Valley Nat. Mon., 11 April 1949, W.D. Pierce (LACM); 2 females, 7 mi. NE Panamint Spgs., 16 May 1969, taken at black light, P. Rude & J. Doyen (UCB). Riverside Co.: 1 female, Deep Cyn., 13 June 1963, taken at light, E.I. Schlinger (UCR); 2 females, Hopkins Well, 16 April 1958, J. Powell (UCB); 2 females, 20 mi. S Indio, 24 April 1973, P. Oman (OSU). San Diego Co.: 2 females, Borego, 24 April 1949, taken at light, L.W. Quate (UCB); 1 male and 2 females, Borego, 23 April 1955, R.O. Schuster (UCB); 1 female, Borrego, 3 May 1956, J. Powell (UCB); 1 male, 5 mi. E Ocotillo Wells, 7 April 1981, ex. Atriplex sp., D.A. Polhemus (JTP). NEVADA. Nye Co.: 1 female, Big Dune, S. Beatty, 19-20 September 1974, Doyen (UCB).

DIAGNOSIS. - Phytocoris torridus is distinguished from P. albidopictus and P. pulchricollis by the yellowish brown general coloration without fuscous markings; absence of dark brown or black setae on the hemelytra, and broader shaft of the right clasper (fig. 41d). This species is sometimes lightly marked with red or reddish brown.

DESCRIPTION. - Male. Length 4.42-4.86 mm, width 1.58-1.74; light brownish yellow to yellowish brown general coloration, dorsal surface sometimes lightly marked with red or reddish brown. Head: width across eyes 0.84-0.86, vertex 0.39-0.41; pale yellow, lightly to moderately marked or tinged with red or reddish brown; frons weakly convex, meeting tylus along deep indentation; frons in darker specimens with pale median line bordered by reddish striae; tylus strongly produced at base. Rostrum: length 2.21-2.36, extending to 4th or 5th abdominal segment. Antennae: yellowish brown, often lightly marked with red; I, length 0.68-0.76, distinctly marked with red or reddish brown in darker specimens; II, length 1.58-1.66; III, length 0.93-1.13; IV, length 0.72-0.97. Pronotum: mesal length 0.84-0.92, posterior width 1.45-1.60; pronotal disk pale yellow or light brownish yellow; collar and calli often marked or tinged with red or reddish brown; propleura pale, lightly marked with red in darker specimens. Scutellum: pale yellow or light brownish yellow; weakly convex. Hemelytra: light brownish yellow to yellowish brown, sometimes with pinkish tinge, lightly marked with red or reddish brown in darker specimens particularly along outer margin of corium and on cuneus; membrane lightly to moderately mottled with fuscous, outer margin with two pale spots. Legs: femora pale yellow or light brownish yellow with red or reddish brown markings, hind pair often more extensively darkened on apical half and marked with pale spots; tibiae pale yellow or light brownish yellow with red or reddish brown markings, front pair with four dark annuli including narrow band at base. Vestiture: dorsum with golden, simple setae intermixed with white and golden, sericeous setae; darker specimens sometimes with scattered brownish setae on pronotum. Genitalia: Figures 41.

Female. Similar to male in color and vestiture. Length 4.75-5.08 mm, width 1.67-1.85. Head: width across eyes 0.84-0.87, vertex 0.41-0.44. Rostrum: length 2.32-2.46, extending to 6th or 7th abdominal segment. Antennae: I, 0.76-0.90; II, 1.73-2.05; III, 1.12-1.30; IV, 0.72-0.79. Pronotum: mesal length 0.81-0.88, posterior width 1.44-1.55.

REMARKS. - *Phytocoris torridus* is distributed in the Mojave and Sonoran deserts. Specimens have been taken as far north as Inyo Co., California and east to Pinal Co., Arizona. The breeding host of this species is not known, but several adult specimens have been collected from *Atriplex* sp., *Dalea spinosa*, and *Larrea divaricata*. Males and females of *P. torridus* are attracted to light. Collection dates range from March 16 to September 20.

Phytocoris albidopictus Knight

Figure 42

Phytocoris albidopictus Knight, 1961:476, 478, fig. 2, 1968:250.

TYPES AND TYPE LOCALITY. - *Phytocoris albidopictus* was described from 12 specimens collected in Arizona, California, New Mexico, and Texas. The holotype male was taken in the Rincon Mts., 1006 m, Pima Co., Arizona, 2 September 1928, A.A. Nichol. The holotype, allotype, and seven paratypes are deposited in the Knight collection (USNM); three paratypes were not located.

DIAGNOSIS. - Length 4.0-5.0 mm. *Phytocoris albidopictus* is very similar to *P. pulchricollis* but is easily distinguished by the shorter and thicker first antennal segment. The ratio of length of antennal segment I to width of head across eyes ranges from 0.90:1 to 1.10:1. The male genital structures are nearly identical to those of *P. pulchricollis.*

REMARKS. - *Phytocoris albidopictus* is widely distributed in the southwestern United States, but is not well represented in collections. In addition to type material, I have examined nine specimens from the following localities: ARIZONA. Cochise Co.: 6 mi. N Portal (UCR). Pima Co.: Ajo Mts. (USNM). CALIFORNIA. Imperial Co.: 3 mi NW Glamis (CAF&A). Riverside Co.: Palm Spgs. (LACM); Palm Cyn., 5 mi. S Palm Spgs. (UCR); P.L. Boyd Desert Rsrh.

Center, 3.5 mi. S Palm Desert (UCR). NEVADA. Nye Co.: Area TM, Nevada Test Site, nr. Mercury (USNM). NEW MEXICO. Dona Ana Co.: Pyramid Peak (LACM). Socorro Co.: Unspecified locality (KU). Collection dates are from April 12 to September 16. The only host plant record for this species comes from a single specimen collected near Portal, Arizona on Larrea. Both males and females of P. albidopictus have been taken at light.

Phytocoris pulchricollis Van Duzee

Figure 43

Phytocoris pulchricollis Van Duzee, 1923:148-149; Carvalho 1959:213; Knight 1968:255.

TYPES AND TYPE LOCALITY. - This species was described from five specimens collected on Carmen Is. and San Marcos Is. in the Gulf of California. The holotype male (No. 1011) was taken on San Marcos Is., 19 June 1921 and the allotype female (No. 1012) at Puerto Ballandra, Carmen Is., 22 May 1921. All type material is retained in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 4.0-5.0 mm. This species is readily distinguished from P. torridus by the fuscous markings on the pronotum, scutellum, and hemelytra; and by the dark brown or black setae on the dorsal surface of the body. Externally, P. pulchricollis closely resembles P. albidopictus but differs by the longer first antennal segment; ratio of segment length to width of head across eyes 1.20:1 to 1.60:1. The male genital structures of these two species are very similar.

REMARKS. - Phytocoris pulchricollis is widely distributed in the American Desert Province of the southwestern United States. Specimens have been collected as far north as Mono Co., California and Lyon Co., Nevada; east to the Santa Catalina Mts. in Arizona;

and south to the U.S.-Mexico border. Several specimens also were examined from northern Mexico. The southern mountain ranges form the western boundary of the distribution in California. I have examined 88 specimens, mostly taken at light. A single specimen each was collected from Prosopis sp., Purshia tridentata (Pursh), and Oenothera sp.; several examples were taken on Hyptis sp. Collection dates range from May 2 to October 28.

Candidus Species - Group

DESCRIPTION. - Small to moderate-sized, 4.2-6.5 mm, elongate, pale species, sometimes lightly marked with fuscous; vestiture of dorsum composed of suberect, simple setae intermixed with broad, flattened setae in P. albidosquamus and P. squamosus; venter densely clothed with white, scale-like setae. Head: antennae pale yellow to fuscous; segment I, except in P. albidosquamus, with dense brush of long, pale setae on ventral surface; frons prominent, deflexed apically, meeting tylus along deep indentation; tylus strongly produced at base; eyes elliptical to slightly reniform. Pronotum: pronotal disk pale, sometimes lightly marked or tinged with red to fuscous especially around calli; basal submargin of disk, except in P. candidus, with wavy, fuscous band or series of fuscous spots; propleura uniformly pale. Hemelytra: white or pale yellow; veins, apex of corium, and inner margin of cuneus marked with fuscous, except uniformly pale yellow in P. candidus; membrane conspurcate, spots coalescing apically. Legs: femora white or pale yellow, lightly to moderately marked with fuscous, except uniformly pale in P. candidus; tibiae pale with fuscous spots, front pair sometimes with 2 or 3 dark annuli. Male genitalia: genital segment without tubercles above clasper bases; P. albidosquamus sometimes with small knob above base of left clasper. Left clasper: sensory lobe moderately to strongly produced; angle sharp; shaft curving upward at base, slightly expanded preapically; inner surface of arm and base of shaft sometimes with small spines or tubercles; apex acute or narrowly truncate. Right clasper: lance-shaped; dorsal surface of arm with row of small spines in P. albidosquamus; apical region of shaft narrowly produced, apex acute. Vesica: membranous region of vesica greatly reduced, basal lobes small; basal process absent or indistinct, except well developed and continuous with base of sclerotized process in P. albidosquamus; sclerotized process variable in size and shape (see figs. 44e-46e).

REMARKS. - Members of the candidus group are distributed in the arid southwestern portion of the United States. The northernmost records are from Harney County, Oregon in the northwestern corner of the Intermountain Sagebrush Province. The host plant associations of these species are poorly known. The only well established record is for P. squamosus which occurs on Ephedra throughout much of its distribution. This species and P. albidosquamus also have been collected on Atriplex. The males of all candidus group species are readily attracted to light; females are slightly to strongly brachypterous and probably do not fly.

Candidus group species are easily recognized by the long first antennal segment with densely distributed, long, pale setae on the ventral surface; dense mat of pale, scale-like setae on the venter; and by the medial groove on abdominal sternites 2 thru 7. Members of the candidus group are closely allied to pulchricollis group species but differ by the more elongate form; long, pale setae on the ventral surface of antennal segment I; broader, scale-like setae on the venter; and by the genital structures of the males.

Key to the Species of the candidus Group

1 Dorsal surface with fuscous markings and flattened, dark brown or black setae 2

\- Dorsal surface uniformly pale yellow, without fuscous markings or dark setae . . . . . candidus Van D., p. 148

2(1) Antennal segment I densely set with long, pale setae on ventral surface; pronotal collar and calli tinged or marked with red or reddish brown; sclerotized process of vesica long and gradually tapered (fig. 45e) . . . squamosus Knight, p. 149

- Antennal segment I with short, sparsely distributed setae on ventral surface; pronotal collar and calli marked with fuscous; sclerotized process coiled, continuous with basal process (fig. 46e) . . . . . *albidosquamus* Knight, p. 150

Phytocoris candidus (Van Duzee)

Figure 44

Pallacocoris candidus Van Duzee, 1918:288-289; Carvalho 1959:184. *Phytocoris candidus*, Knight 1968:215 (n. comb.).

TYPES AND TYPE LOCALITY. - This species was described from 14 specimens collected at Coachella and Palm Spgs., Riverside Co., California, E.P. Van Duzee. The holotype male was taken at Palm Spgs. on 21 May 1917. The holotype (No. 408), allotype (No. 409), and 10 paratypes are retained in the Van Duzee Collection (CAS); two paratypes are deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 4.8-5.6 mm. *Phytocoris candidus* is easily distinguished from *P. albidosquamus* and *P. squamosus* by the uniformly pale yellow general coloration; dorsal surface without fuscous markings or flattened, dark setae. The membranous portion of the vesica is greatly reduced, and the sclerotized process is small and flattened (fig. 44e).

REMARKS. - This species is distributed in the arid southeastern portion of California. In addition to type material, eight specimens of *P. candidus* were examined from the following localities: San Diego Co.: Borrego (UCR); 10.2 mi. NW Ocotillo on St. Hwy. 2, Anza Borrego Desert St. Pk. (OSU). Unknown County: Dead Indian Crk. (UCR). The only host plant record comes from a single specimen

collected at Borrego on Hymenoclea salsola T.&G. Collection dates range from April 23 to May 23.

Phytocoris squamosus Knight

Figure 45

Phytocoris squamosus Knight, 1934:11-13; Carvalho 1959:217; Knight 1968:215.

TYPES AND TYPE LOCALITY. - Phytocoris squamosus was described from 12 specimens collected in Arizona and California. The holotype male and four male paratypes were taken at Bowie, Cochise Co., Arizona, 15 July 1916, H.H. Knight. The holotype, allotype, and seven paratypes are retained in the Knight Collection (USNM). One paratype is deposited in the collection of the CAS; two paratypes were not located.

DIAGNOSIS. - Length: male 4.9-5.9 mm, female 4.2-5.0. Phytocoris squamosus is very similar to P. albidosquamus but differs by the dense brush of long, pale setae on the ventral surface of antennal segment I, red to reddish brown markings on the collar and calli, and by the structure of the male genitalia, especially the long, gradually tapered sclerotized process of the vesica (fig. 45e).

REMARKS. - Phytocoris squamosus is widely distributed in Arizona, Nevada, and western Utah but is uncommon in the desert regions of extreme southern Nevada and southwestern Arizona. In Utah, the distribution extends east to the central mountain highlands. This species also has been collected in Kern and Inyo counties, California; Harney Co., Oregon; and Hidalgo Co., New Mexico. Phytocoris squamosus has been taken on Atriplex, Krameria, and Prosopis but is found most commonly on Ephedra. Males are attracted to light. The wing membrane is slightly reduced in the

female; extending to or just beyond apex of abdomen. I have examined 58 specimens with collection dates ranging from April 26 to September 13.

Phytocoris albidosquamus Knight

Figure 46

Phytocoris albidosquamus Knight, 1968:232-234, fig. 286.

TYPES AND TYPE LOCALITY. - This species was described from 11 specimens collected in Esmeralda, Nye, and Washoe counties, Nevada. The holotype male was taken in Area TM, Nevada Test Site, Nye Co., 14 June 1965, D.E. Beck, H.H. Knight, and J.M. Merino. The holotype and two male paratypes are retained in the Knight Collection (USNM); two female paratypes are deposited in the UCB collection; and one male paratype is deposited in the collection of BYU. The remaining five paratypes were not located. Knight did not designate an allotype for this species.

One female of the paratype series was omitted from the original description; label data: 6 mi. N Goldfield 5300' (1615 m), Esmeralda Co., Nevada, 8 June 1966, W. Gagne. This specimen is deposited in the UCB collection.

DIAGNOSIS. - Length: male 5.3-6.5 mm, female 4.4-4.8. Phytocoris albidosquamus closely resembles P. squamosus but is distinguished by the fuscous markings on the collar and calli; short, sparsely distributed setae on the ventral surface of antennal segment I; and by the form of the male genitalia, in particular the broadly expanded preapical region of the shaft of the left clasper (fig. 46c) and the coiled sclerotized process of the vesica (fig. 46e).

REMARKS. - Phytocoris albidosquamus is distributed throughout much of the Intermountain Sagebrush Province of Nevada and western Utah. The northernmost and easternmost records are from Harney Co.,

Oregon and Garfield Co., Utah respectively. This species also occurs in the arid southeastern portion of California from San Diego Co. north to Inyo County. I have examined 56 specimens with collection dates ranging from April 7 to August 25. Most of these were males taken at light, but several specimens were collected from Atriplex and Sarcobatus. The female of this species is strongly brachypterous with the wing membrane reduced to a narrow flap.

Some variation is seen in the structure of the genital claspers of P. albidosquamus, but does not appear to be correlated with geography. The width of the shaft of the right clasper is especially variable as is the size of the preapical expanded region of the shaft of the left clasper. Knight (1968) incorrectly figured the left clasper of this species with a large angulate sensory lobe. All males examined in this study had the sensory lobe broadly rounded as in figure 46b.

Junceus Species - Group

DESCRIPTION. - Large, 6.3-9.3 mm, brownish species; vestiture of dorsum composed of dark, simple setae intermixed with white, sericeous setae and sometimes narrow, flattened, black setae. Head: antennae yellowish brown to fuscous, segments III & IV usually darker than segment II, frons moderately and evenly convex, meeting tylus along shallow indentation, broadly fuscous or with 6-8 dark striae either side of middle; eyes large, obovate. Pronotum: basal submargin and lateral margins of pronotal disk often narrowly to broadly fuscous, disk sometimes nearly entirely darkened; propleura broadly fuscous at base, except predominantly pale in *P. coniferalis* and *P. nigrifrons*, dark basal region sometimes dissected by pale line, apical 3rd always pale. Hemelytra: grayish white or pale grayish yellow, moderately to densely marked with reddish brown to fuscous particularly along veins and inner apical region of corium; membrane with scattered fuscous spots and patches, often extensively darkened inside areoles. Legs: femora white or pale yellow, reticulated or spotted with reddish brown to fuscous, sometimes nearly entirely darkened; hind femora sometimes with pale, preapical band; tibiae pale, sometimes with 1-3 dark annuli. Male genitalia: genital segment with large, broadly rounded tubercle above base of left clasper. Left clasper: sensory lobe weakly to moderately produced; upper surface of arm and base of shaft set with small, blunt spines; outer surface of shaft with flattened, expanded region medially; apex acute or narrowly rounded. Right clasper: elongate, often with scattered small spines; shaft gradually tapered, but sometimes nearly parallel-sided and abruptly narrowed apically; apex acute. Vesica: primary membranous sack of vesica with 1 or 2 large lobes, lobes sometimes with patch(es) of spinulae or smaller accessory lobes; left basal lobe of vesica with small spinulate knob visible above left margin of gonopore; basal process well sclerotized, sometimes slightly expanded apically; sclerotized process large, serrate along one margin, depressed medially, continuous with apex of basal process or removed by narrow membranous region.

REMARKS. - The junceus group was formed by Knight (1974). In this paper he presented a key, descriptions, and figures of male genital claspers for P. junceus and 15 new species. Since this time, four additional junceus group species have been described (Henry, 1974, 1979; Kelton, 1979; Stonedahl, 1983a) and one synonymy has been proposed (Henry, 1982). Kelton (1979) also recognized P. fenestratus Reuter and P. nigrifrons Van D. as members of this group.

The junceus group has a transcontinental distribution in southern Canada and the northern United States. Eight species are distributed in eastern North America and 10 species have distributions restricted to western North America. One additional species, P. dreisbachi, occurs on both sides of the Rocky Mountains. In the west, junceus group species are distributed in forested regions where they inhabit coniferous trees, predominantly Abies and Pinus. One exception is P. tricinctipes which occurs in the Intermountain Sagebrush region of Nevada and eastern California. Several members of the junceus group are distributed as far south as the San Bernardino Mts. in California and the northern mountain ranges of New Mexico.

Only the western species of the junceus group are treated in this study. Eleven species are recognized from this region, including six previously known junceus species (i.e., alpinus, dreisbachi, knowltoni, nigrifrons, nobilis, rainieri), two species identified here as belonging to this group (i.e., tricinctipes, yollabollae), two new species (i.e., coniferalis, usingeri), and one species of uncertain identity, P. dentatus. The following new synonymys also are proposed: P. abiesi, P. albertae, P. albiclavus, P. elongatus, P. montanae, P. taos, and P. tehamae. Phytocoris dentatus is known from a single male specimen collected in British Columbia, Canada on 10 July 1941. This specimen is deposited in the Knight Collection (USNM), but is presently on loan and unavailable for examination.

Members of the junceus are readily recognized by their large size, 6.3-9.3 mm; large, broadly rounded tubercle above the base of

the left clasper; and by the serrate sclerotized process of the vesica with distinct longitudinal furrow.

Key to the Species of the *junceus* Group

1 Propleura predominantly pale, basal half dissected by 1 or 2 reddish to fuscous lines; lateral margins of pronotal disk pale, sometimes lightly marked with red or brown 2

\- Propleura dark brown or black, apical 1/3 and sometimes anteromedial stripe pale; lateral margins of pronotal disk narrowly to broadly fuscous 3

2(1) Antennal segment II dark brown or black, usually lighter yellowish brown medially; frons pale, sometimes lightly marked with red or reddish brown; front tibiae with three dark annuli . . . . . *coniferalis* n. sp., p. 157

\- Antennal segment II yellow to brownish yellow, apical 1/4 brownish; frons extensively infuscated, sometimes almost entirely darkened; front tibiae with a single dark annulus at apex . . . *nigrifrons* Van D., p. 159

3(1) Basal submargin of pronotal disk pale or with a broad pale region medially 4

\- Basal submargin of pronotal disk fuscous, extreme basal margin sometimes narrowly pale 5

4(3) Lateral margins of pronotal disk narrowly fuscous; antennal segment I with densely distributed, erect, bristle-like setae, length of setae mostly greater than width of segment; hind femora pale yellow with reticulate pattern of reddish brown . . . . . *rainieri* Knight, p. 160

- Lateral margins of pronotal disk broadly fuscous; antennal segment I with fewer bristle-like setae, length of setae less than width of segment; hind femora mostly fuscous with scattered pale spots . . . . . *nobilis* Stonedahl, p. 161

5(3) Pronotal disk uniformly brown or dark brown, basal margin sometimes narrowly pale 6

- Pronotal disk with at least narrow region behind calli white or pale yellow, but usually more broadly pale medially 7

6(5) Antennal segment I pale on ventral surface; basal margin of pronotal disk narrowly pale; left genital tubercle cylindrical, longer than broad (fig. 50a); distributed in Nevada and east-central California on *Pinus monophylla* Torr. & Frem. . . . *tricinctipes* Knight, p. 162

- Antennal segment I fuscous on ventral surface; basal margin of pronotal disk dark brown; left genital tubercle robust, not distinctly longer than broad (fig. 51a); distributed in Alberta, Canada on *Pinus contorta* Dougl. . . . . *alpinus* Kelton, p. 163

7(5) Ratio of length of antennal segment I to width of head across eyes 1.15:1 to 1.40:1, rarely slightly less than 1.15:1 for males; clavus predominantly pale, claval vein and margin bordering scutellum reddish brown to fuscous . . . . . *yollabollae* Bliven, p. 164

- Ratio of length of antennal segment I to width of head across eyes less than 1.15:1; clavus moderately to extensively marked with reddish brown to fuscous 8

8(7) Sclerotized process of vesica with 8-10 tooth-like serrations excluding minute teeth on basal lobe (fig. 53e); spinulate region on left basal lobe of vesica small, rounded . . . . . *knowltoni* Knight, p. 166

\- Sclerotized process of vesica with 12-15 serrations (figs. 54e&55e); spinulate region on left basal lobe of vesica larger and more elongate 9

9(8) Left genital tubercle large and broadly rounded (fig. 54a); sclerotized process as in figure 54e; distributed in California and southern Oregon . . . . . *usingeri* n. sp., p. 167

\- Left genital tubercle smaller, narrowly rounded or truncate apically (fig. 55a); sclerotized process as in figure 55e; distributed in northern Idaho, Alberta, Manitoba, Michigan, Pennsylvania, and Wisconsin . . . . . *dreisbachi* Knight, p. 169

Phytocoris coniferalis new species

Figure 47

TYPES AND TYPE LOCALITY. - Holotype male (antennae missing): Mill Crk., San Bernardino Mts., San Bernardino Co., California, 1830 m, 19 July 1941, ex. Abies concolor (Gord.&Glend.), Timberlake (UCR). Paratypes: CALIFORNIA. Riverside Co.: 1 female, Idyllwild, San Jacinto Mts., 6 July 1950, T.R. Haig (UCB); 1 male, same data as above except F.X. Williams (CAS); 1 male, San Jacinto Mts., 21 July 1929, L.D. Anderson (KU); 1 male, Tahquitz Valley, 19 June 1937, J.A.S. (LACM); 1 male, Tahquitz Valley, San Jacinto Mts., 16 June 1939, J.G. Shanafelt (LACM). San Bernardino Co., same data as holotype: 3 females, 19 July 1941 (UCR); 2 males and 7 females, 20 July 1941 (UCR); 1 female, 9 August 1941 (UCR); 1 female, 26 August 1944 (UCR); 1 female, 3 September 1944 (UCR); 1 female, 13 August 1945 (OSU); 1 male, 3 July 1949 (OSU). San Diego Co.: 1 female, Mt. Palomar, 18 July 1963, J. Powell (UCB).

DIAGNOSIS. - Phytocoris coniferalis is distinguished from other species of the junceus group by the following combination of characters. The lateral margins of the pronotal disk are predominantly pale. The propleuron is pale with two red to reddish brown stripes crossing the basal half. The second antennal segment is dark brown or black, usually with a lighter yellowish brown region medially. The frons is mostly pale with limited red to reddish brown markings, and the front tibiae are marked with three dark annuli.

DESCRIPTION. - Male. Length 6.48-7.24 mm, width 2.14-2.21; grayish yellow ground color with reddish brown to fuscous markings. Head: width across eyes 1.03-1.07, vertex 0.42-0.45; base and middle of tylus, jugum, lorum, and buccula marked with reddish brown to fuscous; frons often lightly marked with red or reddish brown, but usually lacking distinct striae. Rostrum: length 3.34-3.65, extending to 7th or 8th abdominal segment. Antennae: dark brown

to black; I, length 1.37-1.55, upper surface marked with pale spots and 8-12 erect bristle-like setae, ventral surface mostly pale: II, length 3.38-3.46, usually with yellowish brown region medially; III, length 1.67-2.03; IV, length 1.01-1.10. Pronotum: mesal length 0.97-1.08, posterior width 1.69-1.84; pronotal disk pale grayish yellow, sometimes lightly tinged with red; basal submargin of disk with transverse, fuscous line, extreme basal margin narrowly pale; collar brown to fuscous with pale spot medially and at each lateral angle; calli with reddish to fuscous markings; propleura pale with two red or reddish brown stripes crossing basal half. Scutellum: pale yellow, sometimes lightly tinged with red; in darker specimens with fuscous, medial patch at base and brownish markings before apex. Hemelytra: grayish white or pale grayish yellow with brown to fuscous markings, sometimes lightly tinged with red; middle and apex of corium with distinct pale patch; cuneus pale, usually tinged with red, apical 1/3 to 1/2 fuscous; membrane moderately to densely mottled with fuscous. Legs: femora pale yellow with reddish brown to fuscous markings, dark patches often broken by pale spots; hind femora with irregular pale band before apex; tibiae pale with fuscous markings; front tibiae with three dark annuli. Vestiture: dorsum with suberect, simple, dark setae intermixed with narrow, flattened, black setae and sericeous, white setae. Genitalia: Figure 47.

Female. Similar to male in color and vestiture. Length 6.26-7.13 mm, width 2.20-2.39. Head: width across eyes 1.06-1.14, vertex 0.47-0.51. Rostrum: length 3.51-3.74, extending to 7th or 8th abdominal segment. Antennae: I, 1.45-1.75; II, 3.56-3.94; III, 2.32-2.48; IV, 1.22-1.31. Pronotum: mesal length 0.90-1.08, posterior width 1.57-1.74.

REMARKS. - *Phytocoris coniferalis* is known only from the type material collected in southern California. Most of these specimens were taken in the San Bernardino Mts. on *Abies concolor*, but several examples have been collected as far south as Mt. Palomar in San Diego County.

Except for the large tubercles above the clasper bases, the male genital structures of P. coniferalis are not typical of the junceus group (see figs. 47b-e). However, due to external similarities between P. coniferalis and other junceus species, particularly P. nigrifrons, I am placing this species in the junceus group, realizing that it may require relocation at a later date.

Phytocoris nigrifrons Van Duzee

Figure 48

Phytocoris nigrifrons Van Duzee, 1920:352-353; Usinger 1933:171; Carvalho 1959:208; Knight 1968:215; Kelton 1979:689.
Phytocoris tehamae Bliven, 1956:16-17 (NEW SYNONYMY).
Phytocoris abiesi Knight, 1974:124-125, fig. 1 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris nigrifrons was described from four female specimens collected near Huntington Lake, Fresno Co., California, 2134-2743 m, 16-25 July 1919, E.P. Van Duzee. The holotype (No. 709) and two paratypes are retained in the Van Duzee Collection (CAS) and one paratype is deposited in the Knight Collection (USNM).

The junior synonym, P. tehamae, was described from a single female specimen taken at Mineral, Tehama Co., California, 11 August 1935. This specimen is deposited in the collection of the CAS.

The junior synonym, P. abiesi, was described from two specimens with the following label data: "9 mi. E Shasta City, Calif., Abies shastensis, August 8, 1956, Joe Schuh Collector". Although the label refers to a location east of Shasta City (now abbreviated to Shasta) in Shasta County, it is likely that these specimens were actually collected east of the city of Mt. Shasta in Siskiyou County. The above geographic locations are often confused due to a rather complex history of name changes. Also, the location as stated on the label is well removed from the nearest naturally occurring stand of Abies magnifica A. Murr., var. shastensis Lemmon. or any other Abies

species. The holotype male and allotype of P. abiesi are retained in the Knight Collection (USNM).

DIAGNOSIS. - This species most closely resembles P. coniferalis but differs by the larger size, 7.3-8.5 mm; brownish yellow second antennal segment with fuscous apex; darkened frons; and single dark annulus on apices of front tibiae. Phytocoris nigrifrons is distinguished from the remaining species of the junceus group by the pale lateral margins of the pronotal disk, and by the predominantly pale propleura with 1 or 2 reddish brown to fuscous stripes crossing anterior margin.

REMARKS. - Phytocoris nigrifrons is distributed throughout the Sierran Forest Province of California from Mt. Shasta, Siskiyou Co. to Huntington Lk. in Fresno County. Adult specimens have been collected on Abies concolor (Gord.&Glend.) and Abies magnifica A. Murr., mostly at elevations between 1800 and 2500 meters. I have examined 29 specimens with collection dates ranging from June 26 to August 31.

The type specimens of P. abiesi and P. tehamae were collected within the distribution range of P. nigrifrons on Abies. Phytocoris abiesi and P. tehamae are inseparable from P. nigrifrons on the basis of external as well as genitalic characteristics, and therefore, are here placed in synonymy with the latter species.

Phytocoris rainieri Knight

Phytocoris rainieri Knight, 1974:126.

TYPES AND TYPE LOCALITY. - This species was described from two female specimens collected from "coniferous trees" on Mt. Rainier, Washington, 14 August 1931, H.H. Knight. Both specimens are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.0-7.2 mm. This species is easily recognized by the narrowly fuscous lateral margins of the pronotal disk; pale basal submargin of disk; fuscous propleura with apical 1/3 pale; densely distributed, bristle-like setae on antennal segment I, length of setae mostly greater than width of segment; and by the pale yellow hind femora with reddish brown, reticulate pattern.

REMARKS. - Besides type material, I have examined four female specimens of *P. rainieri* from the Cascade Range of Oregon and Washington. One specimen was taken on Mt. Rainier, Washington; another near Barlow Pass, Hood River Co., Oregon on *Abies procera* Rehd.; and two at Rainbow, Lane Co., Oregon on *Abies amabilis* (Dougl.). The range of occurrence is from an unspecified date in July to August 2.

All specimens collected on Mt. Rainier are pale across the basal submargin of the pronotal disk. However, the specimens taken in Oregon have a poorly defined, dark line across the base of the disk, suggesting that this may be a poor character for species recognition. It is also possible that the Oregon specimens are not conspecific with those taken on Mt. Rainier. Until more specimens are available for study, particularly males, the identity of *P. rainieri* and its relationship to other *junceus* group species will remain unclear.

Phytocoris nobilis Stonedahl

Figure 49

Phytocoris nobilis Stonedahl, 1983a:in press.

TYPES AND TYPE LOCALITY. - This species was described from 21 specimens collected in Benton and Lane counties, Oregon. The holotype male and one female paratype were taken in the H.J. Andrews Experimental Forest, T15S, R6E, Sec. 29, NW 1/4, Lane Co., Oregon, 1450 m, 31 July 1979, ex. *Abies procera* Rehd., G.M. Cooper. The

holotype and one female paratype are deposited in the collection of the USNM; a pair each are deposited in the collections of the AMNH and CAS; and 15 paratypes are retained in the OSU collection.

DIAGNOSIS. - Length 6.7-8.9 mm. *Phytocoris nobilis* is distinguished from other members of the *junceus* group by the following combination of characters. The general coloration is grayish white with fuscous markings. The lateral margins of the pronotal disk are broadly fuscous, and the basal submargin of the disk is pale medially. The first antennal segment is sparsely set with bristle-like setae, length of setae less than width of segment. The hind femora are fuscous with scattered pale spots and a pale, preapical band.

REMARKS. - This species is known from several locations in the Coast and Cascade Ranges of Oregon. Adult specimens have been collected from *Abies amabilis* (Dougl.) and *Abies procera*. I have examined 23 specimens with collection dates ranging from July 20 to August 17. Further collecting at high elevations in Oregon and Washington should extend the range of this species considerably.

Phytocoris tricinctipes Knight

Figure 50

Phytocoris tricinctipes Knight, 1968:230-231, fig. 280.

TYPES AND TYPE LOCALITY. - This species was described from seven specimens taken in Nevada. The holotype female was collected in Area 18M(T), Nevada Test Site, nr. Mercury, Nye Co., 22 July 1965, taken at light, E. Beck & J. Merino. The holotype, allotype male, and two female paratypes are retained in the Knight Collection (USNM). The remaining three paratypes were not located.

DIAGNOSIS. - Length 6.5-7.7 mm; grayish white ground color with extensive brown to fuscous markings. *Phytocoris tricinctipes* is distinguished from other species of the *junceus* group by the uniformly brown to dark brown pronotal disk with the basal margin narrowly pale, and by the cylindrical left genital tubercle which is distinctly longer than broad (fig. 50a). The pale ventral surface of antennal segment I and mottled pattern on the hemelytra will further differentiate this species from *P. alpinus*.

REMARKS. - *Phytocoris tricinctipes* is distributed throughout much of Nevada on *Pinus monophylla* Torr.&Frem. This species also occurs in Inyo Co., California on the same host plant. Both sexes are attracted to light. I have examined 43 specimens with collection dates ranging from July 2 to July 26.

Phytocoris alpinus Kelton

Figure 51

Phytocoris alpinus Kelton, 1979:689-690, figs. 3-6, 1980:173-174, figs. 123&135, map 52.

TYPES AND TYPE LOCALITY. - *Phytocoris alpinus* was described from five male specimens collected at Lake Louise, Alberta, Canada, 3 August 1970, ex. *Pinus contorta* Dougl., L.A. Kelton. The holotype (No. 15524) and all four paratypes are deposited in the Canadian National Collection, Ottawa, Canada.

DIAGNOSIS. - Length 8.6-9.0 mm. *Phytocoris alpinus* is distinguished from other western species of the *junceus* group by the uniformly dark brown pronotal disk, without pale basal margin; uniformly fuscous first antennal segment with a few small, pale spots on the dorsal aspect; and by the form of the male genitalia. Externally, this species closely resembles *P. knowltoni* but differs by the uniformly darkened first antennal segment and pronotal disk,

more erect tubercle at base of left clasper (fig. 51a), and by the greater number of teeth on the sclerotized process of the vesica (fig. 51e).

REMARKS. - *Phytocoris alpinus* is known only from western Alberta, Canada where it occurs on *Pinus contorta*. However, the distribution of this species probably extends into the northern Rocky Mountains of the United States where *Pinus contorta* is frequently encountered at higher elevations.

Phytocoris yollabollae Bliven

Figure 52

Phytocoris yollabollae Bliven, 1956:17-18, plate II, fig. 10.
Phytocoris taos Knight, 1974:127, fig. 5 (NEW SYNONYMY).
Phytocoris albiclavus Knight, 1974:127-128 (NEW SYNONYMY).
Phytocoris montanae Knight, 1974:128, fig. 6 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris yollabollae* was described from a single female taken near the Yolla Bolly Middle Eel Wilderness, Van Duzen Rd., Trinity Co., California, 24 July 1949. This specimen is deposited in the collection of the CAS.

The junior synonym, *P. taos*, was described from a single male collected 5 mi. E Taos, Taos Co., New Mexico, 22 July 1968, taken at light, J.C. Schaffner. The holotype is retained in the Knight Collection (USNM).

Phytocoris albiclavus, also a junior synonym, was described from a single female collected in Broadwater Co., Montana, 28 July 1920, A.A. Nichol. This specimen is deposited in the Knight Collection (USNM).

The junior synonym, *P. montanae*, was described from two male specimens collected at Bozeman, Gallatin Co., Montana, 6 August 1920. Both specimens are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.4-8.5 mm. *Phytocoris yollabollae* is distinguished from other species of the *junceus* group by the following combination of characters. The ratio of length of antennal segment I to head width is between 1.15:1 and 1.40:1. The lateral margins and basal submargin of the pronotal disk are infuscated, sometimes broadly so; at least narrow region behind calli always pale. The propleuron is broadly fuscous, apical 3rd pale. The clavus is predominantly pale with claval vein and margin bordering scutellum reddish brown to fuscous. The genital tubercle is broadly rounded (fig. 52a) and the sclerotized process is set with 10 or 11 large serrations (fig. 52e).

REMARKS. - *Phytocoris yollabollae* is widely distributed in the western United States from northern New Mexico, north to Montana and Idaho, and west to the Cascade and Coast Ranges of Washington, Oregon, and northern California. The host plant of this species is *Pseudotsuga menziesii* (Mirb.) but in mixed stands specimens are often taken on *Abies* species as well. I have examined 55 specimens with collection dates ranging from July 8 to August 25.

Considerable variation is seen in *P. yollabollae* over its range of occurrence, particularly in specimens from Utah and New Mexico. However, based on the material I have examined, most of this variation appears to be either continuous, or inconsistent and not correlated with geography. In the absence of distinct discontinuities, there is little evidence to indicate that more than one species is involved. Based on these observations, I am placing *P. albiclavus*, *P. montanae*, and *P. taos* in synonymy with *P. yollabollae*. I have examined the types of these species and found each one to be well within the range of variation observed in *P. yollabollae*. Some of this variation is discussed in the following sentences. The extent of darkening of the pronotal disk is subject to considerable variation. The disk of most specimens is broadly pale medially, but some examples from southern Utah and northern New Mexico are extensively darkened and have only a narrow, pale region behind the calli. The length of the first antennal segment is extremely

variable and tends to be shortest in specimens from Utah and New Mexico. Genital structures of the male also are somewhat variable. In general, the size of the apical accessory lobes of the vesica get progressively smaller from north to south in the Rocky Mountain States. The claspers display minor variation, particularly in the development of the sensory lobe of the left clasper and the outer curvature of the arm of the right clasper. However, these differences seem not to be correlated with geography. Finally, the medial ridge of the sclerotized process tends to be more strongly curved in specimens collected west of the Cascade Range.

Phytocoris knowltoni Knight

Figure 53

Phytocoris knowltoni Knight, 1974:126-127, fig. 4.
Phytocoris elongatus Knight, 1974:131, fig. 10 (NEW SYNONYMY).
Phytocoris albertae Knight, 1974:131-132, fig. 11; Kelton 1980:175, fig. 125, map 52 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris knowltoni* was described from two specimens collected in Uintah, Weber Co., Utah, 1 August 1963, G.F. Knowlton. The holotype male and allotype are retained in the Knight Collection (USNM).

The junior synonym, *P. elongatus*, was described from three male specimens. The holotype was taken 17 mi. E Mayfield, Sanpete Co., Utah, 3110 m, 20 July 1960, P.&B. Rindge; and two paratypes were collected at Rices Spur, Colorado, 1 August 1960, E.D. Ball. All type material is retained in the Knight Collection (USNM).

The junior synonym, *P. albertae*, was described from two male specimens collected at Nordegg, Alberta, Canada, 25 July 1921, J. McDunnough. These specimens were originally included as paratypes in the type series of *P. junceus* Knight but were recognized as a distinct species by Knight (1974). The holotype and single paratype are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.3-9.3 mm. Phytocoris knowltoni is very similar to P. yollabollae but differs by the shorter first antennal segment, ratio of segment length to head width less than 1.15:1; and more extensively darkened clavus. This species also resembles P. dreisbachi and P. usingeri but is distinguished by the smaller number of teeth, 8 to 10, on the sclerotized process (fig. 53e) and by the smaller, more rounded spinulate region on the left basal lobe of the vesica.

REMARKS. - Phytocoris knowltoni is known from the Wasatch Range of central and northern Utah and the Rocky Mts. in Colorado. Knight (1974) and Kelton (1980) reported this species (as P. albertae) from western Alberta, Canada. Specimens have been taken in Alberta and Colorado on Picea, which appears to be the host plant of this species. I have examined eight specimens of P. knowltoni with collection dates ranging from July 4 to August 5. Most of this material was collected at elevations exceeding 2750 m.

Phytocoris usingeri new species

Figure 54

TYPES AND TYPE LOCALITY. - Holotype male: Yosemite Crk. Rgr. Stn., Yosemite Nat. Pk., Mariposa Co., California, 21 July 1946, ex. Pinus murrayana Grev.&Balf., R.L. Usinger (UCB). Paratypes: CALIFORNIA. Madera Co.: 1 male, Chiquito Lk., 28 July 1958, M.E. Irwin (UCD). Mariposa Co.: 1 male, Yosemite Nat. Pk., 1 August 1940, D.E. Hardy (KU). OREGON. Klamath Co.: 1 female, Skookum Mdws., T27S-R9E-Sec. 16, 1620 m, 17 July 1979, ex. Pinus contorta Dougl., G.M. Stonedahl (OSU).

DIAGNOSIS. - This species is distinguished from other members of the junceus group by the following combination of characters. The pronotal disk is extensively infuscated; sometimes with only a narrow pale region behind the calli. The propleuron is shiny fuscous with

apical 1/3 pale. The ratio of length of antennal segment I to head width is less than 1.15:1. The clavus is moderately to extensively darkened. The left genital tubercle is large and broadly rounded (fig. 54a), and the sclerotized process has 13-15 tooth-like serrations (fig. 54e).

DESCRIPTION. - Male. Length 8.42-8.80 mm width 2.52-2.61; pale grayish yellow ground color with brown to fuscous markings. Head: width across eyes 1.19-1.22, vertex 0.46-0.47; pale yellow with shiny, reddish brown to fuscous markings; frons with 6 or 7 reddish striae either side of middle. Rostrum: length 3.78-3.91, extending to 7th abdominal segment. Antennae: I, length 1.30-1.37, pale yellow, dorsal surface mottled with brown or fuscous and densely set with erect, bristle-like setae; II, length 3.15-3.33, yellowish brown or brown; III, length 1.58-1.66, brown to fuscous; IV, length 0.92-0.94, brown to fuscous. Pronotum: mesal length 1.26-1.33, posterior width 2.03-2.12; pronotal disk pale yellow, lateral margins and basal submargin broadly fuscous, sometimes only narrow region behind calli remaining pale; collar fuscous with pale spot medially and at each lateral angle; calli marked with fuscous; propleura shiny fuscous, apical 3rd pale. Scutellum: fuscous; median line, anterolateral angles, and apex pale. Hemelytra: grayish white or pale grayish yellow with brown to fuscous markings; middle and apex of corium with distinct pale patch; basal half of cuneus predominantly pale, sometimes invaded by brown; membrane mottled with brown. Legs: femora pale yellow with reticulate pattern of reddish brown to fuscous, densely set with erect, dark setae; hind femora with irregular pale band before apex; tibiae pale with three poorly defined dark annuli. Vestiture: dorsum clothed with dark, simple setae intermixed with narrow, flattened, white setae. Genitalia: Figure 54.

Female. Similar to male in color and vestiture. Length 7.40 mm, width 2.47. Head: width across eyes 1.20, vertex 0.51. Rostrum: length 3.76, extending to 8th abdominal segment. Antennae: I, 1.24; II, 3.15; III, 1.67; IV, missing. Pronotum: mesal length

1.12, posterior width 1.94. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris usingeri* is known only from the type material collected in southern Oregon and northern California. Two specimens of the type series were taken of *Pinus contorta*, which appears to be the host plant of this species. Further collecting is needed to verify this record and determine the distribution range of *P. usingeri* in western North America.

Phytocoris dreisbachi Knight

Figure 55

Phytocoris dreisbachi Knight, 1974:125-126, fig. 3; Henry 1982:337.
Phytocoris discoidalis Henry, 1974:187-190, figs. 1-4, 1979:9, figs. 7&12; Kelton 1979:689; Henry 1982:337 (synonymy).

TYPES AND TYPE LOCALITY. - *Phytocoris dreisbachi* was described from two males taken in Kalkaska County, Michigan, 2 July 1960, R.K. Dreisbach. Both specimens are deposited in the Knight Collection (USNM).

The junior synonym, *P. discoidalis*, was described from 17 specimens collected in Michigan, Pennsylvania, and Wisconsin. The holotype male was taken 8 mi. E Blue Mt. exit on Turnpike, Cumberland Co., Pennsylvania, 5 June 1973, ex. *Pinus virginiana* Mill., T.J. Henry & A.G. Wheeler, Jr. The holotype (No. 73350), allotype, and five male paratypes are deposited in the collection of the USNM; 10 paratypes are retained in the collection of the Pennsylvania Department of Agriculture; and one female paratype is in the author's collection.

DIAGNOSIS. - Length 6.9-8.2 mm. This species closely resembles *P. usingeri* but differs by the smaller, narrowly rounded to truncated genital tubercle (fig. 55a); distinct notch at the base of the left

clasper shaft (fig. 55c); and by the larger serrations on the sclerotized process (fig. 55e).

REMARKS. - *Phytocoris dreisbachi* is widely distributed in Michigan, Pennsylvania, and Wisconsin where it occurs on *Pinus virginiana*. This species was recently taken at several localities in Benewah Co., Idaho on *Pinus contorta* Dougl. These new records suggest that *P. dreisbachi* has a transcontinental distribution in the northern United States and southern Canada. Kelton (1980) reported this species from the southeastern corner of Manitoba on *P. banksiana* Lamb. and from Alberta on *P. contorta*. The three species of *Pinus* listed above are closely related and form a more or less continuous belt across the northern United States, southern Canada, and down the east and west coasts. It is likely that these pines have very similar mirid faunas, possibly with a number of species in common.

I have examined 25 specimens of *P. dreisbachi* from Idaho, all collected on August 8, 1979. The range of occurrence for this species in the eastern United States is from May 18 to July 8.

Phytocoris dentatus Knight

Phytocoris dentatus Knight, 1974:125, fig. 2.

TYPES AND TYPE LOCALITY. - This species was described from a single male specimen collected in British Columbia, 10 July 1941 by F.J. Survey. The holotype is retained in the Knight Collection (USNM).

REMARKS. - I have been unable to secure the unique type of *P. dentatus* and therefore, am unable to differentiate this species from other members of the *junceus* group. According to Knight (1974), *P. dentatus* is clearly distinguished from other *junceus* group species by the male genital structures, in particular the dentate projections on the dorsal surface of the left clasper and the small, sharp tubercle above the base of the right clasper (see fig. 2 in Knight, 1974).

Based on external features, Knight (1974) places this species close to *P. dreisbachi*.

I have not examined any specimens fitting Knight's description and genitalic illustrations of *P. dentatus*. Considering the type locality of this species, there is a remote possibility that it is a male specimen of *P. rainieri*; a species described from Mt. Rainier, Washington by Knight (1974).

Listi Species - Group

DESCRIPTION. - Small to moderate-sized, 3.2-6.5 mm, brownish species; vestiture of dorsum composed of suberect, simple setae intermixed with sericeous, silvery setae; dorsal surface, except in *P. carnosulus*, also sparsely set with long, erect, bristle-like, black setae. *Head*: antennae brownish yellow to dark brown; segment I mottled with white, ratio of segment length to width of head across eyes rarely exceeding 1.10:1; frons moderately and evenly convex, meeting tylus along shallow indentation; frons with 6-8 dark striae either side of middle; tylus moderately produced at base; eyes obovate to slightly reniform. *Pronotum*: pronotal disk pale with reddish brown to fuscous markings; calli swollen, often rising abruptly from collar; propleura fuscous, apical 1/4-1/3 pale. *Hemelytra*: grayish white or pale grayish yellow; clavus and corium densely checked or spotted with brown to fuscous; cuneus fuscous, basal 1/3-1/2 and extreme apex mostly pale; membrane uniformly infuscated, occasionally with limited pale markings. *Legs*: femora pale, moderately to extensively darkened with reddish brown to fuscous, dark regions often broken by pale spots; hind femora sometimes with pale preapical band; tibiae pale with 4 or 5 dark annuli. *Male genitalia*: genital segment, except in *P. hispidus*, with broad tubercle above base of left clasper. Left clasper: sensory lobe moderately to strongly produced; shaft narrow, slightly expanded preapically (exception: shaft broad and strongly flattened in *P. albicuneatus*); apex acute or truncate. Right clasper: elongate; dorsal margin somewhat arcuate; narrow region before apex of shaft weakly sclerotized, often appearing membranous; apex acute. Vesica: multilobed, size of lobes variable; medial portion of vesica with small, apical or subapical sclerotized region or spiculum; basal process lightly to heavily sclerotized, extending to level of gonopore or beyond; sclerotized process with medial groove, margins reflexed, outer margin, except in *P. carnosulus*, with 9-15 tooth-like serrations.

REMARKS. - The listi group is comprised of four species distributed predominantly in Arizona, Colorado, New Mexico, and western Texas. Phytocoris carnosulus also occurs in the Intermountain Sagebrush Province of southern Nevada and western Utah, and P. listi is reported as far north as Fall River Co., South Dakota (Knight, 1928) and southern Saskatchewan, Canada (Kelton, 1980). The host plant associations of these species are entirely unknown.

The males of listi group species are readily attracted to light, suggesting that they are at least partially nocturnal in their habits. Over 90 percent of the specimens examined were taken at light. I have seen only two females of this group; one specimen each of P. carnosulus and P. listi. Both specimens are strongly brachypterous, which explains why females are not taken at light with the males. Sweeping vegetation at night in areas where males are coming to light should produce female specimens and provide a means for determining the host plant associations of these species.

Listi group species are distinguished from other western members of the genus by their small size; short first antennal segment; long, erect, bristle-like setae on the hemelytra; strongly brachypterous condition of the females; and by the genital structures of the males.

Key to the Species of the listi Group

1 Front tibiae with narrow, fuscous annulus on apex; ratio of length of antennal segment I to width of head across eyes 0.65:1 to 0.90:1 2

\- Front tibiae with four fuscous annuli, but leaving apex pale; ratio of length of antennal segment I to width of head across eyes 1.00:1 to 1.15:1 . . . . . carnosulus Van D., p. 175

2(1) Pronotal disk and scutellum with pale, median line; genital segment of male lacking distinct tubercle above base of left clasper (fig. 57a) . . . . . hispidus n. sp., p. 176

- Pronotal disk and scutellum without pale, median line; genital segment of male with well developed tubercle above base of left clasper (figs. 58a&59a) 3

3(2) Ratio of length of antennal segment I to width of head across eyes 0.75:1 to 0.85:1 for males; left genital tubercle distinctly flattened laterally, apex angulate (fig. 58a) . . . . . *albicuneatus* n. sp., p. 177

- Ratio of length of antennal segment I to width of head across eyes 0.65:1 to 0.75:1 for males; left genital tubercle not distinctly flattened, apex broadly rounded (fig. 59a) . . . . . *listi* Knight, p. 179

Phytocoris carnosulus Van Duzee

Figure 56

Phytocoris carnosulus Van Duzee, 1920:347-348; Carvalho 1959:193; Knight 1968:229.

TYPES AND TYPE LOCALITY. - In the original description of P. carnosulus, Van Duzee states that the type series was comprised of two male and two female examples taken at Prescott, Arizona, July 1, 1917, C.A. Hill. I have examined four specimens from the type locality, all bearing Van Duzee type labels: holotype male (No. 697), 8 July 1917 and three male paratypes, 7 & 8 July 1917. These specimens are retained in the Van Duzee Collection (CAS) except one paratype is deposited in the Knight Collection (USNM). The two female specimens, including the allotype (No. 698), were not located. Also, the number of specimens in the type series and the collection dates do not match the information given by Van Duzee in the original description.

DIAGNOSIS. - Length: male 4.8-6.5 mm, female 4.2. Phytocoris carnosulus is distinguished from other species of the listi group by the following combination of characters. The apices of the front tibiae are pale. The hemelytra are without long, erect, bristle-like, black setae. The length of atennal segment I is equal to or greater than the width of the head across the eyes; ratio - 1.00:1 to 1.15:1.

REMARKS. - Phytocoris carnosulus is widely distributed in Arizona, southern Nevada, southern Utah, and western New Mexico. Specimens have been collected as far north as Lander Co., Nevada and Tooele Co., Utah; and east to Dona Ana, Sierra, and Socorro counties in New Mexico. The westernmost records are from Lander and Nye counties in Nevada. Several specimens also were examined from Pingree Pk., Colorado, and Jeff Davis and Pecos counties in western

Texas. The host plant association of this species is not known. Males are readily attracted to light. I have examined 117 specimens with collection dates ranging from April 11 to October 14. A single brachypterous female was examined from San Juan Co., Utah.

Phytocoris hispidus new species

Figure 57

TYPES AND TYPE LOCALITY. - Holotype male: Badger, Santa Cruz Co., Arizona, 31 July 1924, E.O. Martin (CAS). Paratypes: 1 male, same data as holotype (CAS).

DIAGNOSIS. - Phytocoris hispidus is easily recognized by the pale, median line on the pronotum and scutellum, and the absence of a tubercle above the base of the left clasper (fig. 57a). Characters that further differentiate this species from P. carnosulus are the short first antennal segment; fuscous annulus on apex of front tibiae; and the long, erect, bristle-like setae on the hemelytra.

DESCRIPTION. - Male. length 4.86-4.91 mm, width 1.46-1.48; dark brown general coloration. Head: width across eyes 0.81-0.85, vertex 0.31-0.32; pale yellow; buccula, jugum, lorum, apex of tylus, and postocular region marked with dark, shiny, reddish brown or fuscous; vertex and frons lightly tinged with brown; frons moderately convex, meeting tylus along distinct indentation, with 6-8 narrow striae either side of middle. Rostrum: length 2.11-2.23, extending to or slightly beyond apices of hind coxae. Antennae: I, length 0.70-0.72, dark reddish brown with pale markings; II, length 2.01-2.14, brownish yellow; III, length 1.55-1.67, brownish yellow; IV, length 0.93-0.97, brownish yellow. Pronotum: mesal length 0.70-0.76, posterior width 1.22-1.26; pronotal disk pale yellow, mottled with brown behind calli and with distinct pale line medially; collar fuscous, with broad pale region medially; calli swollen, rising abruptly from collar, marked with fuscous anteriorly;

propleura fuscous, apical 1/3 and line crossing coxal cleft pale. Scutellum: pale yellow, mottled with brown or dark reddish brown but leaving median line pale, basal angles and apex broadly pale. Hemelytra: grayish white or pale grayish yellow, extensively darkened with brown or dark brown; cuneus pale, invaded by reddish brown, apical half mostly fuscous, apex narrowly pale; membrane uniformly infuscated or nearly so. Legs: femora pale yellow, extensively darkened with deep reddish brown or fuscous, dark regions broken by pale spots; tibiae pale with five fuscous annuli, dark bands sometimes broken by pale spots. Vestiture: dorsum with short, suberect, dark setae intermixed with sericeous, silvery setae and sparsely distributed, erect, bristle-like, black setae. Genitalia: Figure 57.

Female. The female of this species is not known.

REMARKS. - *Phytocoris hispidus* is known only from the type material collected at Badger, Santa Cruz Co., Arizona. The host plant association of this species is not known. Males should be attracted to light, as are other members of the *listi* group.

Phytocoris albicuneatus new species

Figure 58

TYPES AND TYPE LOCALITY. - Holotype male: 17 mi. E Douglas, Cochise Co., Arizona, 12 August 1975, taken at black light, J.D. Pinto & S.I. Frommer (UCR). Paratypes: ARIZONA. Cochise Co.: 6 males, same data as holotype (UCR); 1 male, Douglas, 8 July 1956, J.H. Russell (USNM); 1 male, Douglas, 15 August 1958, W.R. Bowen (UCR); 1 male, Portal, 1 August 1967, taken at black light, S.S. Frommer (UCR). TEXAS. Culberson Co.: 2 males, 10 mi. N Van Horn, 27 August 1971, E.E. Grissell & R.F. Denno (CSU).

DIAGNOSIS. - *Phytocoris albicuneatus* is distinguished from other species of the *listi* group by the following combination of

characters. The front tibiae are narrowly fuscous apically. The hemelytra are sparsely set with long, erect, bristle-like setae especially along the veins. The pronotum and scutellum lack the pale, median line seen in P. hispidus. The ratio of length of antennal segment I to width of head across eyes ranges from 0.75:1 to 0.85:1 for males. The left genital tubercle is flattened laterally, apex angulate (fig. 58a), and the shaft of the left clasper is broad and strongly flattened (fig. 58c).

DESCRIPTION. - Male. Length 5.56-6.21 mm, width 1.57-1.69; dark grayish brown general coloration, ventral regions reddish brown to nearly fuscous. Head: width across eyes 0.91-0.96, vertex 0.31-0.35, ventral region shiny reddish brown; vertex, frons, basal half of tylus, and apices of jugum and lorum pale yellow with limited red to fuscous markings; frons moderately convex, meeting tylus along distinct indentation, with 6-8 dark striae either side of middle. Rostrum: length 2.45-2.66, extending to between 6th and 8th abdominal segments. Antennae: I, length 0.68-0.72, white or pale yellow with reddish brown to fuscous annulus at base and apex, pale medial region lightly mottled with reddish brown on dorsal aspect; II, length 1.80-2.03, yellowish brown; III, length 1.24-1.35, yellowish brown; IV, length 1.03-1.26, yellowish brown. Pronotum: mesal length 0.77-0.83, posterior width 1.31-1.42; pronotal disk grayish yellow, lightly to moderately tinged or mottled with brown to fuscous; calli swollen, rising abruptly from collar, lightly mottled with reddish brown to fuscous; propleura dark reddish brown or fuscous, shiny, sometimes narrowly pale at apex. Scutellum: pale yellow, moderately to extensively mottled with fuscous, almost entirely darkened in some specimens but basal angles and apex remaining pale. Hemelytra: grayish yellow, variously tinged and mottled with brown to fuscous; corium with distinct fuscous patch posteromedially; basal 1/3 to 1/2 and apex of cuneus white or pale yellow, remaining portion fuscous; membrane uniformly infuscated. Legs: femora dark reddish brown or fuscous, sparsely marked with pale spots mostly on apical half of segment; front and middle femora

narrowly pale at base; preapical band and basal 1/3 of hind femora pale; tibiae pale with reddish brown to fuscous markings; front tibiae with 5 dark annuli including narrow band at base and apex; middle and hind tibiae also with dark bands but sometimes less distinct. Vestiture: dorsum with short, suberect, dark setae intermixed with sericeous, silvery setae; dorsum also sparsely set with long, erect, bristle-like, black setae particularly along veins of clavus and corium. Genitalia: Figure 58.

Female. The female of this species is not known.

REMARKS. - This species is known only from the type material collected in Cochise Co., Arizona and Culberson Co., Texas. Most of these specimens were taken at black light. The absence of females at light suggests that they are brachypterous, as are the females of *P. carnosulus* and *P. listi*. The host plant association of *P. albicuneatus* is not known. Collection dates range from August 1 to August 27.

Phytocoris listi Knight

Figure 59

Phytocoris listi Knight, 1928:30-31; Carvalho 1959:204; Kelton 1980:172, fig. 120, map 51.

TYPES AND TYPE LOCALITY. - This species was described from eight male specimens collected at Fort Collins, Larimer Co., Colorado and Ardmore, Fall River Co., South Dakota. The holotype was taken at Fort Collins, 17 June 1920, G.M. List. The holotype and two paratypes are deposited in the Knight Collection (USNM); five paratypes were not located.

DIAGNOSIS. - Length: male 5.0-6.0 mm, female 3.2. *Phytocoris listi* is very similar to *P. albicuneatus* but is distinguished by the shorter first antennal segment and by the male genital structures.

The ratio of length of antennal segment I to width of head across eyes ranges from 0.65:1 to 0.75:1 for males. The left genital tubercle is thicker and more rounded than for P. albicuneatus (fig. 59a). The shaft of the left clasper is narrow and slightly expanded preapically (fig. 59c); not broad and strongly flattened as in P. albicuneatus.

REMARKS. - In addition to type material, I have examined 13 specimens of P. listi from the following localities: ARIZONA. Apache Co.: Ganado (UAZ). Cochise Co.: Texas Cyn., Chiricahua Mts., 1740 m (USNM). Santa Rita Mts., T17S, R14E (UAZ). COLORADO. Larimer Co.: Fort Collins (USU). Otero Co.: La Junta (JTP). NEW MEXICO: Unspecified locality (USNM). TEXAS. Jeff Davis Co.: Davis Mts. (UCD, USNM). Collection dates range from June 9 to September 23. Kelton (1980) records this species from southern Saskatchewan, Canada. I have seen only one female of P. listi and it is strongly brachypterous. The host plant association of this species is not known.

Plenus Species - Group

DESCRIPTION. - Moderate to large-sized, 4.7-9.1 mm, yellowish, brownish, or sometimes greenish species; vestiture of dorsum composed of suberect, simple setae intermixed with silvery or golden, sericeous setae. Head: antennae brownish yellow to fuscous, segments III and IV often darker than segment II; segment II sometimes with pale, median annulus; frons weakly to strongly convex, meeting tylus along shallow to deep indentation. Pronotum: pronotal disk uniformly pale to extensively darkened, basal submargin sometimes with transverse fuscous line or series of fuscous patches, but lacking weakly elevated points; propleura pale to moderately darkened, sometimes divided by 1 or 2 dark lines. Hemelytra: grayish white to pale brownish yellow, or sometimes pale green; lightly to densely mottled with brown or fuscous (note: the hemelytra of *P. roseus* are lightly to heavily tinged with red); darker species usually with distinct pale region at apex of corium and base of cuneus; membrane lightly to densely spotted or mottled with fuscous. Legs: femora white or pale yellow, marked or reticulated with red, reddish brown, brown, or fuscous; hind femora often extensively darkened and marked with pale spots, sometimes with pale, preapical band; tibiae pale; front and middle tibiae with 3-5 dark annuli. Male genitalia: genital segment usually with distinct tubercle above base of left clasper (exception: genital tubercles absent in *P. bakeri* and *P. tenerum*). Left clasper: sensory lobe moderately to strongly produced; ventral margin of arm sometimes strongly convex anteriorly; shaft slightly to moderately expanded preapically; apex truncated. Right clasper: elongate to broadly lanceolate; dorsal margin in lateral view often slightly concave medially; arm sometimes with knob-like protuberance on dorsal or inner surface; shaft variable, sometimes gradually tapered but often nearly parallel-sided and abruptly tapered near apex; apex acute. Vesica: multilobed; lobes large, sometimes with patch(es) of small tubercles or spines, or rarely with small sclerotized cap apically; vesica with a single sclerotized process (exception: *P. hirsuticus*

and P. ingens have a small second sclerotized process); sclerotized process variable in shape, often with two or more tooth-like serrations; basal process well sclerotized, extending to level of gonopore or beyond, continuous with sclerotized process in P. longihirtus and P. reticulatus. Note: In P. bakeri and P. formosus the membranous portion of the vesica is greatly reduced, the sclerotized process is very small or absent, and the basal process is indistinct.

REMARKS. - The plenus group is comprised of 20 species distributed predominantly in the American Desert and California Chaparral provinces of the southwestern United States. Several members of this group also occur in the Intermountain Sagebrush Province, and two species are known only from southeastern Arizona.

The host plant relationships of many plenus species are poorly known. However, the available host plant records indicate that members of this group occur primarily on herbaceous plants and small, highly-branched shrubs. Some species (e.g., P. plenus, P. stitti, P. tenerum) have been collected from a variety of different host plants. In particular, the species inhabiting herbaceous plants seem to exhibit little or no host plant specificity.

Many plenus species are attracted to light, suggesting that nocturnalism is widespread in this group. Several species also have been collected in pit-fall traps, which supports the idea that some Phytocoris species inhabiting arid regions may seek shelter in ground litter during hot daylight hours.

The plenus group is an assemblage of five or six smaller groups that are most easily distinguished on the basis of characters of the male genitalia, in particular the structure of the sclerotized process of the vesica. Several external characters (e.g., banding patterns on legs and antennae) also are useful in distinguishing subgroups. However, because of overall similarity in external appearances, host plant relationships, and patterns of distribution, I am treating all species in one large group rather than defining smaller, more discreet subgroups. As a result, it is sometimes difficult to recognize a particular species as belonging to the

plenus group per se. The following combination of characters will distinguish most species of the plenus group: pale general coloration, large eyes, dorsum without flattened dark setae, front tibiae usually with 3-5 dark annuli, pronotal disk without weakly elevated points along posterior margin, genital segment usually with distinct tubercle above base of left clasper, claspers simple, and sclerotized process of vesica usually with two or more tooth-like serrations.

Key to the Species of the plenus Group

Positive identification of certain members of the plenus group requires the examination of male genital structures. For this reason, portions of the following key rely exclusively on characters of the male genitalia. Identification of female specimens is possible in some cases, but usually depends on association with known males.

1	Ratio of length of antennal segment I to width of head across eyes less than or equal to 1.10:1 for males and 1.20:1 for females	2
-	Ratio of length of antennal segment I to width of head across eyes greater than 1.10:1 for males and 1.20:1 for females	6
2(1)	Antennal segment II sparsely set with long, erect, setae . . . . . longihirtus Knight, p. 188	
-	Antennal segment II without long, erect setae	3
3(2)	Antennal segment I with middle 1/3 uniformly pale	4
-	Antennal segment I with pale markings, but middle 1/3 never uniformly pale	5
4(3)	Hemelytra pale green; inner apical angle of corium with large fuscous spot . . . electilis n. sp., p. 188	

- Hemelytra pale grayish yellow with brown or reddish brown markings; corium without fuscous spot apically . . . . . *conspicuus* Johnston, p. 190

5(3) Paracuneus marked with fuscous spot; scutellum strongly convex; genital segment of male without tubercle above base of left clasper (fig. 63a) . . . . . *tenerum* n. sp., p. 191

- Paracuneus without fuscous spot; scutellum weakly to moderately convex; genital segment of male with blunt tubercle above base of left clasper (fig. 64a) . . . . . *breviatus* Knight, p. 193

6(1) Front tibiae with 3-5 dark annuli 7

- Front tibiae unicolored, without dark annuli 19

7(6) Front tibiae pale at apex 8

- Front tibiae with dark annulus at apex 10

8(7) Antennal segment I pale with three dark bands on dorsal aspect; genital tubercle above base of left clasper narrowly produced, elongate (fig. 65a) . . . . . *desertinus* n. sp., p. 194

- Antennal segment I with fuscous markings, but lacking distinct dark bands; left genital tubercle more broadly produced, not distinctly elongate (figs. 66a&67a) 9

9(8) Pronotal disk with fuscous spot behind each callus; shaft of left clasper abruptly expanded preapically (fig. 66c) . . . . . *reticulatus* Knight, p. 196

- Pronotal disk without fuscous spots behind calli; shaft of left clasper only slightly and gradually expanded preapically (fig. 67c) . . . . . *aridus* n. sp., p. 197

10(7) Membranous lobes of vesica greatly reduced; sclerotized process absent or very small and knob-like 11

- Membranous lobes of vesica well developed; sclerotized process present, variable in size and shape but never small and knob-like 12

11(10) Antennal segment I distinctly thickened at base; vesica without a sclerotized process; length 4.8-5.2 mm . . . . . *bakeri* Reuter, p. 198

- Antennal segment I only slightly thickened at base; sclerotized process small and knob-like (fig. 69e); length 5.7-7.6 mm . . . . . *formosus* Van D., p. 199

12(10) Vesica with a single sclerotized process 13

- Vesica with two sclerotized processes (figs. 70e&e') . . . . . *ingens* Van D., p. 201

13(12) Sclerotized process with two or more tooth-like serrations 14

- Sclerotized process without serrations 18

14(13) Hemelytra tinged or marked with red, sometimes almost entirely reddened . *roseus* (Uhler), p. 202

- Hemelytra without red markings 15

15(14) Sclerotized process with 2 or 3 serrations (fig. 72e) . . . . . *plenus* Van D., p. 203

- Sclerotized process with 8 or more serrations (figs. 73e-75e) 16

16(15) Antennal segment II with broad, pale annulus medially; left genital tubercle broad and slightly flattened laterally (fig. 73a); length 6.6-6.8 mm . . . . *solanoi* n. sp., p. 205

- Antennal segment II sometimes lighter medially, but without distinct pale annulus; left genital tubercle narrow and cylindrical (figs. 74a&75a); length 6.5-9.2 mm 17

17(16) Legs clothed with long, erect, pale setae, length of setae 2X-3X thickness of hind tibiae . . . . . *hirtus* Van D., p. 207

- Legs clothed with short, pale setae, length of setae rarely exceeding thickness of hind tibiae . . . . . *stitti* Knight, p. 208

18(13) Ratio of length of antennal segment I to posterior width of pronotum 0.85:1 to 1.00:1 for males; left genital tubercle of male as in figure 76a; female strongly brachypterous . . . . . *megatuberis* n. sp., p. 209

- Ratio of length of antennal segment I to posterior width of pronotum 0.75:1 to 0.85:1 for males; left genital tubercle as in figure 77a; female unknown . . . . . *quadriannulipes* Knight, p. 211

19(6) Legs and first antennal segment densely set with long, pale setae; vestiture of hemelytra pale, sometimes with a few golden brown, simple setae; dorsal width of eye in the male distinctly less than width of vertex 20

- Legs and first antennal segment without or with only a few long, pale setae; hemelytra with sparsely distributed, dark brown or black, simple setae; dorsal width of eye in the male equal to or greater than width of vertex 21

20(19) Hemelytra pale green with faint dusky flecks; vesica with two sclerotized processes (figs. 78e&e'); distributed in eastern California and Nevada . . . . . *hirsuticus* Knight, p. 212

- Hemelytra yellowish, clavus and corium lightly tinged with brown; vesica with a single sclerotized process; distributed in southeastern Arizona . . . . . *seminotatus* Knight, p. 213

21(19) Antennal segment I sparsely set with long, pale setae; dorsal width of eye in the male distinctly greater than width of vertex; vesica with two sclerotized processes (figs. 70e&e') . . . . . *ingens* Van D., p. 201

\- Antennal segment I without long, pale setae; dorsal width of eye in the male about equal to width of vertex; vesica with a single sclerotized process (fig. 75e) . . . . . *stitti* Knight, p. 208

Phytocoris longihirtus Knight

Figure 60

Phytocoris longihirtus Knight, 1968:218, fig. 257.

TYPES AND TYPE LOCALITY. - This species was described from two specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male was taken in Area JAL10C, Nevada Test Site, 25 April 1961, in "can pit-trap". The holotype and allotype are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.7-7.6 mm. Phytocoris longihirtus is similar to P. aridus and P. reticulatus but differs by the shorter first antennal segment (see couplet 1 in key) and by the long, erect setae on the legs and antennae. The tubercle above the base of the left clasper is large and distinctly tapered (fig. 60a), and the sclerotized process is continuous with the basal process (fig. 60e). The female of this species is strongly brachypterous.

REMARKS. - Besides type material, I have examined one male specimen of P. longihirtus from Kramer Hills, San Bernardino Co., California. The host plant association of this species is not known. The types were taken in pit-fall traps, indicating that P. longihirtus maintains a degree of contact with the ground surface. It is possible that this species is nocturnal and seeks shelter in ground litter during arid daylight hours. Collection dates are from April 19 to May 18.

Phytocoris electilis new species

Figure 61

TYPES AND TYPE LOCALITY. - Holotype male: 1 mi. E Wilcox, Cochise Co., Arizona, 11 August 1973, J.D. Pinto (UCR). Paratypes:

ARIZONA. Cochise Co.: 2 females, Wilcox, 8 August 1974, ex. Chenopodium album L., J.D. Pinto (UCR); 1 male, Wilcox, 2 August 1975, J.D. Pinto (UCR); 2 females, 4.3 mi. S Wilcox, 15 August 1975, ex. Chenopodium album, J.D. Pinto (UCR). Pima Co.: 2 males and 6 females, Tucson, 14-17 August 1916 (AMNH).

DIAGNOSIS. - Phytocoris electilis is distinguished from other species of the plenus group by the pale green general coloration, short first antennal segment (see couplet 1 in key) with middle 1/3 uniformly pale, and the large, fuscous spot at the inner apical angle of the corium.

DESCRIPTION. - Male. Length 4.75-5.45 mm, width 1.64-1.91; pale green general coloration, fading with age to yellow. Head: width across eyes 0.91-0.98, vertex 0.33-0.37; frons strongly convex, meeting tylus along deep indentation. Rostrum: length 1.80-2.09, reaching between or slightly beyond hind coxae. Antennae: I, length 0.83-1.01, brownish, middle 1/3 pale; II, length 1.66-2.14, fuscous, basal 1/4 and preapical 1/4 pale; III, length 1.12-1.28, color pattern as in segment II; IV, length 0.90, fuscous. Pronotum: mesal length 0.76-0.94, posterior width 1.35-1.64; pronotal disk pale green with faint dusky markings; propleura pale. Scutellum: pale green: moderately convex. Hemelytra: pale green with dusky markings; inner apical angle of corium with large fuscous spot; anal ridge and apex of cuneus marked with red; membrane lightly to moderately marked with dusky spots. Legs: femora pale greenish yellow, apical 1/3 to 1/2 with reddish brown or brown markings; tibiae pale; front and middle tibiae with 3 or 4 narrow, brownish annuli; hind tibiae with single dark annulus before base. Vestiture: dorsum with suberect, simple setae intermixed with silvery and golden, sericeous setae. Genitalia: Figure 61.

Female. Similar to male in color and vestiture. Length 5.67-6.10 mm, width 2.07-2.23. Head: width across eyes 0.97-1.02, vertex 0.40-0.41. Rostrum: length 2.05-2.23, reaching between or slightly beyond hind coxae. Antennae: I, 0.95-1.03; II, 1.80-2.07;

III, 1.17-1.33; IV, 0.86-0.99. Pronotum: mesal length 1.01-1.06, posterior width 1.69-1.80.

REMARKS. - *Phytocoris electilis* is known only from the type material collected in southern Arizona. The host plant of this species is *Chenopodium album*. Collection dates range from August 2 to August 17.

Phytocoris conspicuus Johnston

Figure 62

Phytocoris conspicuus Johnston, 1930:295-297, fig. 1; Carvalho 1959:195.

TYPES AND TYPE LOCALITY. - This species was described from 12 specimens collected in Colorado and Texas. The holotype female, allotype, and four female paratypes were taken at College Station, Brazos Co., Texas, 5-12 October 1928, in light trap, S.E. Jones. The holotype, allotype, and two paratypes are retained in the personal collection of H.G. Johnston and eight paratypes are deposited in the collection of the USNM.

DIAGNOSIS. - Length 5.1-6.5 mm. *Phytocoris conspicuus* is distinguished from other species of the *plenus* group by the following combination of characters. The middle 1/3 of antennal segment I is uniformly pale; basal and apical 3rds reddish. The length of antennal segment I is equal to or slightly greater than the width of the head across the eyes. The hemelytra are pale grayish yellow with limited brown or reddish brown markings and the cuneus is marked with red or reddish brown.

REMARKS. - I have examined 25 specimens of *P. conspicuus* from Armstrong and Brazos counties, Texas; Meade Co., Kansas; and an unspecified locality in Colorado. Although the distribution of this

species is poorly known, it probably does not occur west of the Rocky Mountains. Phytocoris conspicuus has not been associated with any host plants, but both sexes have been taken at light. The range of occurrence is from July 19 to October 12.

Phytocoris tenerum new species

Figure 63

TYPES AND TYPE LOCALITY. - Holotype male: 14 mi. E Brawley, Imperial Co., California, 28 April 1973, J. Schuh (AMNH). Paratypes: CALIFORNIA. 7 females, same data as holotype (AMNH). Riverside Co., 18 mi. W Blythe: 29 April 1952, 1 male taken at light; 13-18 April 1958, 1 male taken on Coldenia plicata (Torr.), 1 male taken on Nama hispidum Gray, 1 male and 4 females collected at light (UCR).

DIAGNOSIS. - This species is distinguished from other members of the plenus group by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes is less than 1.10:1 for males and 1.20:1 for females. The first antennal segment is not broadly pale medially. The paracuneus is marked with a fuscous spot and the genital segment of the male is without a distinct tubercle above the left clasper base (fig. 63a). Phytocoris tenerum is most similar to P. electilis but differs by the larger size, pale brownish yellow general coloration, strongly convex scutellum, and absence of a broad pale region medially on antennal segment I.

DESCRIPTION. - Male. Length 6.37-7.56 mm, width 1.98-2.50; pale yellow or pale brownish yellow general coloration, sometimes with faint reddish tinge. Head: width across eyes 0.95-1.12, vertex 0.30-0.36; frons moderately convex, meeting tylus along distinct indentation. Rostrum: length 2.52-2.88, extending to 4th abdominal segment. Antennae: brownish yellow, segments III and IV sometimes darker brown; I, length 0.88-1.13, with red to brown markings; II,

length 2.29-2.57; III, length 1.04-1.24; IV, length 0.38-0.54. Pronotum: mesal length 0.88-1.08, posterior width 1.55-1.89; pronotal disk pale yellow, tinged or marked with brown or reddish brown; collar, calli, and basal submargin of disk usually marked with fuscous; calli prominent, bordered posteriorly by deeply impressed line; propleura pale, anterior basal angle sometimes lightly infuscated. Scutellum: strongly convex; pale, usually with dark spot or stripe each side before apex. Hemelytra: pale yellow or pale brownish yellow with brown to fuscous markings, sometimes with faint reddish tinge; paracuneus marked with fuscous spot; membrane conspurcate. Legs: femora pale yellow to brownish yellow, lightly marked with reddish brown to fuscous mostly on apical 1/3 to 1/2 of segment; tibiae pale; front and middle tibiae with 4 or 5 dark annuli; hind tibiae usually with three dark annuli. Vestiture: dorsum with suberect, simple setae intermixed with silvery, sericeous setae; most of sericeous setae on pronotal disk and hemelytra grouped into scattered, circular patches. Genitalia: Figure 63.

Female. Similar to male in color and vestiture. Length 5.94-7.24 mm, width 2.09-2.66. Head: width across eyes 0.98-1.12, vertex 0.41-0.48. Rostrum: length 2.70-3.13, extending to 4th or 5th abdominal segment. Antennae: I, 0.90-1.08, II, 1.60-2.23; III, 0.82-1.12; IV, 0.49-0.54. Pronotum: mesal length 0.93-1.19, posterior width 1.64-2.09.

REMARKS. - This species is distributed in the Mojave and Sonoran deserts where it occurs on herbaceous plants. Adult specimens have been collected from *Abronia*, *Chaenactis*, *Coldenia*, and *Nama*. Both sexes have been taken at light.

SPECIMENS EXAMINED. - I have examined 58 specimens from the following localities: ARIZONA. Maricopa Co.: Mesa (OSU). Pima Co.: Ajo Mts., The Alamo (USNM). Yuma Co.: Ehrenberg (USNM); Yuma (NAU, UAZ, USNM). CALIFORNIA. Kern Co.: El Paso Mts., Iron Cyn. (UCB). Imperial Co.: El Centro (CAF&A); Glamis (CAF&A); 3.5 mi. NW Glamis (CAF&A, UCR). Riverside Co.: Blythe (OSU); Hopkins Well

(UCB); Palm Springs (UCR). San Bernardino Co.: 16 mi. NE Twentynine Palms (UCB). San Diego Co.: Borrego Valley (UCD, UCR). Collection dates range from March 8 to May 1.

Phytocoris breviatus Knight

Figure 64

Phytocoris breviatus Knight, 1968:226-227, fig. 274.

TYPES AND TYPE LOCALITY. - This species was described from 20 specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site), 19 July to 26 August 1962 & 1965, at light (in part). The holotype male was taken at light in Area M(T), Nevada Test Site, 26 August 1965, J.M. Merino. The holotype, allotype, and 13 paratypes are retained in the Knight Collection (USNM). Four paratypes are deposited in the collection of BYU and one paratype was not located. Five paratypes examined at the USNM were omitted from the original description; label data for these are: 1 female, Mercury, Nevada, 401M(TB), VII-21-1965, E. Beck and J. Merino; 1 female, Mercury, Nevada, M(T), VIII-5-1965, Joe Merino; 3 females, Mercury, Nevada, 1M(T), VII-27-1965, E. Beck and J. Merino.

DIAGNOSIS. - Phytocoris breviatus closely resembles P. plenus but differs by the smaller size, 5.40-6.80 mm, shorter first antennal segment, and form of the male genitalia. The ratio of length of antennal segment I to width of head across eyes is less than 1.10:1 for males and 1.20:1 for females. The tubercle above the base of the left clasper is small (fig. 64a), the shaft of the left clasper is only slightly expanded preapically (fig. 64c), and the sclerotized process has 6-8 serrations (fig. 64e).

REMARKS. - Phytocoris breviatus has been collected in southern California (Kern, Inyo, Riverside, and San Diego counties), Nevada (Clark, Nye, and Pershing counties), and Washington Co., Utah. I

have examined 35 specimens mostly taken at light. One specimen from the paratype series was collected from Atriplex canescens (Pursh). Collection dates are from May 2 to September 9.

Phytocoris desertinus new species

Figure 65

TYPES AND TYPE LOCALITY. - Holotype male: P.L. Boyd Desert Rsrh. Center, 3.5 mi. S Palm Desert, Riverside Co., California, 3 May 1974, J.D. Pinto (UCR). Paratypes: 5 males and 8 females, same locality data as holotype, 3 & 4 May 1974, D.L. Dickson, J.A. Mollet, J.D. Pinto, P.S. Silva, S.E. vanVorhis (UCR).

DIAGNOSIS. - Phytocoris desertinus is distinguished from other species of the plenus group by the following combination of characters. Antennal segment I has three dark bands on the dorsal aspect; length of segment I much greater than width of head across eyes. The front tibiae are marked with three dark annuli, leaving the apices pale. The left gential tubercle of the male is narrow and cylindrical (fig. 65a), and the sclerotized process lacks serrations (fig. 65e).

DESCRIPTION. - Male. Length 6.21-7.40 mm, width 2.05-2.43; grayish white ground color with brown markings. Head: width across eyes 1.11-1.17, vertex 0.39-0.42; jugum and tylus lightly marked with reddish brown; frons usually with several faint, reddish or brownish striae. Rostrum: length 3.29-3.47, extending to 7th or 8th abdominal segment. Antennae: I, length 1.55-1.84, white or pale yellow with three dark annuli; II, length 3.22-3.67, yellowish brown or brown, narrowly pale at base; III, length 1.85-2.00, brown to dark brown; IV, length 1.08-1.33, brown to dark brown. Pronotum: mesal length 0.99-1.13, posterior width 1.57-1.91; prontal disk grayish white or pale yellow, sometimes with faint, brownish tinge; collar and calli usually marked with red or reddish brown; propleura pale,

anterior margin sometimes lightly marked with red or reddish brown. Scutellum: pale, sometimes with faint brownish tinge. Hemelytra: grayish white or pale yellow, marked with brown particularly along outer margin of corium and lateral margins of cuneus; corium with large brownish patch basally and another between anal ridge and radial vein; cuneus sometimes marked with red at apex; membrane uniformly pale or lightly conspurcate. Legs: femora white or pale yellow, lightly marked with brown to fuscous mostly on apical half of segment; tibiae pale with three dark annuli; hind tibiae set with long, erect, pale setae. Vestiture: dorsum with suberect, golden to brownish, simple setae intermixed with silvery, sericeous setae. Genitalia: Figure 65.

Female. Similar to male in color and vestiture. Length 6.00-7.40 mm, width 1.85-2.52. Head: width across eyes 1.06-1.22, vertex 0.38-0.43. Rostrum: length 3.19-3.67, extending to or slightly beyond base of ovipositor. Antennae: I, 1.57-1.89; II, 3.19-3.83; III, 1.91-2.00; IV, 1.12-1.30. Pronotum: mesal length 0.94-1.13, posterior width 1.49-1.87.

REMARKS. - *Phytocoris desertinus* is distributed in the Sonoran Desert region of southeastern California and southern Arizona. The host plant association of this species is not known. Both sexes have been collected at light.

SPECIMENS EXAMINED. - Fourteen additional specimens were examined from the following localities. ARIZONA. Pima Co.: Organ Pipe Nat. Mon., Drippings Spgs. (UCB). CALIFORNIA. Riverside Co.: Andreas Cyn. (UCR); Deep Cyn. (UCR); 3.5 mi. S Palm Desert (UCR). San Diego Co.: Borego Desert, Palm Cyn. (UCR). Collection dates range from April 24 to November 11.

Phytocoris reticulatus Knight

Figure 66

Phytocoris reticulatus Knight, 1968:217, fig. 260.

TYPES AND TYPE LOCALITY. - Phytocoris reticulatus was described from 11 specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site) in "can pit-traps". The holotype male was taken in Area CBA10, Nevada Test Site, 11 April 1961. The holotype, allotype, and five paratypes are retained in the Knight Collection (USNM), and two paratypes are deposited in the collection of BYU. The remaining two paratypes were not located. One female paratype examined at the USNM was omitted from the original description; label data: Mercury, Nevada, N.T.S., 23 Oct. 1961, CBA1.

DIAGNOSIS. - Length 5.5-7.8 mm. This species closely resembles P. aridus but is distinguished by the fuscous spots behind the calli and by the male genital structures. The hemelytra of P. reticulatus also tend to be more extensively infuscated, although the degree of darkening is somewhat variable. The sensory lobe of the left clasper is less prominent in P. reticulatus (fig. 66b), but the shaft is more abruptly expanded preapically (fig. 66c). The sclerotized process is continuous with the basal process; lateral margins of expanded apical region deflexed, forming a bowl-shaped structure (fig. 66e). Phytocoris reticulatus also resembles P. longihirtus but differs by the longer first antennal segment (see couplet 1 in key) and absence of long, pale setae on the legs and antennae. Females of P. reticulatus occasionally have the wing membrane slightly to moderately reduced but strongly brachypterous individuals are rare.

REMARKS. - Phytocoris reticulatus is widely distributed in the Mojave and Sonoran deserts. Specimens have been collected as far north as Manhattan, Nye Co., Nevada; east to White Cyn., San Juan

Co., Utah; and south to Organ Pipe Nat. Mon., Pima Co., Arizona. The western boundary of the distribution is formed by the southwestern mountain ranges of California and the southern tip of the Sierra Nevada Mountains. The host plant association of this species is not known. Both sexes have been collected at light. I have examined 68 specimens with collection dates ranging from March 18 to December 17.

Phytocoris aridus new species

Figure 67

TYPES AND TYPE LOCALITY. - Holotype male: Salt R. Cyn., Apache Lk., Maricopa Co., Arizona, 28 April 1981, D.A. & J.T. Polhemus (JTP). Paratypes: 1 male, same data as holotype (JTP). CALIFORNIA. Riverside Co.: 1 male, Andreas Cyn., 24 April 1954, taken at light, Timberlake (UCR); 1 male, Cottonwood Spg., 26 April 1949, taken at light, J.E. Gillaspy (UCB); 1 male, Deep Cyn., 16 May 1963, taken at light, E.I. Schlinger (UCR). NEVADA. Clark Co.: Boulder Beach, Lake Mead, 27 May 1965, J. Powell (UCB).

DIAGNOSIS. - This species is distinguished from other members of the plenus group by the following combination of characters: antennal segment I without dark bands, length of segment distinctly greater than width of head across eyes; front tibiae with three dark annuli, apices pale; pronotal disk without fuscous spots behind calli; left genital tubercle of male broadly produced (fig. 67a); sensory lobe of left clasper prominent (fig. 67b), shaft only slightly expanded preapically (fig. 67c); sclerotized process of vesica without serrations (fig. 67e).

DESCRIPTION. - Male. Length 7.78-8.21 mm, width 2.59-2.70; pale yellow ground color with brown to fuscous markings. Head: width across eyes 1.18-1.24, vertex 0.35-0.39; jugum, lorum, and tylus marked with reddish brown; frons moderately convex, with 6-8 dark striae. Rostrum: length 3.11-3.31, extending to between 4th and 6th

abdominal segments. Antennae: I, length 1.76-1.85, pale yellow with scattered brownish markings; II, length 3.51-3.67, brownish yellow, apical 1/3 sometimes darker brown; III, length 1.80-1.89, brown to fuscous; IV, length 0.99-1.28, brown to fuscous. Pronotum: mesal length 1.13-1.22, posterior width 1.98-2.07; pronotal disk pale yellow with reddish brown to dark brown markings, particularly around calli and along lateral margins; propleura pale, anterior margin sometimes lightly infuscated medially. Scutellum: moderately convex; pale yellow with faint brownish markings. Hemelytra: white or pale yellow, mottled with reddish brown to fuscous patches; membrane conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly on apical half of segment; tibiae pale with three dark annuli. Vestiture: dorsum with light and dark, simple setae intermixed with silvery, sericeous setae. Genitalia: Figure 67.

Female. Similar to male in color and vestiture. Length 8.05 mm, width 2.74. Head: width across eyes 1.22, vertex 0.42. Rostrum: length 3.31, extending to 4th abdominal segment. Antennae: missing. Pronotum: mesal length 1.22, posterior width 2.11. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris aridus* is known only from the type material collected in Arizona, California, and Nevada. The host plant relationships of this species are not known. Several male specimens of the paratype series were taken at light. Collection dates are from April 24 to May 27.

Phytocoris bakeri Reuter

Figure 68

Phytocoris bakeri Reuter, 1909:28; Van Duzee 1917a:318; Carvalho 1959:191; Knight 1968:229; Henry and Stonedahl 1983; in press.

TYPES AND TYPE LOCALITY. - *Phytocoris bakeri* was described from a series of specimens collected at Claremont, Los Angeles Co., California, Baker. I have examined 10 specimens of this series: two males from the collection of the Zoological Museum, Helsinki, Finland; one male from the collection of the USNM; and 5 males and 2 females from the CAS collection. A specimen bearing Reuter's hand-printed determination label was designated a lectotype by Henry and Stonedahl (1983). The lectotype is deposited in the Zoological Museum in Helsinki.

DIAGNOSIS. - This species closely resembles *P. formosus* but is distinguished by the smaller size, 4.8-5.3 mm, shorter first antennal segment which is distinctly thickened basally, and the more extensively darkened hind femora. The genital segment of the male lacks a tubercle above the base of the left clasper (fig. 68a) and the vesica is without a sclerotized process.

REMARKS. - *Phytocoris bakeri* is known from Los Angeles and San Diego counties in California. The host plant of this species is not known, but like the allied species, *P. formosus*, it probably occurs on an herbaceous plant. I have examined nine specimens with collection dates ranging from April 11 to June 5.

Phytocoris formosus Van Duzee

Figure 69

Phytocoris reuteri Van Duzee, 1914:18-19 (preoc. by *P. reuteri* Saunders).

Phytocoris formosus Van Duzee, 1916:37 (n.n.), 1917a:319, 1925:89; Knight 1927a:44, Carvalho 1959:199; Knight 1968:223; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - This species was described from an unknown number of specimens collected at Alpine, San Diego Co.,

California, 4 July and 5 August 1913, E.P. Van Duzee. Fifteen specimens of the original syntype series are retained in the Van Duzee Collection (CAS) and two specimens are deposited in the Knight Collection (USNM). After the original description, Van Duzee selected a lectotype (No. 2000) and "allotype" (No. 2001) from the original series, but did not publish an account of these actions. He tagged the remaining specimens of the syntype series with orange "paratype" labels. The male specimen selected as a lectotype by Van Duzee is designated as such by Henry and Stonedahl (1983) and is deposited in the collection of the CAS.

DIAGNOSIS. - Length 5.7-7.6 mm; yellowish brown general coloration; antennae yellowish brown, segments III and IV brown to fuscous; frons moderately convex, meeting tylus along distinct indentation; pronotal disk pale, basal submargin with transverse fuscous line or series of fuscous patches; propleura pale, anterior margin sometimes with reddish brown stripe; hemelytra yellowish brown, often lightly tinged with red; claval vein, outer margin of corium, and inner apical angle of corium marked with brown; femora pale yellow, reticulated with reddish brown to dark brown; tibiae pale with brown or reddish brown markings; front and middle tibiae with 4 or 5 dark annuli.

The following characters will distinguish *P. formosus* from other species of the *plenus* group: antennal segment I much longer than width of head across eyes, only slightly thickened at base; front tibiae with dark annulus at apex; membranous lobes of vesica greatly reduced, sclerotized process very small and knob-like (fig. 69e).

REMARKS. - *Phytocoris formosus* is distributed in the chaparral province of southwestern California where it occurs on *Cordylanthus filifolius* Nutt. I have examined 56 specimens from Los Angeles, Riverside, San Bernardino, and San Diego counties. Collection dates range from June 22 to September 23.

Phytocoris ingens Van Duzee

Figure 70

Phytocoris ingens Van Duzee, 1920:340; Carvalho 1959:202; Knight 1968:235.

TYPES AND TYPE LOCALITY. - Phytocoris ingens was described from two males and two females collected at Pasadena, Los Angeles Co., California, F. Grinnell. The holotype male (No. 687), allotype (No. 688), and one female paratype are deposited in the Van Duzee Collection (CAS). The male paratype is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.5-8.3 mm. Phytocoris ingens is distinguished from other species of the plenus group by the following combination of characters: antennal segment I distinctly longer than width of head across eyes; front tibiae usually with 4 or 5 dark annuli, sometimes indistinct in paler specimens; hemelytra dull grayish yellow with some dark brown or black, simple setae; legs and first antennal segment often sparsely set with long, pale setae; dorsal width of eye in the male distinctly greater than width of vertex; vesica with two sclerotized processes (figs. 70e&e').

REMARKS. - The distribution of P. ingens is restricted to the chaparral province of southwestern California. I have examined 53 specimens ranging from Dulzura, San Diego Co.; north to Refugio Beach, Santa Barbara Co.; and east to Palm Springs, Riverside County. The only host plant record for this species is Salvia sp. Both sexes have been taken at light. The range of occurrence is from May 16 to August 22.

Phytocoris roseus (Uhler)

Figure 71

Compsocerocoris roseus Uhler, 1894:253-254.

Phytocoris roseus, Reuter 1909:27-28; Van Duzee 1914:19, 1917a:318; Carvalho 1959:214; Knight 1968:249; Henry and Stonedahl 1983:in press.

Phytocoris barbatus Van Duzee, 1920:353-354; Carvalho 1959:214 (synonymy).

TYPES AND TYPE LOCALITY. - In the original description of P. roseus, Uhler refers to a single specimen from San Borja, Mexico and a pair from Los Angeles, California. A type specimen was not designated in the original description. I have examined one male specimen from the original syntype series with label data "San Borja, Lower Cal., Mex., Chas D. Haines, May 1889"; "778"; male symbol; "LECTOTYPE roseus" (handwritten). The red lectotype label was probably applied by E.P. Van Duzee, but no type designation was published. The above specimen was designated a lectotype by Henry and Stonedahl (1983) and is retained in the collection of the CAS (No. 557).

The junior synonym, P. barbatus, was described from a single male collected at Pasadena, Los Angeles Co., California, F. Grinnell. This specimen is deposited in the Van Duzee Collection (CAS), type number 710.

DIAGNOSIS. - Length 5.6-7.3 mm; pale yellowish general coloration, variously marked or tinged with red; antennae fuscous; segment I with scattered pale patches, length equal to or greater than posterior width of pronotum; segment II with broad pale annulus at middle; frons strongly convex, meeting tylus along deep indentation; pronotal disk white or pale yellow; collar and calli marked with fuscous in darker specimens; propleura pale, sometimes tinged with red; hemelytra pale yellow, lightly to extensively tinged

with red, sometimes marked with fuscous along claval suture; membrane lightly to densely conspurcate; femora pale yellow, reticulated with reddish brown to fuscous; tibiae with 3-5 dark annuli.

Phytocoris roseus is readily distinguished from other plenus group species by the reddish markings on the hemelytra, long first antennal segment, fuscous second antennal segment with pale median annulus, and the annulated tibiae. The sclerotized process of the vesica has 3 or 4 large serrations (fig. 71e).

REMARKS. - Phytocoris roseus is widely distributed in the chaparral province of southwestern California from San Diego County north to San Benito County. Specimens also have been collected in Inyo Co., California; Maricopa Co., Arizona; and Pinal Co., Arizona. The host plant of this species is Eriogonum fasciculatum Benth. Both sexes have been taken at light. I have examined 135 specimens with collection dates ranging from April 28 to August 10.

Phytocoris plenus Van Duzee

Figure 72

Phytocoris plenus Van Duzee, 1918:282-283; Carvalho 1959:211; Knight 1968:228, fig. 276.

TYPES AND TYPE LOCALITY. - Phytocoris plenus was described from four male specimens collected in southern California. The holotype (No. 398) was taken at Keen Camp, San Jacinto Mts., Riverside Co., California, 6-12 June 1917, E.P. Van Duzee. The holotype and two paratypes are retained in the Van Duzee Collection (CAS). One paratype is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 6.0-8.1 mm; brownish general coloration; antennae brown to fuscous, segment I with pale spots, segment II sometimes lighter yellowish brown; frons moderately convex, usually marked with fuscous striae; pronotal disk grayish white to pale

brownish yellow, with brown to fuscous markings, basal submargin of disk with broad fuscous band or series of dark patches; propleura pale, often with 1 or 2 fuscous stripes; hemelytra grayish white or grayish yellow with brown to fuscous markings; corium usually with angular fuscous patch between anal ridge and radial vein; membrane moderately to densely conspurcate; femora white to pale brownish yellow, reticulated with brown or dark brown; tibiae pale with 4 or 5 dark annuli.

This species is distinguished from other members of the plenus group by the following combination of characters. The first antennal segment is distinctly longer than the width of the head (see couplet 1 in key). The front tibiae are annulated; apical annulus fuscous. The hemelytra are pale with brown to fuscous markings; not distinctly tinged with red as in P. roseus. The vesica has a single sclerotized process with 2 or 3 tooth-like serrations (fig. 72e).

REMARKS. - Phytocoris plenus is widely distributed in the western United States. I have examined 276 specimens from Arizona, California, Idaho, Oregon, Nevada, Utah, and Washington. The northernmost records are from Satus Pass, Klickitat Co., Washington and Dixie, Idaho Co., Idaho. Specimens have been collected as far east as St. Anthony, Fremont Co., Idaho; Bryce Canyon Nat. Pk., Garfield Co., Utah; and Maricopa, Pima Co., Arizona. The southernmost records are from San Diego Co., California and Yuma Co., Arizona. This species occurs west to the coast ranges of Oregon and California. Adult specimens have been collected from a variety of herbaceous and shrubby plants including Eriogonum spp., Mentzelia laevicaulis (Dougl.), Oxytheca perfoliata T.&G., Phacelia distans Benth., Purshia sp., and Rhus trilobata Nutt. In Oregon, this species was swept from dried grasses and herbs. Both sexes have been taken at light. Collection dates range from February 23 to December 2, suggesting the possibility that P. plenus is bivoltine or multivoltine at least in the southern portion of its range.

Considerable variation exists within this species over its range of distribution. Body size and certain measurable characters of the

head (e.g., lengths of antennal segments, width of eye and vertex) are particularly variable, even when transformed into ratios. The male genitalia of P. plenus, however, display little variation and offer excellent characters for recognition of this species. The vesica has a single sclerotized process with three, rarely two, apical serrations (fig. 72e). The left genital tubercle is broad and somewhat flattened laterally (fig. 72a), and the shaft of the left clasper has a distinct tooth at the base of the expanded preapical region (fig. 72c).

I have examined material from California representing two or possibly three undescribed taxa that resemble P. plenus. Externally, they are very similar to P. plenus and to one another, but each can be recognized by characteristics of the male genitalia. Although these taxa appear to be distinct species, I am postponing treatment of this complex until more specimens are available for study.

Phytocoris solanoi new species

Figure 73

TYPES AND TYPE LOCALITY. - Holotype male: Vacaville, Solano Co., California, 25 July 1948, A.T. McClay (UCD). Paratypes: CALIFORNIA. 1 male, same data as holotype except 4 September 1947 (UCD). Colusa Co.: 1 male and 1 female, 5 mi. S Arbuckle, 13 August 1959, B.N. Chaniotis (UCD).

DIAGNOSIS. - This species is recognized by the following characteristics. Antennal segment I is distinctly longer than the width of the head across eyes. Antennal segment II is marked with a pale, median annulus. The front tibiae are annulated; apical annulus fuscous. The left genital tubercle is broad and somewhat flattened laterally (fig. 73a), and the vesica has a single sclerotized process with 8-10 serrations (fig. 73e). Phytocoris solanoi closely resembles P. desertinus but differs by the dark apices of the front

tibiae, pale annulus at middle of antennal segment II, broader genital tubercle, and the serrated sclerotized process.

DESCRIPTION. - Male. Length 6.59-6.64 mm, width 2.00-2.09; grayish yellow ground color with brown markings. Head: width across eyes 1.07-1.12, vertex 0.40-0.42; buccula, jugum, lorum, and tylus marked with reddish brown; frons moderately convex, marked with several reddish striae. Rostrum: length 2.97-3.19, extending to 7th or 8th abdominal segment. Antennae: dark brown; I, length 1.39-1.44, with three pale annuli; II, length 2.70, with broad pale annulus at middle; III, length 1.64; IV, length 1.35. Pronotum: mesal length 0.93-0.99, posterior width 1.53-1.62; pronotal disk pale grayish yellow, lightly marked with brown; collar and calli marked with reddish brown; propleura pale, lightly infuscated basally, anterior margin with reddish brown stripe medially. Scutellum: pale, lightly marked with reddish brown, usually with fuscous spot either side before apex. Hemelytra: pale grayish yellow, lightly marked with brown or fuscous; corium with angular fuscous patch between anal ridge and radial vein; lateral margins of cuneus marked with brown or fuscous; membrane lightly to moderately conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings; tibiae pale; front and middle tibiae with 4 or 5 fuscous annuli; hind tibiae with two dark annuli. Vestiture: dorsum with light and dark, simple setae intermixed with silvery, sericeous setae. Genitalia: Figure 73.

Female. Similar to male in color and vestiture. Length 6.80 mm, width 2.16. Head: width across eyes 1.09, vertex 0.44. Rostrum: length 3.13, extending to 5th abdominal segment. Antennae: I, 1.53; II, 2.92; III & IV, missing. Pronotum: mesal length 0.99, posterior width 1.58. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris solanoi* is known only from the type material collected in Colusa and Solano counties, California. Collection dates are from July 25 to September 4. The host plant

relationship is not known, but I expect this species occurs on a small shrub or perennial herb.

Phytocoris hirtus Van Duzee

Figure 74

Phytocoris hirtus Van Duzee, 1918:284-285; Carvalho 1959:201; Knight 1968:223.

TYPES AND TYPE LOCALITY. - This species was described from two female specimens collected in southern California. The holotype (No. 401) was taken at Pasadena, Los Angeles Co., F. Grinnell, and the single paratype at Coronodo, North Island, San Diego Co., 30 June 1913, E.P. Van Duzee. Both specimens are retained in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 7.0-8.5 mm. This species closely resembles P. plenus but differs by the long, pale setae on the legs and dorsum; multiple serrations of the sclerotized process (fig. 74e); and the narrow, cylindrical left genital tubercle (fig. 74a). The long, pale setae on the legs and dorsum will differentiate this species from P. stitti. Phytocoris hirtus is distinguished from P. ingens by the smaller eyes, narrow genital tubercle, and the single sclerotized process.

REMARKS. - Phytocoris hirtus is distributed in the chaparral province of southwestern California from San Luis Obispo County to San Diego County. Specimens also have been collected in Inyo Co., California; Washington Co., Utah; and Pima Co., Arizona. The host plant association of this species is not known, but both sexes have been taken at light. I have examined 42 specimens with collection dates ranging from April 19 to August 1.

Phytocoris stitti Knight

Figure 75

Phytocoris stitti Knight, 1961:474,476, fig. 2; 1968:228, fig. 275.
Phytocoris albiceps Knight, 1968:234-235, fig. 277 (NEW SYNONYMY).
Phytocoris merinoi Knight, 1968:227, fig. 271 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris stitti was described from three male specimens taken at Tucson, Pima Co., Arizona, 9 & 10 April 1942, L.L. Stitt. All type material is retained in the Knight Collection (USNM).

The junior synonym, P. albiceps, was described from 10 specimens collected in southern California and southwestern Arizona. The holotype male, allotype, and six male paratypes were taken at Barstow, San Bernardino Co., California, 21 May 1938, J. Standish. All type material is retained in the Knight Collection (USNM) except one paratype that was not located.

The junior synonym, P. merinoi, was described from 13 specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male, allotype, and six paratypes were taken in Area 16M, Nevada Test Site, 11 June 1965, ex. Grayia spinosa (Hook.), H.H. Knight and J.M. Merino. The holotype, allotype, and eight paratypes are retained in the Knight Collection (USNM). Two paratypes are deposited in the collection of BYU and one paratype was not located.

DIAGNOSIS. - Length 6.5-9.1 mm. Phytocoris stitti is distinguished from allied species by the following combination of characters: legs and antennal segment I without long, pale setae; hemelytra with sparsely distributed, dark, simple setae; dorsal width of eye in the male about equal to width of vertex; left genital tubercle narrow and cylindrical (fig. 75a); vesica with a single sclerotized process, set with 8-10 serrations (fig. 75e). The front tibiae are usually annulated, but the bands are sometimes indistinct in paler specimens.

REMARKS. - Phytocoris stitti is widely distributed in the Mojave and Sonoran deserts. Specimens have been collected as far north as Lone Pine, Inyo Co., California and Mercury, Nye Co., Nevada. The easternmost record is Tucson, Pima Co., Arizona. The western boundary of the distribution is formed by the southwestern mountain ranges of California and the southern tip of the Sierra Nevada Mountains. Adult specimens have been collected from Franseria dumosa Gray., Grayia spinosa (Hook.), Hymenoclea monogyra T.&G., H. salsolae T.&G., Purshia tridentata (Pursh), Salazaria mexicana Torr., and Sphaeralcea sp. Males and females are attracted to light. I have examined 270 specimens with collection dates ranging from March 9 to June 26.

Phytocoris albiceps and P. merinoi have been placed in synonymy with P. stitti on the basis of identical genital structures of the males. I have examined type material of both junior synonyms and they differ from typical P. stitti only in the lighter general coloration. Phytocoris stitti ranges in color from white with limited dusky markings to specimens that are extensively marked with brown or dark brown. Females of this species have slightly shorter hemelytra than males, but the wing membrane is always well developed.

Phytocoris megatuberis new species

Figure 76

TYPES AND TYPE LOCALITY. - Holotype male: 3.5 mi. W Westgard Pass Sumt. on St. Hwy. 168, 2134 m, Inyo Co., California, 12 July 1980, taken at light, G.M. Stonedahl and R.T. Schuh (AMNH). Paratypes: 3 males, same data as holotype (USNM, CAS, OSU); 3 males and 1 female, California, Inyo Co., 9 mi. NE Big Pine, 1920 m, 9 June 1966, ex. Artemisia sp. at night, W. Gagne (UCB).

DIAGNOSIS. - Phytocoris megatuberis is distinguished from other species of the plenus group by the following combination of characters. The ratio of length of antennal segment I to posterior

width of pronotum is 0.85:1 to 1.00:1 for males. The front tibiae are annulated; apical annulus fuscous. The left genital tubercle is notched dorsally (fig. 76a) and the vesica has a single sclerotized process without serrations (fig. 76e).

DESCRIPTION. - Male. Length 6.21-8.60 mm, width 1.80-2.32; brownish general coloration. Head: width across eyes 1.00-1.12, vertex 0.40-0.45; frons strongly convex, with 6-8 fuscous striae. Rostrum: length 2.84-3.24, extending to 7th or 8th abdominal segment. Antennae: I, length 1.21-1.76, dark brown with scattered pale patches; II, length 2.47-3.47, brownish yellow, narrowly pale at base; III, length 1.24-1.67, brown to fuscous; IV, length 0.97-1.13, brown to fuscous. Pronotum: mesal length 0.77-1.03, posterior width 1.42-1.82; pronotal disk grayish white with brown to fuscous markings; propleura fuscous, median stripe and apical 1/3 pale. Scutellum: extensively infuscated; apex, midline, and anterolateral angles pale. Hemelytra: grayish white with brown to fuscous markings particularly along veins and on inner apical portion of corium; membrane densely conspurcate. Legs: femora fuscous with pale spots; tibiae pale with 4 or 5 dark annuli, often broken by pale spots, apical annulus narrow. Vestiture: dorsum with suberect, black, simple setae intermixed with silvery, sericeous setae. Genitalia: Figure 76.

Female. Brachypterous, wing membrane greatly reduced; similar to male in color and vestiture. Length 5.13 mm, width 2.03. Head: width across eyes 1.06, vertex 0.49. Rostrum: length 3.10, extending to base of ovipositor. Antennae: I, 1.55; II, 3.00; III, 1.37; IV, 0.94. Pronotum: mesal length 0.72, posterior width 1.26. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris megatuberis* is distributed in southern California and southwestern Nevada. Adult specimens have been collected from *Artemisia* and *Purshia*; males are attracted to light. This species is very similar to *P. quadriannulipes* but is

distinguished by the longer first antennal segment and large, blunt genital tubercle with medial depression on dorsal surface (fig. 76a).

SPECIMENS EXAMINED. - Besides type material, 13 specimens were examined from the following localities: CALIFORNIA. Inyo Co.: 9 mi. W Lone Pine (UCD); 7 mi. N Parcher's Camp (UCD). Los Angeles Co.: 2 mi. NW Valyermo (UCB); Little Rock Cyn. (USU). Mono Co.: Crooked Crk. Naval Reserve Stn. (UCB). Riverside Co.: Desert Spg. (UCD). San Bernardino Co.: Phelan (UCB). NEVADA. Esmeralda Co.: 2 mi. W Lida, 1981 m (UCB). Nye Co.: 3.5 mi SE Manhattan, 2134 m. (OSU). Collection dates range from May 1 to August 4.

Phytocoris quadriannulipes Knight

Figure 77

Phytocoris quadriannulipes Knight, 1968:228, fig. 270.

TYPES AND TYPE LOCALITY. - This species was described from seven male specimens taken in light traps at Richfield, Sevier Co., Utah, 15 July 1929 and 21 May 1930, E.W. Davis. The holotype and five paratypes are retained in the Knight Collection (USNM). One paratype was not located.

DIAGNOSIS. - Length 6.5-7.6 mm. *Phytocoris quadriannulipes* closely resembles *P. megatuberis* but is distinguished by the shorter first antennal segment (see couplet 18 in key) and by the smaller, more erect left genital tubercle (fig. 77a). Also, the shaft of the left clasper is less abruptly expanded preapically in *P. quadriannulipes* (fig. 77c).

REMARKS. - *Phytocoris quadriannulipes* has been collected in Butte and Lemhi counties, Idaho and Sevier Co., Utah. The host plant is not known, but I expect this species occurs on a shrubby plant,

possibly Artemisia. I have examined 11 specimens with collection dates ranging from May 21 to July 15. Although the female of this species is not known, it is probably brachypterous since light traps have yielded only male specimens.

Phytocoris hirsuticus Knight

Figure 78

Phytocoris hirsuticus Knight, 1968:223-224.

TYPES AND TYPE LOCALITY. - This species was described from 4 female specimens collected near Mercury, Nye Co., Nevada (Area 401M, Nevada Test Site), 20 June 1965, ex. Atriplex canescens (Pursh), H.H. Knight and J.M. Merino. The holotype and two paratypes are deposited in the Knight Collection (USNM). One paratype was not located.

DIAGNOSIS. - Length 6.1-7.1 mm. Phytocoris hirsuticus is distinguished from other species of the plenus group by the pale greenish coloration, unicolored front tibiae, and densely distributed, long, pale setae on the legs and first antennal segment. The dorsal width of the eye is less than the vertex width and the vesica has two sclerotized processes (figs. 78e&e').

REMARKS. - In addition to type material, I have examined 17 specimens of P. hirsuticus from Inyo Co., California and Pershing Co., Nevada. The specimens from California were collected on Atriplex and two male specimens from Nevada were taken at light. Collection dates are from May 18 to July 12.

Phytocoris seminotatus Knight

Figure 79

Phytocoris seminotatus Knight, 1934:7-8; Carvalho 1959:216; Knight 1968:216.

TYPES AND TYPE LOCALITY. - This species was described from 13 specimens collected in southeastern Arizona. The holotype male and allotype female were taken at Tucson, Pima Co., 19 September 1928, A.A. Nichol. These specimens and a single female paratype are retained in the Knight Collection (USNM). Seven paratypes are deposited in the collection of the CAS; three paratypes were not located.

In the original description of this species, Knight (1934) incorrectly recorded one male and one female paratype from Texas Canyon, Chiricahua Mts., Arizona, Oct. 14, 1927 (J.A. Kusche). The date and collector are correct, but the locality data on the label reads: "Patagonia, Ariz., on Sonoita Cr."

DIAGNOSIS. - Length 6.8-7.7 mm. Phytocoris seminotatus closely resembles P. hirsuticus but is distinguished by the yellowish general coloration, pale reddish brown markings on the hind femora, and the male genital structures, in particular the shape of the left genital tubercle (fig. 79a) and sensory lobe of the left clasper (fig. 79b). Also, the vesica has a single sclerotized process (fig. 79e), compared to the vesica of P. hirsuticus which has two processes.

REMARKS. - Phytocoris seminotatus is known from Cochise, Pima, and Santa Cruz counties in Arizona. The host plant association of this species is not known. Knight (1934) stated that A.A. Nichol collected the type and allotype on "grasses", but this information was not included with the label data. It is likely that P. seminotatus does not inhabit grasses, in which case I would look for this species on a pale shrubby plant such as Atriplex. The only specimens of this species that I have examined are the types. Collection dates range from September 19 to October 14.

Tiliae Species - Group

DESCRIPTION. - Moderate-sized, 5.5-7.0 mm, brown or grayish species; vestiture of dorsum composed of suberect, simple, black setae intermixed with sericeous, white setae. Head: antennae brown or black; segment I with irregular white patches, length of segment greater than head width; segment II usually with pale, median annulus; frons weakly and evenly arched, meeting tylus along shallow indentation; eyes large, obovate to slightly reniform. Pronotum: pronotal disk white or pale yellow, lightly to extensively darkened with brown to fuscous, extreme basal margin pale; propleura fuscous, apical 1/3-1/2 pale, dark basal region sometimes divided by transverse pale line. Hemelytra: grayish white or pale grayish yellow, often tinged with green in *P. tiliae*; moderately to extensively mottled with brown to fuscous; apex of corium with large pale patch; membrane mottled with brown to fuscous. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly restricted to apical half of segment, dark regions often broken by pale spots; hind femora with oblique, pale band before apex; tibiae pale with brownish markings, front and middle pair with three well defined dark annuli. Male genitalia: genital segment without tubercles above clasper bases. Left clasper: sensory lobe moderately to strongly produced; shaft expanded preapically; apex broadly rounded. Right clasper: broadly lanceolate to slightly quadrate, apex acute. Vesica: multilobed, lobes without spinulate regions; basal process small, well sclerotized; sclerotized process elongate, with deep longitudinal furrow medially, upper margin serrated, posterior margin membranous and attached for entire length to right lobe of vesica.

REMARKS. - The *tiliae* group is comprised of three species, all of which are introduced from the Palearctic region. These species have patchy coastal distributions in southern Canada and the northern United States. *Phytocoris dimidiatus* and *P. tiliae* have been introduced along both seaboards, but *P. populi* is known only from the west coast.

Tiliae group species are bark-inhabitants, and are reported to be largely predaceous (Collyer, 1953: Southwood and Leston, 1959: Wagner, 1971). In North America, these species inhabit a variety of deciduous trees including Alnus, Corylus, Pyrus, Salix, and Tilia. Members of this group can sometimes by seen resting in cracks and crevices of the bark of trunks and large branches.

Members of the tiliae group are readily recognized by their dark coloration, absence of flattened dark setae on the dorsum, lack of genital tubercles in the males, and by the elongate, serrate sclerotized process of the vesica. Externally, tiliae species closely rsemble members of Knight's eastern group II (see Knight, 1941), but are easily distinguished by the form of the male genitalia.

No attempt was made in this study to locate the types of tiliae group species or to obtain these specimens for examination. These are widely distributed and well documented Palearctic species, and there does not appear to be any confusion over the identity of these taxa in more recent European literature (Southwood and Leston, 1959: Wagner and Weber, 1964; Wagner, 1971). Identified specimens from Europe were borrowed from the USNM for comparison with material collected in western North America.

Key to the Species of the tiliae Group

1 Antennal segment I fuscous with 2 or 3 longitudinal, pale stripes; shaft of left clasper broadly expanded preapically (fig. 80c) . . . . . populi (Linnaeus), p. 216

\- Antennal segment I with scattered pale spots, but lacking distinct longitudinal stripes; shaft of left clasper narrowly expanded preapically (figs. 81c&82c) 2

2(1) Pronotal disk greenish yellow or pale grayish yellow, lateral margins broadly fuscous; pale annuli on middle tibiae broader than dark annuli . . . . tiliae (Fabricius), p. 217

\- Pronotal disk brown or dark yellowish brown, without strongly contrasting dark lateral margins; pale annuli on middle tibiae narrower to at most as broad as dark annuli . . . . . dimidiatus Kirschbaum, p. 218

Phytocoris populi (Linnaeus)

Figure 80

Cimex populi Linnaeus, 1758:449.

Phytocoris populi, Zetterstedt 1828:488; Butler 1923:381; Carvalho 1959:211-212 (see this catalogue for more complete listing of pre-1959 citations); Southwood & Leston 1959:296-297, fig. 121; Wagner and Weber 1964:126-127, figs. 92b, 93c, 94b; Wagner 1971:174-175, figs. 125, 127c, 128c, 132c; Stonedahl 1983b: in press.

DIAGNOSIS. - Length 6.5-7.0 mm. Phytocoris populi is readily distinguished from P. dimidiatus and P. tiliae by the longitudinal, pale stripes on antennal segment I, and by the shaft of the left clasper which is broadly expanded preapically (fig. 80c).

REMARKS. - Phytocoris populi is widely distributed in the British Isles, continental Europe, and northern Africa (Carvalho, 1959; Southwood and Leston, 1959; Wagner, 1971). It occurs on a variety of deciduous trees (Butler, 1923; Wagner, 1971) and is reported by Southwood and Leston (1959) to be a bark-inhabiting species. Adults are found from June to November in England (Butler, 1923).

This species was reported from North America by Stonedahl (1983b); locality data: Bellingham, Whatcom Co., Washington; Vancouver, British Columbia, Canada. Collection dates are from July 17 to August 10. In Washington, late instar nymphs and adults were collected on trunks and large branches of Alnus rubra Bong.

Phytocoris tiliae (Fabricius)

Figure 81

Cimex tiliae Fabricius 1776:301.

Phytocoris tiliae, Fallen 1829:85; Butler 1923:382; Downes 1924:29, 1957:11; Collyer 1953:99; Carvalho 1959:218-219 (see this catalogue for more complete listing of pre-1959 citations); Southwood & Leston 1959:296, fig. 122, pl. 51,2; Wagner and Weber 1964:125-126, figs. 92a, 93a, 94a; Wagner 1971:172, figs. 127a&b, 131c&d, 132a; Wheeler & Henry 1976:25-28; Stonedahl 1983b: in press.

DIAGNOSIS. - Length 5.5-6.6 mm. Phytocoris tiliae is easily recognized by the greenish yellow or pale grayish yellow pronotal disk with the lateral margins broadly fuscous. The first antennal segment lacks the pale longitudinal stripes that are characteristic of P. populi. The male genital structures are similar to those of P. dimidiatus but the shaft of the left clasper is more broadly rounded apically (fig. 81c) and the right clasper is broader (fig. 81d).

REMARKS. - Phytocoris tiliae is distributed throughout the British Isles, continental Europe, and much of northern Africa (Carvalho, 1959; Southwood and Leston, 1959). It inhabits the bark of many deciduous trees in Europe (Butler, 1923) and is reported to be largely predaceous on mites and small insects (Collyer, 1953; Southwood and Leston, 1959). In England, adults are present from late June until late October.

Phytocoris tiliae was first recorded in North America from Vancouver, British Columbia (Downes, 1924) and later reported from New York and Washington by Wheeler and Henry (1976). Stonedahl (1983b) reported this species from two localities in northwestern Oregon. In western North America, P. tiliae has been collected from Alnus, Corylus, Pyrus, Salix, and Tilia.

SPECIMENS EXAMINED. - I have examined 78 specimens from the following localities in western North America: BRITISH COLUMBIA. Agassiz (UBC); Vancouver (UBC); Victoria (UBC). OREGON. Benton Co.: Corvallis (OSU). Linn Co.: Albany (OSU). WASHINGTON. King Co.: Seattle (OSU). Lewis Co.: Chehalis (OSU). Whatcom Co.: Bellingham (OSU). Collection dates range from July 19 to October 11.

Phytocoris dimidiatus Kirschbaum

Figure 82

Phytocoris dimidiatus Kirschbaum, 1855:199; Butler 1923:385; Knight 1923:630-631, fig. 136; Blatchley 1926:708; Carvalho 1959: 196-197 (see this catalogue for more complete listing of pre-1959 citations); Southwood & Leston 1959:297, pl. 51, 1; Wagner and Weber 1964:128-129, fig. 92c; Wagner 1971:175-176, figs. 127d, 128d, 133a-c; Stonedahl 1983b: in press.

DIAGNOSIS. - Length 6.0-6.8 mm. Phytocoris dimidiatus is similar to P. tiliae but differs by the more brownish general coloration, unicolored pronotal disk without strongly contrasting dark lateral margins, and by the narrower pale annuli on the middle tibiae. The male genital structures are very similar to those of P. tiliae but the shaft of the left clasper is more angulate apically (fig. 82c) and the right clasper is narrower than for P. tiliae (fig. 82d). This species is easily distinguished from P. populi by the absence of longitudinal, pale stripes on antennal segment I.

REMARKS. - *Phytocoris dimidiatus* is widely distributed in the Palearctic region (Carvalho, 1959; Southwood and Leston, 1959). It occurs on a number of deciduous trees in Europe, and is reported by Wagner (1971) to be at least partially predaceous. The adults are found from mid-June to November in England (Southwood and Leston, 1959).

Phytocoris dimidiatus was first recorded in North America from Kentville, Nova Scotia (Knight, 1923), and more recently from British Columbia, Oregon, and Washington (Stonedahl, 1983b). Adult specimens have been collected on *Pyrus*, and both sexes have been taken at light.

SPECIMENS EXAMINED. - Twenty-three specimens were examined from the following localities. BRITISH COLUMBIA. Lulu Is. (UBC). OREGON. Benton Co.: Corvallis (OSU). Klamath Co.: Klamath Falls (OSU). Multnomah Co.: Portland (OSU). Yamhill Co.: McMinnville (OSU). WASHINGTON. Whatcom Co.: Bellingham (OSU). Collection dates are from July 9 to September 6.

Interspersus Species - Group

DESCRIPTION. - Moderate-sized, 6.0-7.7 mm, yellowish species with red and brown markings; vestiture of dorsum composed of suberect, simple setae intermixed with silvery, sericeous setae. Head: antennae pale yellow to brownish yellow; segment I longer than width of head across eyes; frons weakly to moderately convex, meeting tylus along shallow indentation, usually with several reddish striae either side of middle; eyes large, length distinctly greater than width of vertex. Pronotum: pronotal disk lightly to moderately marked with red and/or brown, basal submargin sometimes with transverse series of reddish to fuscous patches; propleura pale, occasionally with reddish anteromedial stripe; scutellum moderately to strongly convex, often abruptly deflexed apically, marked with a round, reddish to fuscous spot either side before apex. Hemelytra: white or pale yellow, lightly to moderately checked with red and/or brown; corium usually with large pale region on inner apical angle; membrane spotted or mottled with brown to fuscous. Legs: femora pale yellow with red or reddish brown markings; hind femora often with reticulate pattern, sometimes with pale preapical band; tibiae pale yellow, sometimes lightly marked with red or with several poorly defined reddish annuli. Male genitalia: genital segment without tubercles, except small tubercle present above base of left clasper in *P. kiowa*. Left clasper: sensory lobe weakly to strongly produced; shaft swollen at base, slightly to moderately expanded preapically, apex truncated or narrowly rounded, flattened laterally. Right clasper: lanceolate to somewhat elongate, apex acute. Vesica: primary membranous sack of vesica unilobed, elongate, apex of lobe set with tiny spines; left basal lobe also with spinulate region apically; basal process moderately to well sclerotized, extending to or slightly beyond level of gonopore, continuous with base of sclerotized process or separated by narrow membranous region; sclerotized process with 2 or 3 large tooth-like serrations.

REMARKS. - The interspersus group is comprised of four species that are readily recognized by the pale yellow coloration with red and brown markings; round, dark spot either side of scutellum before apex; and by the shape of the sclerotized process of the vesica. The male genital structures are similar to those of stellatus group species, but externally, interspersus species are more similar to certain members of the plenus group (e.g., P. electilis, P. tenerum). With the exception of P. interspersus, the members of this group are restricted to Arizona, southern Colorado, and New Mexico. Phytocoris interspersus is widely distributed in forested regions throughout much of western North America.

The host plant associations of interspersus group species are varied. Phytocoris kiowa, P. navajo, and P. viridescens appear to be inhabitants of Quercus: a single specimen of P. viridescens also was taken on Eriogonum jamesii Benth. Phytocoris interspersus has been collected from a variety of trees and shrubs, as well as several herbaceous plants.

Key to the Species of the interspersus Group

1 Hemelytra with some dark brown or black, simple setae particularly on apical 3rd of clavus and inner apical region of corium; dorsal width of eye for males greater than width of vertex 2

\- Hemelytra with long, pale, simple setae, rarely somewhat golden brown but never dark brown or black; dorsal width of eye for males equal to or less than width of vertex 3

2(1) Antennal segment II brownish yellow, apex narrowly infuscated: shaft of left clasper abruptly expanded preapically (fig. 83c); sclerotized process of vesica with two large teeth (fig. 83e) . . . . . navajo n. sp., p. 223

- Antennal segment II uniformly pale yellow to brownish yellow, not darkened apically: shaft of left clasper narrowly and gradually expanded preapically (fig. 84c): sclerotized process of vesica with three tooth-like serrations (fig. 84e) . . . . . *interspersus* Uhler, p. 225

3(1) Hemelytra opaque white, moderately to extensively mottled with red or reddish orange; genital segment of male with small tubercle above base of left clasper (fig. 85a); sensory lobe of left clasper strongly produced (fig. 85b); sclerotized process of vesica with three tooth-like serrations (fig. 85e) . . . . . *kiowa* n. sp., p. 227

- Hemelytra opaque white with blueish green tinge and faint reticulate pattern of yellowish brown to dusky brown; genital segment of male without tubercle above base of left clasper (fig. 86a): sensory lobe of left clasper weakly produced (fig. 86b); sclerotized process of vesica with two large teeth apically and 1 or 2 smaller serrations at base (fig. 86e) . . . . . *viridescens* Knight, p. 229

Phytocoris navajo new species

Figure 83

TYPES AND TYPE LOCALITY. - Holotype male: Chiricahua Mts., Cochise Co., Arizona, 8 July 1932, R.H. Beamer (KU). Paratypes. ARIZONA. Cochise Co., Chiricahua Mts.: 1 male and 1 female, same data as holotype (KU); 1 female, nr. 8 July 1932, J.D. Beamer (KU); 1 male, 14 July 1938, L.W. Hepner (KU); 1 female, 14 July 1938, R.H. Beamer (KU); 1 female, 3 July 1947, R.H. Beamer (KU); 1 female, Onion Saddle, 30 June 1955, W.F. Barr (UID); 1 male and 3 females, nr. Portal, 1500-1700 m, 2-7 May 1978, ex. Quercus sp., R.T. Schuh (AMNH); 1 female, 1.4 mi. towards Rustler Pk. from Onion Saddle, 2400 m, 13 June 1980, ex. Quercus arizonica Sarg., R.T. Schuh, K.&R. Schmidt (AMNH); 9 females, 1.5 mi. towards Portal from Onion Saddle, 2350 m, 13 June 1980, ex. Quercus reticulata Humb. & Bonpl., R.T. Schuh, K.&R. Schmidt (AMNH, OSU). Coconino Co.: 1 male, Flagstaff, 8 July 1967, taken at light, J.D. Johnson (NAU); 1 female, Todd's Lodge, Oak Crk. Cyn., 13 June 1941, G.H.&J.L. Sperry (AMNH). Santa Cruz Co.: 1 female, Santa Rita Mts., 2440-2740 m, 15 June 1924, ex. Pinus reflexa Engelm., A.A. Nichol (UAZ); 1 male, Madera Cyn., Santa Rita Mts., 28 September 1962, taken at light, W.F. Barr (UID).

DIAGNOSIS. - This species is very similar to P. interspersus but differs by the fuscous apex of antennal segment II, dark annuli on the front tibiae, and by the form of the male genitalia. The shaft of the left clasper is abruptly expanded preapically (fig. 83c) and the shaft of the right clasper (fig. 83d) is not distinctly tapered as in P. interspersus. The sclerotized process of the vesica has two large teeth apically (fig. 83e), compared to that of P. interspersus which has three apical teeth. Phytocoris navajo is distinguished from P. kiowa and P. viridiscens by the narrower vertex and presence of scattered, dark brown or black, simple setae on the pronotum and hemelytra.

DESCRIPTION. - Male. Length 6.10-7.07 mm, width 2.16-2.29; yellowish brown to pale reddish brown general coloration. Head: width across eyes 1.02-1.11, vertex 0.28-0.33; pale yellow with red markings; frons and vertex lightly tinged with pale brownish orange, sometimes forming several intersecting lines; frons moderately convex, often with 4 or 5 poorly defined or incomplete, reddish striae. Rostrum: length 2.43-2.74, extending to 4th or 5th abdominal segment. Antennae: brownish yellow; I, length 1.15-1.40, lightly marked with red on dorsal aspect; II, length 2.52-2.97, apex narrowly infuscated; III, length 1.30-1.51; IV, length 0.90-1.06. Pronotum: mesal length 0.79-0.95, posterior width 1.51-1.78; pronotal disk pale yellow, lightly to moderately tinged with brown, basal submargin with 4-6 reddish brown to fuscous setiferous patches, extreme basal margin pale; collar and borders of calli marked with red; propleura pale, anterior margin with two, red to dark reddish brown marks. Scutellum: strongly convex, abruptly deflexed apically; pale yellow with round, dark spot either side before apex; dorsal surface lightly to moderately sprinkled with small, red or reddish brown flecks especially above dark apical spots. Hemelytra: opaque white to pale grayish yellow, mottled with light brown to dusky patches, sometimes darker brown near apex of corium; clavus and corium often with faint pinkish tinge; cuneus and outer margin of corium distinctly marked with red, membrane moderately sprinkled with small fuscous spots. Legs: femora pale yellow, front and middle pair lightly marked with red mostly on apical 3rd of segment; hind femora more extensively reticulated with red or reddish brown, sometimes also with brown markings apically; tibiae pale, front and middle pair with 3 or 4, often poorly defined, dark annuli; hind tibiae with red to reddish brown spots on dorsal aspect. Vestiture: dorsum with suberect, golden, simple setae intermixed with recumbent, silvery, sericeous setae; pronotum and hemelytra also with scattered, dark brown or black, simple setae particularly at apex of clavus and on corium between anal ridge and radial vein. Genitalia: Figure 83).

Female. Similar to male in color and vestiture. Length 6.37-6.91 mm, width 2.12-2.27. Head: width across eyes 1.02-1.04, vertex 0.38-0.40. Rostrum: length 2.61-2.95, extending to 5th or 6th abdominal segment. Antennae: I, 1.24-1.39; II, 2.43-2.88; III, 1.24-1.53; IV, 0.90-1.05. Pronotum: mesal length 0.90-0.99, posterior width 1.66-1.80.

REMARKS. - *Phytocoris navajo* is known from Cochise, Coconino, and Santa Cruz counties in Arizona. Adult specimens have been collected from several species of oak including *Q. arizonica* and *Q. reticulata*. A single specimen was taken on *Pinus reflexa* in the Santa Rita Mts., but pine is probably not a true host plant of this species. Several male specimens also have been taken at light. The range of occurrence is from May 2 to July 14 with the exception of one specimen collected in the Santa Rita Mts. on September 28.

Phytocoris interspersus Uhler

Figure 84

Phytocoris interspersus Uhler, 1895:32-33; Van Duzee 1903:110; Tucker 1907:60; Reuter 1909:19-20; Van Duzee 1917a:316; Knight 1927a:44; Carvalho 1959:202; Knight 1968:216.
Phytocoris eurekae Bliven, 1966:116, pl. X, figs. 8&9 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris interspersus* was described from a single female specimen collected in Cheyenne Cyn., nr. Colorado Springs, El Paso Co., Colorado, July, Tucker. I have been unable to locate this specimen and suspect that it is either lost or destroyed. If the type of *P. interspersus* ultimately cannot be located, a neotype designation will be required, preferably from the same or nearby locality as the original type specimen.

Although possible, it is unlikely that the original type of *P. interspersus* is conspecific with one of the other *interspersus* group species. In the original description, Uhler refers to the "convexly

prominent" scutellum with "tip bent down", and the dark hairs on the pronotum and hemelytra. This information in conjunction with the location of the original type in Colorado strongly supports the idea that the species described by Uhler is conspecific with P. interspersus as known to subsequent workers and as treated in this study.

The junior synonym, P. eurekae, was described from two male specimens collected in Humboldt County, California by B.P. Bliven. The holotype (No. 13872) was taken at Falk, 27 July 1958, "on willow", and a single paratype was collected at Eureka on 24 August 1959. Both specimens are retained in the collection of the CAS.

DIAGNOSIS. - Length 6.0-7.3 mm. Phytocoris interspersus is distinguished from other species of the interspersus group by the following combination of characters. The hemelytra are set with scattered, dark brown or black, simple setae particularly at apex of clavus and on corium between anal ridge and radial vein. The second antennal segment is uniformly brownish yellow, not darkened apically as in P. navajo. The dorsal width of the eye in males is much greater than the width of the vertex. The shaft of the left clasper is narrowly and gradually expanded preapically (fig. 84c), and the sclerotized process has three tooth-like serrations (fig. 84e).

REMARKS. - Phytocoris interspersus is widely distributed in the western United States except for the American Desert Province, Intermountain Sagebrush Province, and most of central and southern California. This species also occurs in southern British Columbia, Canada. In the Pacific Coast states, P. interspersus has been collected in the coast ranges as far south as Humboldt Co., California and east to the eastern slopes of the Cascade Range. The distribution extends across northern Washington and northern and central Idaho to the Rocky Mountains in Wyoming, Colorado, and New Mexico. The southernmost record in New Mexico is 18 mi. E Alma, Catron County. Specimens also have been collected throughout the

northern and central mountain highlands of Utah, as well as the Santa Catalina Mts. and Chiricahua Mts. in Arizona.

Phytocoris interspersus is most common in open forest situations or clearcuts where it occurs on a variety of shrubs and trees. Adult specimens have been collected from the following plants, mostly in the Pacific Coast states: Abies procera Rehd., Acer circinatum Pursh., Alnus rubra Bong., Arctostaphylos sp., Castanopsis chrysophylla (Dougl.), Corylus cornuta Marsh., Holodiscus discolor (Pursh.), Juniperus sp., Myrica californica Cham. & Schlecht., Quercus garryana Dougl., Pseudotsuga menziesii (Mirb.), Ribes sp., Robinia neomexicana Gray. Phytocoris interspersus is occasionally taken on herbaceous plants such as fireweed, Epilobium angustifolium L., but this is the exception rather than the rule. Males and females have been collected at light. I have examined 185 specimens with collection dates ranging from June 15 to October 4.

Phytocoris kiowa new species

Figure 85

TYPES AND TYPE LOCALITY. - Holotype male: 2.3 mi. E Cloudcroft, Otero Co., New Mexico, 1947 (AMNH). Paratypes: ARIZONA. Cochise Co.: 2 females, Flys Peak, Chiricahua Mts., 2590-2956 m, 5 August 1927, J.A. Kusche (CAS, CAF&A). Coconino Co.: 1 female, 18 August 1927, P.A. Readio (KU); 1 female, Flagstaff, 2134 m, 5 August 1967, D.C.&K.A. Rentz (UCB); 1 male, Flagstaff, 29 July 1969, taken at light, C.D. Johnson (NAU); 6 females, Oak Crk. Cyn., 14 August 1927; R.H. Beamer (KU). COLORADO. Montezuma Co.: 1 male, Mesa Verde Nat. Pk., 13 July 1930, R.L. Usinger (UCB). NEW MEXICO. Colfax Co.: 1 male, 5 mi. E Eagle's Nest, 21 July 1968, J.C. Schaffner (SHF). Otero Co.: 1 male, same data as holotype (AMNH). San Miguel Co.: 1 male, Sapello, 24 July 1950, ex. Quercus sp., R.H. Beamer (KU). Santa Fe Co.: 1 male, Santa Fe Canyon 21 May 1932 (USNM); 1 male and 2 females, Tesuque, 15 July 1932 (USNM).

DIAGNOSIS. - *Phytocoris kiowa* is distinguished from other species of the *interspersus* group by the following combination of characters: hemelytra moderately to extensively mottled with red or reddish orange; vestiture of hemelytra without dark brown or black, simple setae; dorsal width of eye in males less than width of vertex; genital segment of male with small tubercle above base of left clasper (fig. 85a); sensory lobe of left clasper strongly produced (fig. 85b), shaft broadly expanded preapically (fig. 85c); sclerotized process of vesica with three tooth-like serrations (fig. 85e).

DESCRIPTION. - Male. Length 6.00-7.67 mm, width 2.09-2.12; pale yellow general coloration with reddish markings. Head: width across eyes 0.94-1.01, vertex 0.39-0.40; white or pale yellow, lightly mottled with yellowish orange to pale brownish orange; jugum, lorum, buccula, tylus, and frons sometimes lightly marked with red. Rostrum: length 2.48-2.88, extending to 5th or 6th abdominal segment. Antennae: brownish yellow; I, length 1.24-1.44, set with long, pale, bristle-like setae, dorsal surface sometimes lightly marked with red; II, length 2.30-2.79; III, length 1.37-1.64; IV, length 1.04-1.17. Pronotum: mesal length 0.88-1.06, posterior width 1.51-1.84; pronotal disk pale yellow, moderately to extensively mottled or tinged with yellowish orange to pale brownish orange, collar and calli tinged with orange and sometimes with limited red markings; propleura pale, usually with light brownish orange across middle. Scutellum: strongly convex, abruptly deflexed apically; pale yellow with dark reddish brown spot either side before apex and reddish line between spots; dorsal surface of scutellum more extensively marked with red in darker specimens. Hemelytra: opaque white, moderately to extensively mottled with red or reddish orange, sometimes also lightly tinged with yellowish brown; membrane pale with faint dusky patches. Legs: femora pale yellow, often becoming brownish yellow apically, marked with red particularly on apical half of segment; tibiae pale yellow, front pair sometimes with several poorly defined dark annuli. Vestiture: dorsum with long, pale,

suberect, simple setae intermixed with recumbent, silvery, sericeous setae. Genitalia: Figure 85.

Female. Similar to male in color and vestiture. Length 6.16-6.37 mm, width 2.03-2.16. Head: width across eyes 0.98-1.03, vertex 0.42-0.46. Rostrum: length 2.52-2.70, extending to 5th or 6th abdominal segment. Antennae: I, 1.26-1.42; II, 2.30-2.75; III, 1.39-1.60; IV, 1.06-1.17. Pronotum: mesal length 0.90-0.92, posterior width 1.57-1.66.

REMARKS. - *Phytocoris kiowa* is known only from the type material collected in Arizona, New Mexico, and southern Colorado. The only host plant record for this species comes from a single male specimen taken at Sapello, San Miguel Co., New Mexico on *Quercus* sp. The range of occurrence is from May 21 to August 18.

Phytocoris viridescens Knight

Figure 86

Phytocoris viridescens Knight, 1961:483, fig. 2.

TYPES AND TYPE LOCALITY. - This species was described from a pair of specimens collected in southern Colorado. The holotype male was taken at Stonewall, 2590 m, Las Animas Co., 7 August 1925, ex. *Eriogonum jamesii* Benth., H.H. Knight. The allotype female was collected at Dolores, Montezuma Co., 3 August 1900, E.D. Ball. Both specimens are retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.8-6.8 mm. *Phytocoris viridescens* keys to the couplet with *P. kiowa* but differs from this species by the coloration of the hemelytra and form of the male genitalia. The hemelytra are opaque white with a blueish green tinge and faint reticulate pattern of light brown; not distinctly mottled with red as in *P. kiowa*. The genital segment of the male lacks a tubercle above the base of the left clasper (fig. 86a). The sensory lobe of the

left clasper is weakly produced (fig. 86b), and the sclerotized process of the vesica has two large teeth apically and one or two smaller serrations basally (fig. 86e). Phytocoris viridescens is easily distinguished from P. interspersus and P. navajo by the blueish green tinge on the hemelytra, broad vertex, and absence of dark brown or black, simple setae on the pronotum and hemelytra.

REMARKS. - This species has been collected in Colorado and New Mexico. In addition to type material, I have examined five specimens from the following localities: COLORADO. El Paso Co.: Colorado Springs (CAS). Las Animas Co.: Stonewall, 2440 m (JTP). NEW MEXICO. Lincoln Co.: Ruidoso (KU). Collection dates are from June 26 to August 7. Phytocoris viridescens has been collected from Eriogonum jamesii and Quercus gambelii Nutt.

Stellatus Species - Group

DESCRIPTION. - Moderate-sized, 4.6-7.4 mm, reddish or brownish species; vestiture of dorsum composed of suberect, simple setae intermixed with white or silvery, sericeous setae; pale setae often clumped. Head: antennae dark brown or black, segment II sometimes brown or yellowish brown; segment I pale on ventral surface, dorsal aspect with scattered pale patches; length of segment I equal to or less than width of head across eyes, sometimes slightly longer in females of P. angusticollis; frons weakly convex, meeting tylus along shallow indentation, marked with 4-6 dark striae either side of middle; eyes large, obovate. Pronotum: basal submargin of pronotal disk with transverse fuscous line or series of fuscous spots; propleura fuscous, apical 1/4-1/3 pale. Hemelytra: white or pale yellow, often somewhat translucent; lightly to moderately mottled with red to fuscous; corium with large pale patch medially and before apex; membrane mottled with pale fuscous. Legs: femora pale yellow with red to fuscous markings mostly on apical half of segment; hind femora with distinct reticulate pattern; tibiae pale with red to fuscous markings, sometimes with 2 or 3 dark annuli. Male genitalia: genital segment without tubercles above clasper bases. Left clasper: sensory lobe weakly produced; shaft short; preapical region of shaft, except in P. angusticollis, flattened laterally and with dorsal margin strongly reflexed; apex narrowly produced, acute. Right clasper: narrowly to broadly lanceolate; apex acute. Vesica: primary membranous sack of vesica unilobed, elongate, with large lobal sclerite apically in P. angusticollis; basal lobes small, right basal lobe weakly sclerotized in part; basal process moderately to well sclerotized, extending above level of gonopore, expanded apically, apex separated from base of sclerotized process by narrow membranous region; sclerotized process somewhat club-shaped and with 2 or 3 large, tooth-like serrations.

REMARKS. - The stellatus group is comprised of three species: P. stellatus is widely distributed in pine forests of western North America; P. alpestris and P. angusticollis are distributed in

mountainous regions of southeastern Arizona and western New Mexico. These species appear to be restricted to coniferous host plants, but detailed records are available only for P. stellatus.

Members of the stellatus group are recognized by the following combination of characters: reddish or brownish general coloration; dorsal surface without flattened, dark setae; length of antennal segment I equal to or less than width of head across eyes; genital segment of male without tubercles above clasper bases; vesica unilobed, sclerotized process with 2 or 3 large, tooth-like serrations. Stellatus group species are closely allied to members of Knight's eastern group III (see Knight, 1941), but differ by the shape of the genital claspers and by the fewer number of teeth on the sclerotized process of the vesica. Members of these groups inhabit similar host plants and are very similar in external appearance. Stellatus group species also share many characters with members of the interspersus group, but are easily distinguished by the darker general coloration, absence of round dark spots on the apex of the scutellum, and by the shape of the male genital claspers. The host plant associations of species belonging to these two groups also are different.

Key to the Species of the stellatus Group

1 Ratio of length of antennal segment I to width of head across eyes 0.60:1 to 0.80:1; clavus and corium moderately to extensively marked or tinged with reddish orange to reddish brown; areole veins reddish . . . . . stellatus Van D., p. 233

\- Ratio of length of antennal segment I to width of head across eyes 0.85:1 to 1.10:1: clavus and corium with brown to fuscous markings, sometimes lightly marked with red; areole veins not reddish 2

2(1) Scutellum with pale median line, basal angles broadly pale; inner margin and apex of cuneus marked with red or reddish brown; hind femora without pale preapical band; length 6.4-7.4 mm . . . . . angusticollis Knight, p. 235

\- Scutellum without pale median line, basal angles darkened or narrowly pale; cuneus without red markings; hind femora with pale preapical band; length 5.4-5.9 mm . . . . . alpestris n. sp., p. 236

Phytocoris stellatus Van Duzee

Figure 87

Phytocoris stellatus Van Duzee, 1920:350-351; Downes 1924:29; Carvalho 1959:217; Knight 1968:225, fig. 272; Kelton 1980:171, fig. 119, map 51.

Phytocoris tinctus Knight, 1928:36-37; Carvalho 1959:219; Knight 1968:225 (NEW SYNONYMY).

Phytocoris arcatae Bliven, 1959:31-32 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris stellatus was described from three specimens collected at Carmel, Monterey Co., California, 24 March 1919, "taken on pines", E.P. Van Duzee. The holotype male (No. 703), allotype (No. 704), and single female paratype are retained in the Van Duzee Collection (CAS).

The junior synonym, P. tinctus, was described from 11 specimens taken in Colorado and Arizona. The holotype male, allotype, and four male paratypes were collected at Stonewall, 2590 m, Las Animas Co., Colorado, 7 August 1925, ex. Pinus edulis Engelm., H.H. Knight. All type material is deposited in the Knight Collection (USNM) except five paratypes that were not located.

The junior synonym, P. arcatae, was described from 28 specimens collected at Samoa, Humboldt Co., California, ex. Pinus contorta Dougl., B.P. Bliven: holotype male, 4 September 1938; allotype, 8 September 1946; one paratype, 30 August 1936; 23 paratypes, 4 & 18 September 1938; two paratypes, 8 September 1946. All type material is deposited in the collection of the CAS.

DIAGNOSIS. - Length 4.6-7.0 mm. Phytocoris stellatus is easily recognized by the short first antennal segment, ratio of segment length to width of head across eyes 0.60:1 to 0.80:1; reddish orange to reddish brown hemelytra; and by the reddish areole veins. The shaft of the left clasper is distinctly expanded preapically (fig. 87c) and the sclerotized process of the vesica has two tooth-like serrations (fig. 87e).

REMARKS. - Phytocoris stellatus is widely distributed in western North America. Specimens have been collected along the Pacific Coast from San Luis Obispo Co., California to Vancouver Island, British Columbia. The distribution extends inland to the Sierra Nevada Mountains and Cascade Range (also the Blue Mountains complex of northeastern Oregon), and east across northern Washington, Idaho, and southern British Columbia to the Rocky Mountains. In the Rocky Mt. states, P. stellatus has been collected from Glacier Nat. Pk. in Montana south to Cloudcroft, Otero Co., New Mexico. This species also occurs in the central and southeastern mountain ranges of Arizona, the northern Wasatch Plateau and Uinta Mts. of Utah, and the Snake Range in White Pine Co., Nevada. Kelton (1980) reported P. stellatus from the southwestern corner of Alberta, Canada.

Phytocoris stellatus has been collected from a number of Pinus species. It is most commonly taken on beach or lodgepole pine, P. contorta Dougl., but also inhabits P. muricata D. Don. and P. radiata D. Don. in California, P. flexilis James. in Nevada, P. aristata Engelm. in Colorado and Nevada, and P. edulis Engelm. in Arizona and Colorado. Both sexes have been collected at light. I have examined 725 specimens with collection dates ranging from June 17 to September

23. In southern coastal California, adults of P. stellatus have been collected year round.

I have examined the holotype specimens of P. arcatae and P. tinctus and they are conspecific with P. stellatus. The general coloration of the type and paratypes of P. tinctus is noticeably lighter than for P. stellatus, but other external features of these specimens are typical of P. stellatus. Knight (1928) stated that P. tinctus differs from P. stellatus in the form of the male genital claspers, but I found the genital structures of these taxa to be identical. The junior synonym, P. arcatae, is similar in all aspects to P. stellatus, including general coloration and structure of the male genitalia. The difference in size between the sexes (males with longer hemelytra) that was noted by Bliven (1959) is typical of P. stellatus across its entire distribution. Bliven also stated that P. arcatae has a different period of adult emergence than P. stellatus, apparently not realizing that P. stellatus has at least two generations a year throughout much of California. The differences in form of the male genital claspers, reported without detail by Bliven, were not observed. On the basis of the above information, I am placing P. tinctus and P. arcatae in synonymy with P. stellatus.

Phytocoris angusticollis Knight

Figure 88

Phytocoris angusticollis Knight, 1925a:57-58; Carvalho 1959:190; Knight 1968:235.

TYPES AND TYPE LOCALITY. - This species was described from a single male specimen collected on Mt. Lemon, Santa Catalina Mts., Pima Co., Arizona, 27 July 1917, H.H. Knight. This specimen (holotype) is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 6.4-7.4 mm. *Phytocoris angusticollis* is distinguished from other species of the *stellatus* group by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes ranges from 0.85:1 to 1.10:1. The clavus and corium are marked with brown to fuscous patches. The basal angles and apex of the scutellum are broadly pale; narrow median line also pale. The inner margin and apex of the cuneus are marked with red or reddish brown, and the hind femora lack a pale, preapical band. The male genital structures are distinctive (figs. 88a-e); membranous lobe of vesica with large sclerite apically.

REMARKS. - This species is distributed in mountainous regions of southeastern Arizona and western New Mexico. I have examined 39 specimens from Catron Co., New Mexico and the following counties in Arizona: Apache, Graham, Pima. Most of this material was taken at elevations between 2135 m and 2745 m. Several specimens have been collected from *Pseudotsuga menziesii* (Mirb.). The range of occurrence is from June 22 to August 22.

Phytocoris alpestris new species

Figure 89

TYPES AND TYPE LOCALITY. - Holotype male: Chiricahua Mts., trail from Rustler Pk. to Fly Peak, 2440-2740 m, Cochise Co., Arizona, 31 August 1976, J.D. Pinto (UCR). Paratypes: 1 male, same data as holotype (UCR).

DIAGNOSIS. - *Phytocoris alpestris* closely resembles *P. stellatus* but differs by the darker brown general coloration; longer first antennal segment, ratio of segment length to width of head across eyes greater than 0.85:1; absence of red markings on the areole veins; and by the structure of the male genitalia. The shaft of the left clasper is shorter and deeper in *P. alpestris*, and the preapical

expanded region is more rounded (fig. 89c). The sclerotized process of the vesica is small and has three tooth-like serrations (fig. 89e).

DESCRIPTION. - Male. Length 5.45-5.89 mm, width 1.76; dark brown general coloration. Head: width across eyes 0.89-0.92, vertex 0.21-0.23; brownish yellow with fuscous markings; frons weakly convex, meeting tylus along shallow indentation, marked with 4-6 dark striae either side of middle; vertex narrow, lightly tinged with red. Rostrum: length 1.94-2.03, extending to 5th abdominal segment. Antennae: dark brown to nearly black; I, length 0.79-0.88, with large pale spots on dorsal aspect, ventral surface mostly pale; II, length 2.09-2.34, base narrowly pale; III, length 1.10-1.30, with pale annulus at base and apex; IV, length 0.72-0.79. Pronotum: mesal length 0.70-0.74, posterior width 1.31-1.37; pronotal disk pale yellow, extensively tinged with brown, basal submargin and region behind calli marked with darker brown, extreme basal margin narrowly pale; collar and calli pale yellow, lightly marked with reddish brown to fuscous; propleura brown to fuscous, apical 1/3 pale. Scutellum: extensively darkened with brown to fuscous, apex broadly pale, dorsal surface sometimes with scattered pale spots. Hemelytra: translucent grayish white, extensively mottled with brown to fuscous and marked with scattered pale spots especially along outer margin of corium and on cuneus; corium with large pale patch medially and before apex; basal 1/3 of cuneus pale yellow with reddish brown to fuscous reticulations, apical 2/3 more extensively darkened; membrane with dusky patches. Legs: femora pale yellow with fuscous markings mostly on apical half of segment; apical 2/3 of hind femora reticulated with fuscous, dark regions broken by pale spots, spots coalescing preapically forming pale band; tibiae pale with 2 or 3 fuscous annuli, dark bands often marked with pale spots. Vestiture: dorsum with stout, black, simple setae intermixed with white, sericeous setae; white setae often clumped. Genitalia: Figure 89.

Female. The female of this species is not known.

REMARKS. - *Phytocoris alpestris* is known only from the type specimens collected in the Chiricahua Mts., Cochise Co., Arizona. The host plant is not known, but I expect this species inhabits a conifer, most likely a member of the genus *Pinus*. Additional collecting should extend the distribution range of *P. alpestris* in Arizona and possibly into western New Mexico.

Pulchellus Species - Group

DESCRIPTION. - Small, 4.5-5.8 mm, yellowish to pale greenish yellow species with red markings; vestiture of dorsum composed of pale, simple setae intermixed with silvery sericeous setae, pronotal disk sometimes with darker simple setae and in P. rubroornatus with some narrow flattened, black setae. Head: pale yellow or pale brownish yellow with red markings; frons moderately convex, meeting tylus along distinct indentation; antennae pale yellow to brownish yellow, segment I sometimes lightly marked with red near base. Pronotum: pronotal disk yellowish brown with reddish tinge or deep rose red, usually with pale patch anteromedially; propleura pale, lightly to moderately marked or tinged with red. Hemelytra: pale yellow or pale greenish yellow, cuneus and paracuneus moderately to densely reddened; membrane mottled with faint dusky to fuscous spots. Legs: femora pale brownish yellow, sometimes lightly marked with red; hind femora extensively reddened and marked with pale spots; tibiae pale; front tibiae sometimes with three poorly defined, brownish orange annuli; hind tibiae with broad reddish band at base. Male genitalia: genital segment with well developed tubercle above base of left clasper. Left clasper: sensory lobe prominent; shaft variable, long and only slightly expanded preapically in P. rubroornatus, shorter and broadly expanded in P. pulchellus; apex narrowly rounded. Right clasper: long and slender in P. pulchellus; shorter and much thicker in P. rubroornatus, narrowing abruptly beyond middle when viewed from above; apex acute. Vesica: multilobed, lobes with patch(es) of tiny tubercles, basal lobes well developed; sclerotized process variable, simple elongate structure in P. rubroornatus, convoluted plate with one serrate margin in P. pulchellus; basal process well sclerotized, extending above level of gonopore, removed from base of sclerotized process by narrow membranous region.

REMARKS. - The pulchellus group is comprised of two species distributed in the Gila Mountains Forest and Mexican Highland provinces of central and southeastern Arizona. Both species have

been collected from oaks. Adults and nymphs of P. rubroornatus also have been taken on Berberis haematocarpa Wooton.

Phytocoris pulchellus and P. rubroornatus are distinguished from other western members of the genus by their pale greenish yellow coloration; reddish pronotum, cuneus, and hind femora; and by the form of the male genitalia. These species appear to be closely allied to certain members of Knight's eastern group IV (see Knight, 1941), especially those species that inhabit oaks.

Phytocoris pulchellus Knight

Figure 90

Phytocoris pulchellus Knight, 1934:15-16; Carvalho 1959:213; Knight 1968:225.

TYPES AND TYPE LOCALITY. - This species was described from nine specimens collected in the Santa Rita Mtns. and at Tucson, Arizona. The holotype male was taken in the Santa Rita Mtns., 1372 m, 9 September 1925, A.A. Nichol. The holotype, allotype, and four paratypes are retained in the Knight Collection (USNM); three paratypes were not located.

DIAGNOSIS. - Length 4.5-5.0 mm. This species is distinguished from P. rubroornatus by the yellowish brown to brown color of the pronotal disk, tinged with red; lighter reddish markings on the cuneus; absence of tumid points along basal submargin of pronotal disk; and by the serrated sclerotized process of the vesica (fig. 90e). Also, the first antennal segment is thicker at the ends than in the middle.

REMARKS. - Phytocoris pulchellus is known from Pima and Santa Cruz counties in Arizona where it has been collected from Quercus oblongifolia Torr. I have examined 13 specimens with collection dates ranging from April 19 to September 9.

Phytocoris rubroornatus Knight

Figure 91

Phytocoris rubroornatus Knight 1961:482, 1968:216.

TYPES AND TYPE LOCALITY. - Described from a single female (incorrectly listed as a male in original description) taken at Williams, Coconino Co., Arizona, 15 August 1930, E.D. Ball. This specimen is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 4.8-5.8 mm. Phytocoris rubroornatus closely resembles P. pulchellus, but is distinguished by the deep rose red color of the cuneus and pronotal disk, uniform thickness of antennal segment I, broadly swollen points along basal submargin of pronotal disk, and by the simple sclerotized process of the vesica, without tooth-like serrations (fig. 91e).

REMARKS. - This species has been collected in Coconino, Maricopa, and Yavapai counties, Arizona on Berberis haematocarpa Wooton and Quercus sp. I have examined 18 specimens with collection dates ranging from June 2 to August 15.

Gracillatus Species - Group

DESCRIPTION. - Moderate-sized, 5.0-7.8 mm, grayish white or pale brownish yellow species with brown to fuscous markings; vestiture of dorsum composed of dark, suberect, simple setae intermixed with silvery, sericeous setae; dorsal surface rarely with sparsely distributed, flattened, dark setae. Head: antennae brownish yellow to fuscous, except segment I pale with dark patches on dorsal aspect, segments III & IV usually darker than segment II; frons moderately convex, striae either side of middle usually darkened; eyes large, elliptical. Pronotum: pronotal disk lightly to moderately tinged or shaded with fuscous, basal submargin with series of dark, setiferous patches, extreme basal margin pale; propleura pale, usually with 1 or 2 fuscous stripes crossing anterior margin. Hemelytra: grayish white or brownish yellow, moderately to densely marked with spots and larger patches of brown to fuscous; membrane mottled with fuscous. Legs: femora white or pale yellow with reticulate pattern of fuscous mostly on apical half of segment, dark regions often broken by pale spots; tibiae pale with fuscous markings, front pair with three dark annuli, bands poorly defined or obsolete in pale specimens; middle and hind tibiae sometimes with dark annuli. Male genitalia: genital segment without tubercles above clasper bases. Left clasper: sensory lobe produced into large, flattened, strongly curved process (fig. 92b), directed away from plane of shaft; shaft elongate, slightly swollen preapically, apex blunt. Right clasper: small, lanceolate, apex acute. Vesica: primary membranous sack with several lobes, middle lobe with patch of spinulae apically and weakly sclerotized region near base; basal process moderately sclerotized, extending to level of gonopore, continuous with base of sclerotized process; sclerotized process club-shaped, expanded apical region deflexed, apex angulate.

REMARKS. - The gracillatus group is comprised of two species. Phytocoris gracillatus is widely distributed in arid regions of the western United States, and P. tenuis is known from Marin, Santa Cruz, and Toulumne counties in California. The host plant association of

the latter species is not known, but P. gracillatus has been widely collected on Artemisia and Chrysothamnus.

Phytocoris gracillatus and P. tenuis are easily recognized by the genital structures of the males, in particular the club-shaped sclerotized process of the vesica (fig. 92e) and the sensory lobe of the left clasper (fig. 92b). The genital segment of the male is without tubercles above the clasper bases.

Key to the Species of the gracillatus Group

1 Brownish yellow general coloration, hemelytra with limited fuscous markings mostly along inner margin of corium; pronotal disk with several dark longitudinal lines, lateral pair most distinct; front tibiae without dark annuli . . . . . tenuis Van D., p. 244

- Gray or grayish brown general coloration, hemelytra usually more extensively darkened with brown to fuscous; pronotal disk without dark lines, but lateral margins sometimes infuscated: front tibiae with three fuscous annuli, sometimes obscured or obsolete in pale specimens . . . . . gracillatus Knight, p. 245

Phytocoris tenuis Van Duzee

Phytocoris tenuis Van Duzee, 1920:341-342; Carvalho 1959:218; Knight 1968:215, fig. 261.

TYPES AND TYPE LOCALITY. - This species was described from three specimens collected on Mt. Tamalpais, Marin Co., California. The holotype male (No. 690) and allotype (No. 691) were taken by E.P. Van Duzee on 23 June 1918, and a single female paratype on 19 September 1909 by E.C. Van Dyke. All type material is retained in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 6.0-6.5 mm. *Phytocoris tenuis* closely resembles *P. gracillatus* but differs by the paler brownish yellow general coloration with fewer fuscous markings on the hemelytra, longitudinal fuscous lines on the pronotal disk, and by the absence of dark annuli on the front tibiae.

REMARKS. - *Phytocoris tenuis* is known from the type material collected in Marin Co., California. Knight (1968) also reported this species from Santa Cruz and Tuolumne counties in California. The host plant association of *P. tenuis* is not known.

The internal genital structures of the male of *P. tenuis* were not examined in this study because of the somewhat teneral condition of the single male specimen (holotype) available for dissection. I tentatively separated *P. tenuis* and *P. gracillatus* on the basis of external differences, recognizing that the relationship between these taxa requires further investigation.

Phytocoris gracillatus Knight

Figure 92

Phytocoris gracillatus Knight, 1968:229-230, fig. 278.

TYPES AND TYPE LOCALITY. - Described from six specimens collected in Nevada, Utah, and Washington. The holotype male was taken in Area 19M, Nevada Test Site, nr. Mercury, Nye Co., Nevada, 23 June 1965, ex. Artemisia tridentata Nutt., H.H. Knight and J.M. Merino. All type material is retained in the Knight Collection (USNM) except two paratypes that were not located.

DIAGNOSIS. - Length 5.0-7.8 mm. Externally, P. gracillatus closely resembles P. canescens but is distinguished by the uniformly pale ventral surface of antennal segment I, macropterous condition of the female, and by the distinct male genitalia, especially the large, forked left clasper (fig. 92b). Also, the hemelytra of P. gracillatus usually have fewer and less distinct dark, setiferous spots, and the hind femora are more coarsely reticulated with fuscous. Phytocoris gracillatus is distinguished from P. tenuis by the characters given in the species key.

REMARKS. - Phytocoris gracillatus is widely distributed in the western United States, predominantly in the Intermountain Sagebrush and American Desert provinces. Specimens have been collected as far north as Chelan Co., Washington and Sublette Co., Wyoming; east to Eagle Co., Colorado; and south to Cochise Co., Arizona and San Diego Co., California. The Cascade Range, Sierra Nevada Mountains, and southwestern mountain ranges of California form the western boundary of the distribution. This species is most commonly taken on Artemisia tridentata, but specimens also have been collected from Chrysothamnus nauseosus (Pall.) and C. viscidiflorus (Hook.). Both sexes are attracted to light. I have examined 294 specimens with

collection dates mostly between April 12 and October 18, but as early as December in desert regions of Arizona and California.

Phytocoris gracillatus is extremely variable in size and general coloration, but is readily recognized by the form of the male genitalia. Some of the paler specimens approach the brownish yellow color that is typical of P. tenuis. The genital structures of the male also are somewhat variable, particularly the size of the dorsal process of the left clasper and the shape of the sclerotized process of the vesica. However, most of the variation observed in this species is more or less continuous and not correlated with geography. Also, there is little correlation between the variation displayed by different characters. Based on this information, I am treating P. gracillatus as one highly variable species, rather than attempting to recognize distinct populations. A detailed study, including careful field observations, is needed to assess the importance of and possible reason(s) for the wide range of variation displayed by this species.

Laevis Species - Group

DESCRIPTION. - Large, 6.5-10.4 mm, yellowish or dusky brown species; vestiture of dorsum composed of short, simple setae intermixed with silvery, sericeous setae. Head: antennae pale yellow to yellowish brown; segment I thicker on basal half, usually marked with brownish spots or reticulations; frons strongly convex, somewhat conical, extending well beyond and overhanging base of tylus; lora greatly inflated, anterodorsal angle with small knob-like protuberance; rostrum short, not extending beyond apices of hind coxae; eyes large. Pronotum: pronotal disk grayish white to pale yellow, with fuscous spot behind inner angle of each callus; collar, calli, and disk sometimes lightly marked or tinged with brown to fuscous in darker specimens; propleura uniformly pale; scutellum with fuscous mark either side before apex. Hemelytra: grayish white or pale yellow, with brownish yellow to dark brown markings, sometimes with reticulate pattern; membrane marked with spots and larger patches of fuscous especially inside and behind areoles. Legs: femora pale yellow or light brownish yellow, lightly to densely reticulated with brown or dark brown; front and middle femora slightly swollen apically; tibiae mostly pale, apices sometimes narrowly darkened. Male genitalia: genital segment without tubercles above clasper bases. Left clasper: sensory lobe prominent; shaft slightly expanded preapically; apex truncate, narrowly flattened laterally. Right clasper: narrowly lanceolate; apex acute. Vesica: primary membranous sack of vesica deeply divided medially, lobes with spinulate region apically, left lobe shallowly bifurcate; basal process long and slender, extending well beyond level of gonopore; sclerotized process bulbous basally, narrowing before middle, apical half flattened, inner basal margin with 5 or 6 blunt teeth; gonopore small.

REMARKS. - Two species are included in this group, *P. laevis* and *P. rolfi*. Both are widely distributed in arid regions of the western United States where they occur on *Chrysothamnus* and *Gutierrezia*. *Phytocoris laevis* has been collected as far east as South Dakota and

Presidio Co., Texas. Kelton (1980) records this species from Alberta and Saskatchewan, Canada.

Phytocoris laevis and P. rolfsi are easily distinguished from other western members of the genus by their large size; pale yellow to yellowish brown general coloration; absence of flattened, dark setae on the dorsum; strongly convex, almost conical frons; tubercle on the anterodorsal angle of the lorum; and by the fuscous spot behind inner angle of each callus. Externally, P. laevis and P. rolfsi are very similar but differ by the characters given in the following key. The male genital structures are essentially identical and provide no characters for distinguishing these taxa.

Key to the Species of the laevis Group

1 Dorsal surface pale yellow; clavus, apical half of corium, and apex of cuneus marked with deeper brownish yellow; tibial spines dark brown or black; hind tibiae also with small, black, spine-like setae on dorsal surface . . . . . laevis (Uhler), p. 249

- Dorsal surface dirty white, lightly to moderately reticulated with dusky flecks; tibial spines brownish yellow or golden brown, rarely darker brown; hind tibiae without small, dark, spine-like setae . . . . . rolfsi Knight, p. 250

Phytocoris laevis (Uhler)

Figure 93

Callodemas laevis Uhler, 1895:33-34.

Phytocoris laevis, Reuter 1909:14; Van Duzee 1917a:316; Knight 1927a:44; Carvalho 1959:204; Knight 1968:216: Kelton 1980:166, fig. 115, map 49.

TYPES AND TYPE LOCALITY. - According to the original description, P. laevis was described from one female specimen taken at Glenwood Springs, Colorado, August 24, by Gillette and one female specimen collected in New Mexico. I have been unable to locate either of these specimens and suspect that they are lost or destroyed. If this is the case, a neotype designation will be required, preferably from Glenwood Springs, Colorado or New Mexico.

DIAGNOSIS. - Length 6.5-9.4 mm; distinguished from other western species of Phytocoris by the following characters: pale yellow general coloration; dorsal surface without flattened, dark setae; frons strongly convex, somewhat conical, overhanging base of tylus; lorum with distinct tubercle at anterodorsal angle; pronotal disk with fuscous spot behind each callus; tibial spines dark brown or black. Male genital structures distinctive (figs. 93a-e); genital segment without tubercles above clasper bases.

REMARKS. - Phytocoris laevis is distributed throughout much of Arizona, Colorado, New Mexico, Utah, and southern Idaho. Specimens also have been collected in Los Angeles, San Bernardino, and San Diego counties, California; Gallatin Co., Montana; and Presidio Co., Texas. Knight (1968) reported this species from South Dakota and Alberta, Canada, and Kelton (1980) added records from Saskatchewan, Canada. Phytocoris laevis has been collected from Chrysothamnus and Gutierrezia. I have examined 124 specimens with collection dates ranging from August 17 to November 1.

Phytocoris rolfsi Knight

Figure 94

Phytocoris rolfsi Knight, 1934:1-3; Carvalho 1959:214; Knight 1968:216.

TYPES AND TYPE LOCALITY. - This species was described from 13 specimens collected in Yakima Co., Washington by A.R. Rolfs. The holotype male and one male paratype were taken at Wiley City, 23 September 1931, on Chrysothamnus nauseosus Pall. The holotype, allotype, and three paratypes are retained in the Knight Collection (USNM); one paratype each is deposited in the collections of T.A&M and WSU; and six paratypes were not located.

DIAGNOSIS. - Length 8.1-10.4 mm. This species is very similar to P. laevis but differs by the darker dusky yellow coloration, hemelytra often with reticulate pattern of brown to nearly fuscous; brownish yellow to golden brown tibial spines; and by the more conically convex frons with 6-8 brown or reddish brown striae. The male genital structures of P. rolfsi (figs. 94a-e) closely resemble those of P. laevis.

REMARKS. - Phytocoris rolfsi is widely distributed in the western United States. I have examined 100 specimens from California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. Specimens have been collected as far south as Riverside Co., California; north to Yakima Co., Washington; and east to Jefferson Co., Montana, Sweetwater Co., Wyoming, and Las Animas Co., Colorado. The southernmost records in the Intermountain Region are from San Juan Co., Utah and Las Animas Co., Colorado. The Cascade Range and Sierra Nevada Mountains form the western boundary of the distribution. Adults and nymphs of P. rolfsi have been collected from Chrysothamnus nauseosus and C. viscidiflorus (Hook.). Collection dates are from August 5 to November 3.

Fraterculus Species - Group

DESCRIPTION. - Small to large, 4.4-8.8 mm, brownish orange to dark brown, or grayish species; vestiture of dorsum composed of suberect, simple setae intermixed with narrow, flattened, white or golden setae; darker species also with flattened, black setae. Head: antennae yellowish brown to fuscous; segment I with scattered pale spots on dorsal aspect; segment II sometimes with pale, median annulus; frons weakly and evenly arched, meeting tylus along shallow indentation; tylus weakly to moderately produced at base. Pronotum: pronotal disk uniformly pale to extensively infuscated; basal submargin of disk, in darker species, with transverse, fuscous band or 4-6 weakly elevated, fuscous points; propleura uniformly pale to broadly fuscous at base, apical 1/4 - 1/3 always pale. Hemelytra: variously colored and marked; corium usually with distinct pale region medially and apically; membrane sparsely to densely conspurcate, spots often coalescing to form larger fuscous patches. Legs: femora pale, moderately to extensively marked with red, brown, or dark brown; darkened regions of femora often broken by pale spots; hind femora sometimes with pale, preapical band; tibiae uniformly pale to extensively darkened and marked with pale spots; front and middle tibiae sometimes with alternating light and dark annuli. Male genitalia: genital segment without distinct tubercles but sometimes with weakly produced, carinate swelling above clasper bases. Left clasper: sensory lobe prominent, dorsal margin usually somewhat flattened laterally; base of shaft with series of small spines; shaft often slightly to moderately expanded preapically, outer margin of expanded region flattened dorsoventrally; apex flattened laterally, truncate or broadly rounded (exception: apex acute in *P. comulus* and *P. umbrosus*). Right clasper: large and broad; dorsal margin of arm weakly to strongly arched, sometimes with knob-like protuberance; shaft and sometimes distal region of arm with series of small spines on inner surface. Vesica: multilobed, lobes often with spinulate region(s); basal process well sclerotized extending to or slightly

beyond level of gonopore; sclerotized process usually bulbous and hollow basally, open along narrow slit for much of length, tapering beyond middle to acute apex.

REMARKS. - Members of the *fraterculus* group are widely distributed in western North America but several species also occur east of the Rocky Mountains. All species, with the exception of *P. palmeri*, are associated with coniferous host plants, predominantly of the genus *Pinus*. The majority of species appear to be restricted to a single host plant species, but some occur regularly on several coniferous hosts. Furthermore, it is not uncommon to find two or three members of this group occurring together on the same host plant. Co-occurrence may have arisen through resource partitioning, whereby different species occupy different portions of the host plant (e.g., bole, branches, foliage, cones). However in some instances, it appears that co-occurrence is the result of overlapping ranges of occurrence in species that are temporally isolated for much of the season.

The species of this group are highly variable in size and general coloration but are easily recognized by the following combination of male genital characters. The genital segment lacks distinct tubercles above the clasper bases. The dorsal margin of the left clasper sensory lobe is often somewhat carinate. The right clasper is large, broad, and set with a series of spines on the inner surface. The sclerotized process is bulbous and hollow basally, open along narrow slit for much of its length, and gradually tapered beyond middle to an acute apex.

Key to the Species of the *fraterculus* Group

Portions of the following key serve only in the separation of male specimens based on genitalic characters. In these instances, identification of females must rely on association with known males.

1 Basal submargin of pronotal disk with transverse, fuscous line or series of fuscous patches; or disk broadly fuscous basally 2

- Basal submargin of pronotal disk pale, without fuscous line or series of dark patches 12

2(1) Front tibiae with 2 or 3 pale annuli; general coloration variable 3

- Front tibiae with pallid spots but lacking distinct pale annuli; general coloration dark reddish brown . . . . . *politus* Reuter, p. 256

3(2) Ratio of length of first antennal segment to width of head across eyes less than or equal to 1.10:1 4

- Ratio of length of first antennal segment to width of head across eyes greater than 1.10:1 6

4(3) Second antennal segment dark reddish brown or fuscous, usually with pale, median annulus; dorsal margin of arm of right clasper strongly and broadly arched (fig. 96d), without small knob-like protuberance . . . . . *umbrosus* Knight, p. 257

- Second antennal segment yellowish brown, without pale, median annulus; dorsal margin of arm of right clasper weakly arched and with small knob-like protuberance (figs. 97d&98d) 5

5(4) Sensory lobe of left clasper prominent, dorsal margin not distinctly carinate (fig. 97b); sclerotized process of vesica flattened, apex broadly rounded (fig. 97e) . . . . . *chihuahuanae* n. sp., p. 258

- Sensory lobe of left clasper less prominent, dorsal margin carinate (fig. 98b); sclerotized process of vesica bulbous and hollow basally, tapering distally to acute apex (fig. 98e) . . . . . *simulatus* Knight, p. 260

6(3) Right clasper elongate, length at least 3X greatest width (figs. 99d&100d) 7

- Right clasper broad, length distinctly less than greatest width X 3 (figs. 101d-106d) 8

7(6) Pale annuli of front tibiae narrower than dark annuli; areole veins marked or tinged with red; shaft of left clasper slightly expanded preapically (fig. 99c) . . . . . palmeri Reuter, p. 261

- Pale and dark annuli of front tibiae similar in width; areole veins without red markings; shaft of left clasper greatly expanded preapically (fig. 100c) . . . . . schuhi n. sp., p. 263

8(6) Shaft base of left clasper with flattened ridge arising from dorsal surface, ridge with 3-5 small serrations . . . . . corticola n. sp., p. 265

- Shaft base of left clasper without flattened process dorsally, but sometimes with large blunt tubercle (fig. 102c) or series of spines (figs. 103c&104c) 9

9(8) Scutellum strongly convex, abruptly deflexed beyond middle and sloping steeply to apex 10

- Scutellum weakly to moderately convex, sloping gradually to apex, not abruptly deflexed beyond middle 11

10(9) Shaft of left clasper with large, often spinulate tubercle basally (fig. 102c); basal half of sclerotized process oblong (fig. 102e); distributed in the Sierra Nevada Mts., San Gabriel Mts., and San Bernardino Mts. of California . . . . . commissuralis Van D., p. 267

- Shaft of left clasper with series of spines basally (fig. 103c), spines sometimes grouped together and forming a small tubercle; basal half of sclerotized process nearly spherical (fig. 103e); widely distributed in western United States, east of Sierra Nevada Mts. in California . . . . heidemanni Reuter, p. 268

11(9) Pale annuli of front tibiae distinctly narrower than dark annuli; shaft of left clasper expanded preapically (fig. 104c) . . . . . fraterculus Van D., p. 269

- Pale and dark annuli of front tibiae similar in in width; shaft of left clasper not expanded preapically (fig. 106c) . . . . . *piceicola* Knight, p. 271

12(1) Ratio of length of first antennal segment to width of head across eyes less than or equal to 1.05:1 for males and 1.20:1 for females 13

- Ratio of length of first antennal segment to width of head across eyes greater than 1.05:1 for males and 1.20:1 for females 16

13(12) Cuneus extensively marked or tinged with red 14

- Cuneus without red markings . . . . *mellarius* Knight, p. 272

14(13) Length 4.7-5.5 mm . . . . . *comulus* Knight, p. 273

- Length 5.6-7.0 mm 15

15(14) Shaft of left clasper slightly expanded preapically (fig. 109c); dorsal margin of arm of right clasper with knob-like protuberance (fig. 109d) . . . . . *jucundus* Van D., p. 274

- Shaft of left clasper not expanded preapically (fig. 110c); arm of right clasper without dorsal protuberance (fig. 110d) . . . . . *cochise* n. sp., p. 276

16(12) Shaft of left clasper narrowly expanded preapically (fig. 111c); arm of right clasper with dorsal knob-like protuberance (fig. 111d) . . . . *auranti* n. sp., p. 277

- Shaft of left clasper broadly expanded preapically (fig. 112c); arm of right clasper without dorsal protuberance (fig. 112d) . . . . . *mirus* Knight, p. 279

Phytocoris politus Reuter

Figure 95

Phytocoris politus Reuter, 1909:21; Van Duzee 1917a:320; Carvalho 1959:211; Knight 1968:225, fig. 269; Henry and Stonedahl 1983: in press.

Phytocoris rusticus Van Duzee, 1920:348-349; Carvalho 1959:215 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris politus was described from an unknown number of specimens collected in Ormsby County, Nevada. I have examined two specimens of this series from the collection of the Zoological Museum, Helsinki, Finland and two specimens from the Knight Collection (USNM). A male specimen from the ZMH was designated a lectotype by Henry and Stonedahl (1983).

The junior synonym, P. rusticus, was described from 10 specimens collected in southern Oregon and northern California. The holotype male and one male paratype were taken at Mt. St. Helena, Napa Co., California, 9 June 1918, E.P. Van Duzee. The holotype (No. 699) allotype (No. 700), and six paratypes are retained in the Van Duzee Collection (CAS); two paratypes are deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.4-6.8 mm. Phytocoris politus is easily distinguished from other species of the fraterculus group by the dark reddish brown coloration, fuscous submarginal band on the pronotal disk, and absence of pale annuli on the front tibiae.

REMARKS. - Phytocoris politus is widely distributed in California and Oregon, and also is known from several counties in western Idaho. Specimens have been collected as far north and east as Latah County, Idaho. The southernmost records are from the San Jacinto Mts. of California. In Oregon, this species does not

occur west of the Cascade Range except in the Siskiyou Mts. The coast ranges form the western boundary of the distribution in California. Adult specimens have been collected from Pinus attenuata Lemmon, P. jeffreyi Grev. & Balf., and P. ponderosa Dougl. I have examined 240 specimens with collection dates ranging from June 7 to October 18.

Phytocoris umbrosus Knight

Figure 96

Phytocoris umbrosus Knight, 1928:37-38; Carvalho 1959:219; Knight 1968:225.

TYPES AND TYPE LOCALITY. - The holotype male, allotype, and four paratypes were collected at Stonewall, 2590 m, Las Animas Co., Colorado, 7 August 1925, H.H. Knight, ex. Pinus ponderosa Dougl. Eight additional paratypes were collected in Arizona and New Mexico. One female from the paratype series was omitted from the original description; label data for this specimen is: Las Vegas HS, 11-8, NM; H.S. Barber Collector. All type material is retained in the Knight Collection (USNM) except seven paratypes that were not located.

DIAGNOSIS. - Similar to P. politus in size, 4.6-6.8 mm, and general coloration, but distinguished by the following combination of characters: second antennal segment usually with pale, median annulus; front tibiae with distinct pale annuli; and arm of right clasper without dorsal knob-like protuberance (fig. 96d).

REMARKS. - Phytocoris umbrosus is distributed in Colorado, New Mexico, and Arizona where it occurs on Pinus ponderosa Dougl. Specimens have been collected as far north and east as Estes Park, Larimer Co., Colorado; south to the Huachuca Mts., Cochise Co.,

Arizona; and west to Williams, Coconino Co., Arizona. I have examined 71 specimens with collection dates ranging from July 7 to August 22. Males of this species have been taken at light.

Phytocoris chihuahuanae new species

Figure 97

TYPES AND TYPE LOCALITY. - Holotype male: 10 mi. W Portal, 2000 m, Cochise Co., Arizona, 11 June 1980, ex. Pinus chihuahuana Engelm., R.T. Schuh, K.&R. Schmidt (AMNH). Paratypes: 11 males and 21 females, same data as holotype (AMNH, CAS, OSU, USNM).

DIAGNOSIS. - Phytocoris chihuahuanae is distinguished from other members of the fraterculus group by the following combination of characters. The basal submargin of the pronotal disk is marked with a series of fuscous patches. The length of the first antennal segment is less than the width of the head. The second antennal segment is yellowish brown and lacks a pale, median annulus. Although similar to P. simulatus in the above characters, P. chihuahuanae is differentiated by the more prominent sensory lobe of the left clasper (fig. 97b) and the flattened sclerotized process of the vesica with broad, rounded apex (fig. 97e).

DESCRIPTION. - Male. Length 4.48-5.40 mm, width 1.44-1.73: general coloration light brownish yellow with red and brown markings. Head: width across eyes 0.91-0.99, vertex 0.24-0.31; pale yellow with red markings. Rostrum: length 2.21-2.43, extending to 7th or 8th abdominal segment. Antennae: I, length 0.63-0.74, dark brown with pale spots, sometimes tinged with red; II, length 2.01-2.38, yellowish brown; III, length 0.94-1.08, brown or yellowish brown; IV, length 0.83-0.90, brown or yellowish brown. Pronotum: mesal length 0.66-0.84, posterior width 1.18-1.42; pronotal disk light brownish yellow, basal submargin with 4-6 fuscous patches; propleura brown, apical 1/3 pale. Scutellum: pale yellow, lightly

tinged with red or reddish brown, sometimes with dusky spot either side before apex. Hemelytra: light brownish yellow; clavus and corium with dark brown markings; outer margin of corium and apical half of cuneus marked with red; membrane moderately conspurcate, veins yellow, sometimes tinged with red. Legs: femora pale yellow, reticulated with reddish brown to fuscous, sometimes with bright red markings; tibiae pale with reddish brown to fuscous markings; front tibiae with 4 dark annuli including narrow band at base. Vestiture: dorsum with suberect, simple setae intermixed with flattened, golden brown to dark brown setae and sericeous, white setae. Genitalia: Figure 97.

Female. Similar to male in color and vestiture. Length 4.48-5.34 mm, width 1.55-1.80. Head: width across eyes 0.89-0.96, vertex 0.33-0.37. Rostrum: length 2.39-2.50, extending to base of ovipositor. Antennae: I, 0.68-0.78; II, 2.12-2.38; III, 1.04-1.12; IV, 0.89-0.95. Pronotum: mesal length 0.72-0.82, posterior width 1.31-1.43.

REMARKS. - *Phytocoris chihuahuanae* is known from mountainous regions of southeastern Arizona, but probably occurs in southwestern New Mexico and northern Mexico as well. The host plant of this species is *Pinus chihuahuana* Engelm.

SPECIMENS EXAMINED. - Eleven other specimens were examined from the following localities: ARIZONA. Apache Co.: St. John (KU). Cochise Co.: Chiricahua Nat. Mon. (KU); Chiricahua Mts., Cave Crk. Cyn. (USU); Huachuca Mts. (ASU, KU); 4 mi. W Portal (AMNH). Santa Cruz Co.: Nogales, Mt. Washington (CAS); Santa Rita Mts. (CAS). The range of occurrence is from June 9 to August 24.

Phytocoris simulatus Knight

Figure 98

Phytocoris simulatus Knight, 1928:34-35; Carvalho 1959:216; Knight 1968:225, fig. 268.

TYPES AND TYPE LOCALITY. - This species was described from 24 specimens taken in southern Colorado and northern New Mexico. The holotype male, allotype, and 15 paratypes were collected at Ft. Garland, Costilla Co., Colorado, 10 August 1925, H.H. Knight, ex. Pinus edulis Engelm. Two specimens of the paratype series were omitted from the original description; label data for these are: Br't Angel, 12-7, Ar.; H.S. Barber Collector and Las Vegas HS, 5-8, NM; H.S. Barber Collector. Upon examination, the latter specimen was found to be conspecific with the related species, P. mellarius. All type material is retained in the Knight Collection (USNM) except three paratypes that were not located.

DIAGNOSIS. - Length 4.8-6.1 mm. Phytocoris simulatus is very similar to P. chihuahuanae but is easily distinguished by characters of the male genitalia. The sensory lobe of the left clasper is less prominent in P. simulatus and the shaft is more abruptly expanded preapically (figs. 98b&c). The sclerotized process is bulbous basally and tapers to a fine point (fig. 98e). In P. chihuahuanae, the sclerotized process is flattened and the apex is broadly rounded (fig. 97e). Phytocoris simulatus also is similar to P. mellarius but differs by the fuscous line on the basal submargin of the pronotal disk, flattened dark setae on the hemelytra, darker markings on the legs, and by the male genital structures.

REMARKS. - I have examined 33 specimens of P. simulatus from Colorado, New Mexico, and eastern Utah. Specimens have been collected east to the Rocky Mts. and as far west as Wayne Co., Utah. The northernmost and southernmost records are from Buena Vista,

Caffee Co., Colorado and Silver City, Grant Co., New Mexico, respectively. The host plant of P. simulatus is Pinus edulis Engelm. The range of occurrence is from June 15 to September 16.

Phytocoris palmeri Reuter

Figure 99

Phytocoris annulicornis, Van Duzee 1908:113 (misident.).

Phytocoris palmeri Reuter, 1909:32; Van Duzee 1917a:318; Knight 1923:621, fig. 134; Blatchley 1926:705; Carvalho 1959:209; Henry and Stonedahl 1983:in press.

Phytocoris vittatus Reuter, 1909:28-29; Van Duzee 1917a:318; Knight 1923:627-628; Blatchley 1926:708; Knight 1941:190; Carvalho 1959:221; Henry and Stonedahl 1983:in press (NEW SYNONYMY).

Phytocoris hesperius Knight, 1928:44-45; Carvalho 1959:201; Knight 1968:229, fig. 263 (NEW SYNONYMY).

Phytocoris hesperellus Knight, 1968:232, fig. 264 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris palmeri was described from an unknown number of specimens collected at Quinze Lk., Quebec, Canada, 14 August 1907, W.J. Palmer. I have examined two specimens from the type series of this species; a male specimen (No. 1994), retained in the collection of the CAS, and one female specimen deposited in the USNM. The male specimen was designated a lectotype by Henry and Stonedahl (1983).

I have seen a single female specimen of the junior synonym, P. vittatus, in the collection of the USNM with the following label data: Lake Placid, NY., 8-12-'04; Van Duzee Collector; Phytocoris vittatus n.sp. O.M. Reuter det. Knight (1923:628) referred to this specimen as the type of the species but there is no type label on the specimen. Reuter (1909) did not indicate whether this was the only specimen on which he based the original description. Because of the questionable status of this specimen, it was designated a lectotype

by Henry and Stonedahl (1983) and is retained in the collection of the USNM.

The junior synonym, P. hesperius, was described from 28 specimens collected in Arizona, Colorado, Oregon, New Mexico, and Wyoming. The holotype male and a single male paratype were taken at Stonewall, 2590 m, Las Animas Co., Colorado, 7 August 1925, H.H. Knight, ex. Cercocarpus betuloides Nutt. All type material is retained in the Knight Collection (USNM) except two male paratypes deposited in the collection of the UAZ and 11 paratypes that were not located.

The holotype male of the junior synonym, P. hesperellus, was collected at Salt Lk. City, Salt Lk. Co., Utah, 1 July 1955, H.B. Stafford. The allotype was taken in Area 17M, Nevada Test Site, Nye Co., Nevada, 16 June 1965, H.H. Knight and J.M. Merino. Both specimens are retained in the Knight collection (USNM).

DIAGNOSIS. - Length 5.6-8.1 mm. Externally, P. palmeri closely resembles P. schuhi but is distinguished by the following characters. The lateral margins of the pronotal disk are usually broadly infuscated. The pale annuli on the front tibiae are much narrower than the dark annuli, and the areole veins are tinged with red. These species are further differentiated by characteristics of the male genitalia (see figs. 99&100).

REMARKS. - Phytocoris palmeri is widely distributed in western North America, predominantly in mountainous regions. I have examined specimens from British Columbia, Canada and all western states except Montana and Wyoming. In the Cascade Range the distribution extends south to Siskiyou Co., California. The southernmost record in the Rocky Mts. is Tajique, Torrance Co., New Mexico. This species also is widely distributed in the central and southeastern mountain ranges of Arizona. Adult specimens have been collected from the following host plants: Acacia sp., Cercocarpus betuloides Nutt., Crataegus douglasii Lindl., Holodiscus discolor (Pursh), Rhamnus crocea Nutt., Rhus trilobata Nutt., Ribes sp., Solidago sp., and Symphoricarpos

sp. Both sexes have been collected at light. I have examined 185 specimens with collection dates ranging from June 1 to October 5.

Phytocoris palmeri also occurs in eastern North America, but is known only from type material collected in Quebec and New York. Knight (1941) reports this species from New York on Ribes cynosbati L. The absence of records from eastern North America is best explained by the apparent confusion over the identity of both P. palmeri and P. vittatus. As a result, this species appears to have been misidentified by many early workers. I expect that further collecting and careful examination of museum specimens will add many records for this species in northeastern North America.

Phytocoris palmeri is extremely variable in size, body proportions, and extent of dark markings on the dorsum. The variability in external characters has led to descriptions of several species that are conspecific with P. palmeri (i.e., P. hesperellus, P. hesperius, P. vittatus). Although highly variable in size and general coloration, P. palmeri is readily identified by the form of the male genitalia (fig. 99). Phytocoris palmeri does not inhabit coniferous host plants, but is placed in the fraterculus group based on genital structure of the male.

Phytocoris schuhi new species

Figure 100

TYPES AND TYPE LOCALITY. - Holotype male: Clear Crk. Narrows Smt. on Interstate Hwy. 70, 2188-2244 m, Sevier Co., Utah, 15 July 1980, ex. Juniperus sp., R.T. Schuh and G.M. Stonedahl (AMNH). Paratypes: 5 males and 7 females, same data as holotype (AMNH, OSU).

DIAGNOSIS. - This species is distinguished from other members of the fraterculus group by the following combination of characters. The basal submargin of the pronotal disk is marked with a wavy, fuscous line. The ratio of length of first antennal segment to width of head across eyes is greater than 1.10:1. The right clasper is at

least 3X as long as greatest width (fig. 100d) and the shaft of the left clasper is greatly expanded preapically (fig. 100c). Phytocoris schuhi closely resembles P. palmeri but differs by the narrower pale annuli of the front tibiae, absence of red markings on the areole veins, and by the male genital structures (fig. 100).

DESCRIPTION. - Male. Length 5.94-7.07 mm, width 1.76-2.05; grayish general coloration with brown to fuscous markings. Head: width across eyes 1.02-1.11, vertex 0.32-0.33; frons with 6-8 reddish brown striae. Rostrum: length 2.68-2.92, extending to 6th or 7th abdominal segment. Antennae: brown to fuscous; I, length 1.21-1.42, dorsal surface with large white patches; II, length 2.79-3.29; III, length 1.26-1.44; IV, length 0.90-1.02. Pronotum: mesal length 0.79-0.96, posterior width 1.40-1.55; pronotal disk brownish gray, basal submargin with wavy fuscous line and 4-6 weakly elevated points; collar and calli grayish yellow with reddish brown markings; propleura fuscous, apical 3rd pale. Scutellum: pale gray with fuscous spot either side before apex. Hemelytra: pale gray with limited brown to fuscous markings particularly along claval, cubital, and radial veins; membrane lightly to moderately conspurcate, areole veins pale except radius fuscous. Legs: femora white or pale yellow, extensively marked with fuscous particularly on apical half of segment; dorsal surface of hind femur with large uniformly fuscous region; dark regions of femora broken by pale spots; tibiae pale with dark markings, front tibiae with alternating light and dark annuli. Vestiture: dorsum with long, dark, simple setae intermixed with flattened, black setae and flattened, white setae. Genitalia: Figure 100.

Female. Similar to male in color and vestiture. Length 5.89-6.97 mm, width 1.89-2.16. Head: width across eyes 1.02-1.05, vertex 0.42-0.45. Rostrum: length 2.75-3.08, extending to 5th or 6th abdominal segment. Antennae: I, 1.40-1.62; II, 3.04-3.51; III, 1.44-1.62; IV, 0.86-1.04. Pronotum: mesal length 0.76-0.92, posterior width 1.40-1.58.

REMARKS. - Although poorly collected, P. schuhi appears to have a fairly broad distribution in the southwestern United States. Specimens have been taken in Arizona, Nevada, New Mexico, and Utah. The only host plant record is Juniperus sp.

SPECIMENS EXAMINED. - Fifteen other specimens were examined from the following localities: ARIZONA. Cochise Co.: 5 mi. W Portal, 1646 m (AMNH). NEVADA. White Pine Co.: Little Antelope Smt. on U.S. Hwy. 50, 2267 m (OSU). NEW MEXICO. Torrance Co.: Tajique (KU). UTAH. Emery Co.: 13.2 mi. NW Jct. St. Hwys. 10 and 31, 2179 m (OSU). The range of occurrence is from May 15 to August 11.

Phytocoris corticola new species

Figure 101 .

TYPES AND TYPE LOCALITY. - Holotype male: Lehman Crk. Cmpgd., Humboldt Nat. For., 2322 m, White Pine Co., Nevada, 14 July 1980, ex. Pinus monophylla Torr. & Frem., G.M. Stonedahl and R.T. Schuh (AMNH). Paratypes: 21 males and 6 females, same data as holotype except 9 males and 2 females collected at UV light (AMNH, CAS, OSU, USNM).

DIAGNOSIS. - Phytocoris corticola is distinguished from other large, grayish or brownish species of the fraterculus group by characteristics of the male genitalia. The shaft base of the left clasper is produced dorsally as a flattened ridge. The arm of the right clasper lacks a dorsal, knob-like protuberance (fig. 101d) and the right basal lobe of the vesica is set with a series of small spines.

DESCRIPTION. - Male. Length 8.37-8.91 mm, width 2.65-2.81: brown or grayish brown general coloration. Head: width across eyes 1.31-1.35, vertex 0.43-0.47. Rostrum: length 4.10-4.27, extending to 7th or 8th abdominal segment. Antennae: dark brown; I, length

1.66-1.82; II, length 3.72-3.94; III, length 1.80-1.96; IV, length 1.17-1.28. Pronotum: mesal length 1.26-1.37, posterior width 2.14-2.27; pronotal disk extensively darkened; basal submargin of disk with transverse, fuscous line, sometimes dissected into 4-6 fuscous patches; propleura fuscous, apical 3rd pale. Scutellum: grayish white, lightly to densely mottled with fuscous, sometimes almost entirely darkened but leaving pale median line. Hemelytra: grayish yellow, clavus and corium extensively marked with brown or fuscous; membrane densely conspurcate, veins fuscous. Legs: femora mostly darkened, brown or fuscous, marked with pale spots; hind femora without pale, preapical band; tibiae extensively darkened and marked with pale spots; front and middle tibiae with 2 or 3 pale annuli. Vestiture: dorsum with simple, black setae intermixed with flattened, black setae and flattened, white setae. Genitalia: Figure 101.

Female. Similar to male in color and vestiture. Length 8.37-9.00 mm, width 2.70-3.02. Head: width across eyes 1.31-1.38, vertex 0.48-0.52. Rostrum: length 4.37-4.59, extending to or slightly beyond base of ovipositor. Antennae: I, 1.87-2.02; II, 4.00-4.21; III, 2.02-2.16; IV, 1.28-1.35. Pronotum: mesal length 1.31-1.42, posterior width 2.18-2.41.

REMARKS. - *Phytocoris corticola* has been collected in Colorado, Nevada, and Utah. A single specimen also was taken near Santa Fe, New Mexico. The known host plants are *Pinus edulis* Engelm., *P. monophylla* Torr. & Frem., and *P. ponderosa* Dougl. Males and females of this species are attracted to light.

SPECIMENS EXAMINED. - In addition to type material, 19 specimens were examined from the following localities: COLORADO. Clear Crk. Co.: 7 mi. W Idaho Springs (OSU). Douglas Co.: Roxborough Rd. nr. Chatfield Pk. (JTP). NEVADA. Lander Co.: Austin Smt. (UCB). NEW MEXICO. Santa Fe Co.: 10 mi. NE Santa Fe (AMNH). UTAH. Emery Co.: 13.2 mi. NW St. Hwy. 10 on St. Hwy. 31 (OSU). Garfield Co.: Boulder Mt. (USU). Sevier Co.: Clear Crk. Narrows Smt. (OSU); 26.6 mi. N

St. Hwy. 24 on St. Hwy. 72 (OSU); 2.4 mi. S rt. 4 on Kanosh Rd. (AMNH). Wayne Co.: 10.5 mi. N St. Hwy. 24 on St. Hwy. 72 (OSU); Boulder Mt. (USU). Collection dates range from July 10 to August 17.

Phytocoris commissuralis Van Duzee

Figure 102

Phytocoris commissuralis Van Duzee, 1920:351; Downes 1924:29; Carvalho 1959:194; Knight 1968:250, fig. 306.

TYPES AND TYPE LOCALITY. - Described from two males and two females collected by E.P. Van Duzee at Huntington Lake, 2134 m, Fresno Co., California, 24 July 1919. The male holotype (No. 705), allotype (No. 706), and a single female paratype are deposited in the Van Duzee Collection (CAS). The male paratype is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 7.5-8.7 mm. Phytocoris commissuralis is very similar to P. heidemanni but is distinguished from this species by characters of the male genitalia. The shaft of the left clasper has a large, often spinulate tubercle basally (fig. 102c), and the dorsal protuberance on the arm of the right clasper is weakly produced (fig. 102d). The sclerotized process of the vesica is larger in P. commissuralis (fig. 102e) and the basal half of the process is oblong rather than spherical as in P. heidemanni.

REMARKS. - Phytocoris commissuralis is known from the Sierra Nevada Mts., San Gabriel Mts., and San Bernardino Mts. of California. Downes (1924) reported this species from Victoria, British Columbia, but it is doubtful that P. commissuralis occurs that far north. The only host plant record for P. commissuralis is a label reading "Pinus" on a specimen from Crystal Lk., Los Angeles Co., California. Several specimens have been taken at light. I have examined 11 specimens with collection dates ranging from July 9 to September 2.

Phytocoris heidemanni Reuter

Figure 103

Phytocoris heidemanni Reuter, 1909:27; Van Duzee 1917a:318, 1918:285; Carvalho 1959:200; Knight 1968:229, figs. 266,267; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - Phytocoris heidemanni was described from Pecos, New Mexico, 23 June, O. Heidemann. I have examined a single female from the type locality that bears Reuter's hand printed determination label. This specimen was designated a lectotype by Henry and Stonedahl (1983) and is deposited in the collection of the USNM.

DIAGNOSIS. - Phytocoris heidemanni is similar to P. fraterculus but differs by the larger size, 7.0-9.2 mm, strongly convex scutellum, and form of the male genitalia. The basal half of the sclerotized process is spherical (fig. 103e) and the spinulate region on the extreme right lobe of the vesica is very small. In Arizona, Colorado, New Mexico, and Wyoming, P. heidemanni is further differentiated from the eastern biotype of P. fraterculus by the distinct dorsal protuberance on the arm of the right clasper (fig. 103d).

REMARKS. - Phytocoris heidemanni is widely distributed in Nevada, Utah, Arizona, and the Rocky Mts. from Glacier Co., Montana to Socorro Co., New Mexico. The westernmost records are from Mono and Inyo counties in California, and the southernmost record is from the Chiricahua Mts., Cochise Co., Arizona. Specimens also were examined from two apparently isolated populations; Hood River Co., Oregon and Crook Co., Wyoming. Adult specimens have been collected from the following host plants: Pinus albicaulis Englem., P. contorta Dougl., P. edulis Engelm., P. monophylla Torr. & Frem., and P. ponderosa Dougl. Both males and females of P. heidemanni are

attracted to light. I have examined 115 specimens with collection dates ranging from June 11 to September 5.

Phytocoris fraterculus Van Duzee

Figures 104 & 105

Phytocoris fraterculus Van Duzee, 1918:283-284: Carvalho 1959:199; Knight 1968:235, fig. 285.

Phytocoris westwoodi Bliven, 1966:119, pl. X, figs. 14 & 15 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - This species was described from 14 specimens collected in Arizona and California. The holotype male (No. 399), allotype (No. 400), and two paratypes were taken at Yosemite, Mariposa Co., California, 16 June 1916, W.M. Giffard. All type material is retained in the Van Duzee Collection (CAS) except two paratypes deposited in the Knight Collection (USNM) and one paratype that was not located.

Four female paratypes in the Van Duzee Collection are not conspecific with the holotype. One specimen collected at Fallen Leaf Lk., 1950 m, Eldorado Co., California, 21 August 1916, W.M. Giffard is correctly identified as P. dumicola and a second specimen with the same data is identified as P. californicus. A third paratype from Bright Angel Camp, 2100 m, Coconino Co., Arizona, H.F. Wickham is conspecific with P. heidemanni. The last specimen from Soda Spgs. Smt., 2012 m, Nevada Co., California, 24 August 1916, W.M. Giffard is tentatively identified as P. ceanothicus. In each case, I have added the appropriate determination label to prevent later confusion regarding the correct identity of these specimens.

The junior synonym, P. westwoodi, was described from two specimens collected in northern California by B.P. Bliven. The holotype male was taken at Westwood, Lassen Co., 21 July 1954, "on Pinus", and the allotype female was collected in Trinity Co. (Van Duzen Rd.), 14 July 1957, "on douglas fir". Both specimens are

retained in the collection of the CAS (type number 13880). The allotype of P. westwoodi is not conspecific with the holotype. It is correctly placed in the conspurcatus group, but could not be identified to species.

DIAGNOSIS. - Length 5.9-7.6 mm, brown or grayish brown general coloration; antennae dark brown, length of segment I greater than width of head, segment II without pale median annulus; pronotal disk extensively infuscated, basal submargin with transverse fuscous line; propleura fuscous, apical 3rd pale; hemelytra extensively darkened with brown to fuscous; femora mostly brown to fuscous and marked with pale spots, hind femora with pale preapical band; tibiae densely marked with brown to fuscous, front and middle tibiae with 2 or 3 pale annuli.

Phytocoris fraterculus is very similar to other brown or grayish brown species of the fraterculus group but is distinguished by the following combination of characters. The scutellum is moderately convex and slopes gradually toward the apex. The pale annuli of the front tibiae are much narrower than the dark annuli. The right clasper is broad; length distinctly less than greatest width X 3 (fig. 104d). The shaft base of the left clasper lacks a flattened process dorsally, and the shaft is broadly expanded preapically (fig. 104c).

REMARKS. - The distribution of P. fraterculus includes much of the western United States with the exception of the American Desert and Intermountain Sagebrush provinces. This species has not been collected west of the Cascade Range in Washington and Oregon but does occur in the transverse mountain ranges of southwestern Oregon and northern California, as well as the coast ranges of central and southern California. The distribution extends east to the Rocky Mountains and south to the Chiricahua Mts. in Arizona.

Examination of male genital structures revealed several consistent differences between specimens from California, Oregon, and Washington (western populations); and those from Arizona, Colorado,

New Mexico, and Wyoming (eastern populations). Males from the Pacific Coast states have a distinct dorsal knob on the arm of the right clasper (fig. 104d). This knob is very small or absent in specimens from eastern populations (fig. 105d). The sensory lobe of the left clasper is rounded apically in west coast males (fig. 104b) but more truncate in eastern specimens (fig. 105b). Finally, the membranous portion of the vesica is more deeply divided medially in males from eastern populations, and lacks a median, spinulate region that is always present in western specimens. The eastern and western populations of P. fraterculus appear to overlap in Idaho and western Montana, but I was unable to determine if the two forms remain distinct in this region. Until more specimens are available for study, I am recognizing the western and eastern populations as biotypes of a single species. Externally, these biotypes are very similar except that eastern specimens are usually slightly larger and have a narrower vertex.

Adult specimens of P. fraterculus have been taken on Pinus attenuata Lemmon, P. contorta Dougl., and P. ponderosa Dougl. I have examined 405 specimens with collection dates ranging from June 9 to October 4.

Phytocoris piceicola Knight

Figure 106

Phytocoris piceicola Knight, 1928:32-33; Carvalho 1959:210; Knight 1968:229, fig. 283.

TYPES AND TYPE LOCALITY. - The holotype male, allotype, and 12 male paratypes were collected at Stonewall, 2590 m, Las Animas Co., Colorado, 7 August 1925, H.H. Knight, ex. Picea sp. Seven additional paratypes were collected in Arizona. All type material is retained in the Knight Collection (USNM) except 11 paratypes that were not located.

DIAGNOSIS. - Length 6.1-7.2 mm; grayish yellow with brown markings; antennae yellowish brown, segments III and IV usually darker brown, length of segment I greater than width of head, segment II without pale median annulus; pronotal disk pale yellow, basal submargin with transverse fuscous line; propleura fuscous, apical 3rd pale; hemelytra grayish yellow, clavus and corium lightly marked with brown, membrane moderately conspurcate, veins tinged with red; femora pale, reticulated with brown; tibiae pale with brown markings, front tibiae with 2 or 3 pale annuli.

Phytocoris piceicola is distinguished from other species of the *fraterculus* group by the following combination of characters: basal submargin of pronotal disk with transverse, fuscous line; light and dark annuli of front tibiae similar in width; ratio of length of first antennal segment to width of head across eyes greater than 1.10:1; scutellum moderately convex, sloping gradually toward apex; broad right clasper (fig. 106d); and shaft of left clasper not expanded preapically (fig. 106c).

REMARKS. - In addition to type material, 17 specimens of *P. piceicola* were examined from Sedalia, Douglas Co., Colorado to Las Cruces, Dona Ana Co., New Mexico. Knight (1928) reported this species from Mt. Lemon, Pima Co. and Williams, Coconino Co., Arizona. I have examined a single female paratype from Mt. Lemon, Arizona. The only host plant record for *P. piceicola* is *Picea* sp. The range of occurrence is from July 1 to August 7.

Phytocoris mellarius Knight

Figure 107

Phytocoris mellarius Knight, 1925a:56-57; Carvalho 1959:205; Knight 1968:225, fig. 265.

TYPES AND TYPE LOCALITY. - *Phytocoris mellarius* was described from 11 specimens collected at Grand View, Grand Canyon, Arizona, 3

August 1917, H.H. Knight. The male holotype, allotype, and five female paratypes are retained in the Knight Collection (USNM). A pair is deposited in the Van Duzee Collection (CAS) and a single female in the collection at UAZ. One male paratype was not located.

Five additional paratypes were discovered in the Knight Collection (USNM) that were not listed in the original description: label data for these specimens reads: Grand Canyon, Ariz., 40 mi. south, Aug. 3, 1917, H.H. Knight; on Pinus (in part).

DIAGNOSIS. - Length 5.0-6.0 mm. Phytocoris mellarius closely resembles P. chihuahuanae and P. simulatus but is distinguished by the following combination of characters: stramineous general coloration with light brown markings; vestiture of dorsum pale, hemelytra with few or no flattened black setae; basal submargin of pronotal disk without fuscous markings; and sclerotized process of vesica long and narrow (fig. 107e).

REMARKS. - This species is distributed in southern Nevada, southern Utah, and Arizona on pinyon pine. Specimens also have been collected in Kern, Inyo, Mono, Riverside, and San Bernardino counties in California, and in Montrose Co., Colorado. The northernmost and southernmost records are from White Pine Co., Nevada and Cochise Co., Arizona, respectively. Adults and nymphs have been taken on Pinus edulis Engelm. and P. monophylla Torr. & Frem. I have examined 230 specimens with collection dates ranging from May 21 to October 7.

Phytocoris comulus Knight

Figure 108

Phytocoris comulus Knight, 1928:38-39; Carvalho 1959:194; Knight 1968:223.

TYPES AND TYPE LOCALITY. - This species was described from 30 specimens collected in Arizona, Colorado, Nebraska, and New Mexico.

The holotype male, allotype, and two female paratypes were taken at Durango, La Plata Co., Colorado, 13 August 1925, H.H. Knight, ex. Pinus edulis Engelm. All type material is deposited in the Knight Collection (USNM) except 15 paratypes that were not located.

DIAGNOSIS. - Similar to P. cochise but smaller, length 4.7-5.5 mm, and with darker, reddish brown to dark brown markings on the legs and first antennal segment. The banded front tibiae and large pale region between the eyes will further differentiate this species from P. cochise. The genital structures of the male are very similar to those of P. umbrosus.

REMARKS. - Phytocoris comulus is widely distributed in Arizona and Colorado on Pinus edulis Engelm. and P. ponderosa Dougl. Specimens also have been collected in Sioux Co., Nebraska; San Miguel Co., New Mexico; Sevier Co., Utah; and Fremont Co., Wyoming. In Arizona, this species occurs as far south as the Chiricahua Mts. in Cochise County and is distributed north and west to the Grand Canyon. I have examined 75 specimens with collection dates ranging from June 10 to August 24.

Phytocoris jucundus Van Duzee

Figure 109

Phytocoris jucundus Van Duzee, 1914:17-18, 1917a:319, 1917b:262; Carvalho 1959:203; Knight 1968:226; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - Phytocoris jucundus was described from an unknown number of specimens collected on "pine trees" at Pine Hills, Cuyamaca Mts., 1280 m, San Diego Co., California, 19 October 1913, E.P. Van Duzee. Eight specimens of the original syntype series are retained in the Van Duzee Collection (CAS) and one female specimen is deposited in the collection of the USNM. Following the

original description, Van Duzee selected a lectotype (No. 1998) and "allotype" (No. 1999) for this species but did not publish an account of this action. He tagged the remaining specimens of the syntype series with orange "paratype" labels. The male specimen selected as a lectotype by Van Duzee is designated as such by Henry and Stonedahl (1983) and is deposited in the collection of the CAS.

DIAGNOSIS. - Length 5.5-6.8 mm; similar to *P. cochise* but without flattened, black setae on the pronotal disk, along outer margin of corium, and on cuneus. The shaft of the left clasper is not expanded preapically (fig. 109c). The arm of the right clasper is strongly arched and lacks a dorsal, knob-like protuberance (fig. 109d). *Phytocoris jucundus* is easily distinguished from *P. auranti* and *P. mirus* by the short first antennal segment; ratio of segment length to width of head across eyes less than or equal to 1.05:1 for males and 1.20:1 for females.

REMARKS. - *Phytocoris jucundus* is distributed throughout much of California and Oregon, and also is known from several counties in western Idaho. Specimens have been collected as far north and east as Latah County in Idaho. The southernmost record is from the Cuyamaca Mts., San Diego Co., California. In Oregon, this species is not known to occur west of the Cascade Range except in the Siskiyou Mts. and an apparently isolated population near Winkle Lk. in Benton County. The coast ranges form the westesrn boundary of the distribution in California. Adult specimens have been collected from *Pinus attenuata* Lemmon, *P. contorta* Dougl., and *P. ponderosa* Dougl. I have examined 170 specimens with collection dates ranging from July 25 to October 19.

Phytocoris cochise new species

Figure 110

TYPES AND TYPE LOCALITY. - Holotype male: Rustler Pk., Chiricahua Mts., 2500 m, Cochise Co., Arizona, 17 August 1952, H.B. Leech and J.W. Green (CAS). Paratypes: ARIZONA. Cochise Co.: 4 males and 4 females, same data as holotype (CAS, OSU); 1 male and 1 female, Chiricahua Mts., 12 August 1937, E.D. Ball (UAZ); 2 males and 1 female, Chiricahua Mts., trial from Rustler Pk. to Fly Peak, 2438-2743 m, 31 August 1976, J.D. Pinto (UCR).

DIAGNOSIS. - Externally, P. cochise closely resembles P. mirus and P. auranti but is distinguished from these species by the short first antennal segment and flattened, black setae on the pronotal disk, cuneus, and outer margin of corium. The shaft of the left clasper is not expanded preapically (fig. 110c) as in P. mirus and P. auranti. Phytocoris cochise also resembles P. jucundus but differs by the flattened, black setae on the dorsum, and strongly arched arm of the right clasper, without dorsal protuberance (fig. 110d).

DESCRIPTION. - Male. Length 6.53-7.02 mm, width 2.12-2.20; brownish orange general coloration. Head: width across eyes 1.12-1.17, vertex 0.34-0.35; pale yellow with red markings; frons densely set with long, pale setae. Rostrum: length 2.25-2.36, extending to between hind coxae. Antennae: brownish yellow; I, length 1.08-1.22, reticulated with reddish brown and marked with pale spots; II, length 2.59-2.74; III, length 1.08-1.19; IV, length 0.83-0.90. Pronotum: mesal length 0.90-0.99, posterior width 1.67-1.85; pronotal disk pale grayish yellow with reddish brown markings. Scutellum: grayish yellow, sometimes lightly flecked with red or reddish brown. Hemelytra: grayish yellow with red or reddish brown markings; apical half of clavus with white spots, particularly along commissure; cuneus densely marked with red; membrane dusky, sometimes lightly

conspurcate, veins reddish. Legs: femora pale grayish yellow, reticulated with reddish brown, marked with pale spots apically; hind femora often extensively reddened; tibiae pale yellow, lightly mottled with reddish brown and marked with pale spots. Vestiture: dorsum with suberect, simple setae intermixed with flattened, white to golden setae; pronotal disk, cuneus, and outer margin of corium also with flattened, black setae. Genitalia: Figure 110.

Female. Similar to male in color and vestiture. Length 6.26-6.42 mm, width 2.11-2.27. Head: width across eyes 1.06-1.09, vertex 0.44-0.46. Rostrum: length 2.36-2.41, extending between or slightly beyond hind coxae. Antennae: I, 1.17-1.24; II, 2.29-2.47; III, 1.08-1.17; IV, 0.79-0.92. Pronotum: mesal length 0.90-0.92, posterior width 1.66-1.76.

REMARKS. - *Phytocoris cochise* is known only from the type material collected in the Chiricahua Mts., Cochise Co., Arizona. The host plant is not known, but I expect this species inhabits a conifer, most likely a species of *Pinus*.

Phytocoris auranti new species

Figure 111

TYPES AND TYPE LOCALITY. - Holotype male: Deer Pk., Chiricahua Mts., 2743-2987 m, Cochise Co., Arizona, 30 July 1927, J.A. Kusche (CAS). Paratypes: ARIZONA, Cochise Co., Chiricahua Mts.: 7 males, same data as holotype (CAS, OSU); 4 males, Turkey Flat, 2438-2743 m, 22 July 1927, J.A. Kusche (CAS); 1 male, Rustler Pk., 2438-2743 m, 26 July 1927, J.A. Kusche (CAS).

DIAGNOSIS. - *Phytocoris auranti* is distinguished from other species of the *fraterculus* group by the following combination of characters: brownish orange general coloration; basal submargin of pronotal disk without fuscous markings; ratio of length of first antennal segment to width of head across eyes greater than 1.05:1 for

males and 1.20:1 for females; shaft of left clasper narrowly expanded preapically (fig. 111c); and arm of right clasper without or with poorly developed dorsal protuberance (fig. 111d).

DESCRIPTION. - Male. Length 7.29-8.15 mm, width 2.27-2.41; brownish orange general coloration. Head: width across eyes 1.11-1.17, vertex 0.36-0.38; pale yellow with red markings; frons with 6-8 red striae either side of middle. Rostrum: length 3.24-3.49, extending to 5th or 6th abdominal segment. Antennae: brownish yellow; I, length 1.33-1.46, lightly tinged with red and marked with pale spots; II, length 3.19-3.38; III, length 1.44-1.69; IV, length 1.04-1.13. Pronotum: mesal length 1.01-1.13, posterior width 1.82-2.02; pronotal disk brownish orange, region behind calli sometimes lighter, brownish yellow. Scutellum: uniformly brownish yellow to brownish orange. Hemelytra: brownish orange, confusedly sprinkled with small, reddish flecks; apex of corium with large pale patch; cuneus more deeply reddened; membrane dusky, veins reddish. Legs: femora pale yellow to brownish yellow, reticulated with red or reddish brown and marked with pale spots; tibiae uniformly pale yellow. Vestiture: dorsum with suberect, pale setae intermixed with flattened, golden setae and patches of flattened, white setae. Geneitalia: Figure 111.

Female. Length 6.91-7.40 mm, width 2.21-2.36; similar to male in color and vestiture. Head: width across eyes 1.04-1.09, vertex 0.43-0.45. Rostrum: length 3.33-3.46, extending to base of ovipositor or slightly beyond. Antennae: I, 1.46-1.51; II, 3.24-3.55; III, 1.62-1.69; IV, 1.08-1.17. Pronotum: mesal length 0.95-1.08, posterior width 1.76-1.87.

REMARKS. - This species is known only from specimens collected in the Chiricahua Mts. and Pinaleno Mts. of southeastern Arizona. Although the host plant is not known, *P. auranti* most likely occurs on a conifer, possibly *Picea engelmannii* Parry. Several males have been taken at light.

SPECIMENS EXAMINED. - Eleven additional specimens were examined from the following localities: ARIZONA. Cochise Co.: Chiricahua Mts., Rustlers Pk. (OSU); Chiricahua Mts., trail from Rustlers Pk. to Fly Peak (UCR); Huachuca Mts., Carr Cyn. (CAS); 1.5 mi. E Onion Saddle (AMNH). Graham Co.: Pinaleno Mts., Arcadia For. Cmp. (UAZ). The period of occurrence is from June 13 to August 31. Specimens were collected at altitudes between 2042 m and 2743 m.

Phytocoris mirus Knight

Figure 112

Phytocoris mirus Knight, 1928:35-36; Carvalho 1959:207; Knight 1968:235.

TYPES AND TYPE LOCALITY. - This species was described from six specimens collected in Arizona and Colorado. The holotype male, allotype, and a single male paratype were taken at Stonewall, 2590 m, Las Animas Co., Colorado, 7 August 1925, H.H. Knight, ex. *Picea* sp. All type material is retained in the Knight Collection (USNM) except two paratypes that were not located.

DIAGNOSIS. - Length 6.0-7.0 mm. *Phytocoris mirus* is very similar to *P. auranti*, but is distinguished by the following genitalic characters. The sensory lobe of the left clasper is strongly produced and narrowly rounded apically (fig. 112b). The shaft of the left clasper is short and broadly expanded preapically (fig. 112c), and the arm of the right clasper lacks a dorsal knob-like protuberance (fig. 112d). The long first antennal segment will separate *P. mirus* from the externally similar species, *P. cochise* and *P. jucundus* (see couplet 12 in key).

REMARKS. - *Phytocoris mirus* is distributed in mountainous regions of Arizona and Colorado, and also is known from Grant Co. and Sandoval Co., New Mexico. Specimens have been collected as far north as Boulder, Boulder Co., Colorado and east to Manitou Springs, El Paso Co., Colorado. In Arizona, this species is distributed from the Chiricahua Mts., Cochise Co., north and west to Flagstaff in Coconino County. Adults have been taken on *Picea engelmannii* Parry and *Pseudotsuga menziesii* (Mirb.). I have examined 20 specimens with collection dates ranging from July 10 to August 31.

Aurora Species - Group

DESCRIPTION. - Moderate-sized, 5.8-7.7 mm, grayish or brownish species; vestiture of dorsum composed of suberect, dark, simple setae intermixed with sericeous, white setae and broad, flattened, black setae. Head: antennae yellowish brown to fuscous, segments III and IV usually darker than segment II; segment I longer than width of head across eyes, dorsal surface with irregular pale markings, ventral surface usually pale; segment II without pale, median annulus; frons weakly to moderately convex, meeting tylus along shallow indentation, usually marked with 6-8 dark striae. Pronotum: basal submargin of pronotal disk with transverse fuscous band and 4-6 weakly elevated points; propleura fuscous, apical 1/3 pale. Hemelytra: moderately to extensively marked with brown to fuscous; corium usually with large pale patch apically; cuneus sometimes marked or tinged with red; membrane moderately to densely spotted or mottled with fuscous. Legs: femora white or pale yellow with brown to fuscous markings, dark regions often broken by pale spots; hind femora extensively darkened, especially on apical half; front and middle tibiae with 3 or 4 dark annuli. Male genitalia: genital tubercles upright, situated directly above clasper bases, broadly joined to genital segment. Left clasper: arm with large knob-like or spine-like protuberance arising from dorsal surface, inner ventral surface distinctly excavated; inner surface of sensory lobe with several small spines; shaft slightly expanded preapically, apex acute or narrowly rounded. Right clasper: size and shape variable, sometimes extending to base of left clasper; usually with several large spines on inner surface of arm and/or shaft; apex acute. Vesica: large membranous sack behind gonopore deeply divided medially, lobes weakly sclerotized in part, usually with small patch(es) of spinulae; left lobe with elongate sclerotized strap adnate to inner margin; basal lobes well developed; sclerotized process simple, elongate or lanceolate, continuous with basal sclerotized region of right membranous lobe, sometimes extending to or slightly beyond apex of lobe; basal process well sclerotized, expanding apically.

REMARKS. - Members of the *aurora* group are widely distributed in forested regions of the western United States. The majority of species inhabit shrubs (e.g., *Ceanothus*, *Purshia*) or small, non-coniferous trees (e.g., *Castanopsis*, *Cercocarpus*, *Salix*), mostly in open forest situations. One exception is *P. sagax*, which occurs on *Abies* and *Larix* in the Cascade Range and Sierra Nevada Mountains.

The species of this group are readily recognized by the large eyes; broad, flattened, black setae on the dorsal surface of the body; upright tubercles above clasper bases; large, dorsal protuberance on the arm of the left clasper; deeply divided membranous sack of the vesica, lobes partly sclerotized; and the small, simple sclerotized process. Externally, the members of this group closely resemble species of the *conspurcatus* group, but are easily distinguished by the genital characters listed above.

Key to the Species of the *aurora* Group

1	Ratio of length of antennal segment I to posterior width of pronotum 0.70:1 to 0.95:1	2
-	Ratio of length of antennal segment I to posterior width of pronotum 0.95:1 to 1.20:1	6
2(1)	Apical pale annulus of front tibiae much narrower than preceding dark annulus; ratio 0.50:1 to 0.67:1	3
-	Apical pale annulus of front tibiae about as broad or broader than preceding dark annulus; ratio greater than 0.67:1	5
3(2)	Shaft of right clasper elongate (fig. 113d), extending to or slightly beyond base of left clasper, apex strongly recurved . . *cercocarpi* Knight, p. 285	
-	Shaft of right clasper shorter, not extending beyond middle of genital aperture, apex not strongly recurved	4

4(3) Right clasper broad (fig. 114d), inner surface of arm with large bifurcate (rarely trifurcate) process; dorsal protuberance of left clasper well removed from apex of sensory lobe (fig. 114b) . . . . . dumicola n. sp., p. 286

- Right clasper narrow (fig. 115d), inner surface with 3 or 4 stout spines; dorsal process of left clasper only slightly removed from apex of sensory lobe (fig. 115b) . . . . . tobrendae n. sp., p. 289

5(2) Middle tibiae with 3 or 4 narrow, fuscous annuli; dorsal protuberance of left clasper large, extending above apex of sensory lobe (fig. 116b); shaft of right clasper short (fig. 116d), not reaching to base of left clasper; known from Colorado and Arizona . . . . angustatus Knight, p. 291

- Middle tibiae without distinct dark annuli, or with a single narrow annulus apically; dorsal protuberance of left clasper smaller, well removed from and not extending above apex of sensory lobe (fig. 117b), shaft of right clasper elongate (fig. 117d), extending to base of left clasper; distributed in California, Oregon, and Washington . . . . . sagax Van D., p. 292

6(1) Ratio of length of antennal segment I to posterior width of pronotum 0.95:1 to 1.10:1; sclerotized process not extending above apex of right lobe of vesica 7

- Ratio of length of antennal segment I to posterior width of pronotum 1.10:1 to 1.20:1; sclerotized process extending above apex of right lobe of vesica . . . . . lattini n. sp., p. 293

7(6) Sensory lobe of left clasper acutely produced (fig. 119b); shaft of right clasper without preapical spines; sclerotized process as in figure 119e . . . . *ceanothicus* n. sp., p. 295

\- Sensory lobe of left clasper rounded, dorsal protuberance arising between apex of lobe and angle (fig. 120b); shaft of right clasper with 3 or 4 preapical spines on dorsal surface (fig. 120d); sclerotized process as in figure 120e . . . . . *aurora* Van D., p. 298

Phytocoris cercocarpi Knight

Figure 113

Phytocoris cercocarpi Knight, 1928:39-41; Carvalho 1959:194; Knight 1968:229, fig. 284.

TYPES AND TYPE LOCALITY. - This species was described from 20 specimens collected in El Paso Co. and Las Animas Co., Colorado. The holotype male, allotype, and 17 paratypes were taken at Stonewall, Las Animas Co., 2590 m, 7 August 1925, ex. Cercocarpus betuloides Nutt., H.H. Knight. All type material is retained in the Knight Collection (USNM) except five paratypes that were not located.

DIAGNOSIS. - Length 5.5-7.0 mm. Phytocoris cercocarpi is distinguished from other species of the aurora group by the following characters. The ratio of length of antennal segment I to posterior width of pronotum ranges from 0.70:1 to 0.80:1 for males. The apical pale annulus of the front tibiae is much narrower than the preceding dark annulus. The shaft of the right clasper extends to or slightly beyond the base of the left clasper; apex strongly recurved (fig. 113d). Dorsal protuberance of left clasper as in figure 113b.

REMARKS. - This species is known from the type material collected in the Rocky Mts. of Colorado and from several specimens taken in mountainous regions of southeastern Arizona. The only host plant record for this species is Cercocarpus betuloides. Besides type material, I have examined four specimens of P. cercocarpi with collection dates ranging from June 19 to August 18.

Phytocoris dumicola new species

Figure 114

TYPES AND TYPE LOCALITY. - Holotype male: 2-5 mi. S Viola, 1360 m, Shasta Co., California, 9 July 1980, ex. Ceanothus integerrimus H.&A., G.M. Stonedahl and R.T. Schuh (AMNH). Paratypes: CALIFORNIA. Mariposa Co.: 6 males and 1 female, Miami Ranger Stn., 1524 m, 29 June & 1 July 1946, H.P. Chandler (CAS, UCB). Shasta Co.: 10 females, same data as holotype, 1360-1390 m, 9-10 July 1980 (AMNH, CAS, OSU). OREGON. Klamath Co.: 24 males and 5 females, 1 mi. W Crescent, 1372 m, 17 July 1979, ex. Purshia tridentata (Pursh), G.M. Stonedahl and M.D. Schwartz (OSU, USNM).

DIAGNOSIS. - Phytocoris dumicola is distinguished from other species of the aurora group by the following combination of characters. The ratio of length of antennal segment I to posterior width of pronotum is 0.75:1 to 0.95:1 for males. The pale annuli on the front tibiae are much narrower than the dark annuli. The right clasper is broad (fig. 114d) and has a large bifurcate (rarely trifurcate) process arising from the inner surface of the arm. The dorsal protuberance on the arm of the left clasper is well removed from the apex of the sensory lobe (fig. 114b).

DESCRIPTION. - Male. Length 6.32-7.72 mm, width 1.89-2.25; brown or brownish gray general coloration, sometimes lightly tinged with red. Head: width across eyes 1.02-1.10, vertex 0.32-0.36; white or pale yellow with reddish brown to fuscous markings; frons moderately convex, meeting tylus along shallow indentation, moderately to extensively darkened but usually with distinct pale mark medially, sometimes with 6-8 poorly defined dark striae either side of middle. Rostrum: length 2.56-3.07, extending to between 5th and 7th abdominal segments. Antennae: I, length 1.19-1.55, dark reddish brown to fuscous with pale patches on dorsal aspect, ventral surface sometimes pale apically; II, length 2.84-3.31, dark yellowish

brown to brown, sometimes tinged with red; III, length 1.31-1.67, brown or dark brown; IV, length 0.94-1.13, brown or dark brown. Pronotum: mesal length 0.83-0.92, posterior width 1.49-1.69; pronotal disk pale yellow to brownish yellow, moderately to extensively tinged or marked with brown to fuscous, lateral margins and basal submargin often broadly infuscated, extreme basal margin pale; basal submargin of disk with 4-6 weakly elevated points; collar tinged with brown or reddish brown, with pale spot medially; calli tinged with brown and usually with reddish brown to fuscous reticulations; propleura dark reddish brown or fuscous, apical 3rd pale. Scutellum: pale yellow, extensively darkened with brown to fuscous, apex usually broadly pale and with two reddish brown to fuscous, parallel lines medially. Hemelytra: grayish white or grayish yellow, extensively tinged with brown and mottled with brown to fuscous patches; outer margin of corium and cuneus sometimes tinged with red; membrane densely mottled with fuscous. Legs: femora white or pale yellow, moderately to extensively darkened with reddish brown to fuscous particularly on apical half of segment, dark regions broken by pale spots; hind femora with 3 or 4 large pale spots on leading edge; tibiae pale with reddish brown to fuscous markings; front tibiae with four dark annuli including narrow band at base, apical three dark bands much broader than pale annuli; middle tibiae with 3 or 4, less distinct, dark annuli. Vestiture: dorsum with long, dark, simple setae intermixed with broad, flattened, black setae and sericeous, white setae. Genitalia: Figure 114.

Females. Similar to male in color and vestiture. Length 6.16-7.07 mm, width 1.89-2.03. Head: width across eyes 0.97-1.02, vertex 0.43-0.48. Rostrum: length 2.75-3.04, extending to between 4th and 6th abdominal segments. Antennae: I, 1.22-1.66; II, 2.68-3.47; III, 1.37-1.76; IV, 0.95-1.17. Pronotum: mesal length 0.85-0.90, posterior width 1.51-1.71.

REMARKS. - *Phytocoris dumicola* has a predominantly northern distribution in the western United States. Specimens have been collected as far south as Inyo Co., California; north in the Cascade

Range to Kittitas Co., Washington; and east to Lincoln Co., Wyoming. This species also occurs on the Wasatch Plateau of central Utah as far south as Fish Lk. in Sevier County. A single specimen also was examined from Sundance, Crook Co., Wyoming. The Sierra Nevada Mts. and Cascade Range appear to form the western boundary of the distribution, but specimens have been taken west of this boundary at the following localities: 3 mi. S Eel R. Rgr. Stn., Mendocino Co., California; Zena, Polk Co., Oregon; Spanaway, Pierce Co., Washington.

Phytocoris dumicola is most common in open forest situations where it occurs on a variety of understory shrubs. Adult specimens have been collected from the following plants: Ceanothus integerrimus, C. velutinus Dougl., Cercocarpus ledifolius Nutt., Crataegus douglasii Lindl., Purshia tridentata, and Symphoricarpos sp. Several specimens were taken on Juniperus sp. and Populus tremuloides Michx., but these are probably not true host plants of P. dumicola. Males and females of this species have been collected at light.

SPECIMENS EXAMINED. - Besides type material, I have examined 76 specimens of P. dumicola from the following localities: CALIFORNIA. El Dorado Co.: 13 mi. E Georgetown (UCB). Inyo Co.: 7 mi. N Parcher's Camp (UCD). Mariposa Co.: Yosemite, 1183-1219 m (UCB). Mendocino Co.: Etsel Rdg., 3 air mi. S Eel R. Rgr. Stn., 1128 m (UCB). Modoc Co.: Fandago Pass Smt., 1890 m (AMNH). Mono Co.: Mono Lk. (UCB); U.S. Hwy. 395 at Mono Craters, 2188 m (AMNH). Plumas Co.: Johnsville (CAF&A). Shasta Co.: Castle Craigs St. Pk. (AMNH). Siskiyou Co.: McBride Spg., Mt. Shasta, 1524 m (UCB); Mt. Shasta City (UCB); Yreka (CAF&A). Yosemite Nat. Pk.: Clouds Rest, 3025 m (LACM). IDAHO. Ada Co.: 4 mi. SE Boise (OSU). Butte Co.: Craters of the Moon Nat. Mon. (UID). Latah Co.: Moscow (UID). Washington Co.: 16 mi. NW Cambridge on St. Hwy. 71 (OSU). OREGON. Baker Co.: Wallowa-Whitman Nat. For., T8S-R45E-Sec.11 (OSU). Deschutes Co.: Pringle Falls (OSU); 5 mi. NW Sisters (UCB); 5 mi. S Sisters, 1190 m (OSU). Jefferson Co.: 10 mi.W Sisters on U.S. Hwy. 20 (OSU). Klamath Co.: Hayden Mt. Smt., W of Keno, 1475 m (AMNH);

Sand Crk. (OSU); 5 mi. SE Keno (OSU). Lake Co.: 10 mi. S Silver Lk. (UCB); 24 mi. E LaPine (OSU). Polk Co.: Zena (OSU). Wheeler Co.: 4.5 mi. S Mitchell on Prairie Smt. Rd. (AMNH); 33.4 mi. E Prineville on U.S. Hwy. 26 (OSU). UTAH. Box Elder Co.: Snowville (USU); 1 mi. N Mantua (USU). Cache Co.: Logan (KU,USU); Logan Cyn. (USU). Davis Co.: Farmington (USU). Garfield Co.: Bryce Cyn. Nat. Mon. (UCB). Sevier Co.: Fish Lk. (KU). Utah Co.: Spanish Fork (USU). WASHINGTON. Kittitas Co.: Cliffdell (KU). Pierce Co.: Spanaway (OSU). Yakima Co.: Naches (KU); Tieton (OSU). WYOMING. Crook Co.: Reuter Cyn. Cmp., 5 mi. N Sundance, 1800 m (AMNH). Lincoln Co.: 12 mi. SE Smoot (USU). Collection dates for the above material range from May 9 to November 17.

A single female specimen from the paratype series of *P. fraterculus* was found to be conspecific with *P. dumicola*; label data: Fallen Leaf Lk., 1950 m, El Dorado Co., California, 26 October 1916, E.P. Van Duzee. This specimen now bears my identification label for *P. dumicola* and is deposited in the collection of the CAS.

Phytocoris tobrendae new species

Figure 115

TYPES AND TYPE LOCALITY. - Holotype male: Lee Cyn., 39 mi. NW Las Vegas, Clark Co., Nevada, 28 July 1966, 2256 m, F.,P.,&M. Rindge (AMNH). Paratypes: CALIFORNIA. Mono Co.: 1 male, Blanco's Corral, White Mts., 3048 m, 23 July 1953, D.D. Lindsdale (UCB); 2 males, Crooked Crk., White Mts., 27 July 1961, J.S. Buckett (CAF&A). NEVADA. Clark Co.: 2 males, same data as holotype (AMNH). White Pine Co.: 2 males and 2 females, 8.3 mi. N U.S. Hwy. 50 on Steptoe Crk. Rd., 2393 m, 19 July 1980, ex. *Cercocarpus ledifolius* Nutt., G.M. Stonedahl & R.T. Schuh (OSU, USNM); 2 females, Lehman Crk. Cmpgd., Humboldt Nat. For., 2286 m, 12 August 1980, ex. *Cercocarpus ledifolius*, G.M. & J.A. Stonedahl (AMNH, OSU). UTAH. Emery Co.: 1 male and 1 female, 13.2 mi. NW Jct. St. Hwy. 10 on St. Hwy. 31, 2180 m, 17 July 1980, ex. *Cercocarpus ledifolius*, G.M. Stonedahl &

R.T. Schuh (CAS). Sevier Co.: 1 male and 1 female, 2.3 mi. N Int. Hwy. 70 on Rd. to Kanosh, 2128 m, 16 July 1980, ex. Cercocarpus ledifolius, G.M. Stonedahl & R.T. Schuh (OSU).

DIAGNOSIS. - Phytocoris tobrendae closely resembles P. dumicola but is easily distinguished by the form of the male genitalia. The dorsal process of the left clasper is only slightly removed from the apex of the sensory lobe (fig. 115b). The right clasper is narrower than in P. dumicola and has 3 or 4 stout spines arising from the inner surface (fig. 115d). Also, the sclerotized process is much larger in P. tobrendae (fig. 115e).

DESCRIPTION. - Male. Length 6.48-7.51 mm, width 2.03-2.34; grayish general coloration. Head: width across eyes 1.04-1.12, vertex 0.31-0.35; pale yellow; base and middle of tylus, buccula, jugum, and lorum marked with reddish brown to fuscous; frons weakly convex, meeting tylus along shallow indentation, pale medially and bordered by fuscous, usually without distinct striae. Rostrum: length 2.99-3.24, extending to 6th or 7th abdominal segment. Antennae: I, length 1.22-1.53, white or pale yellow with large fuscous patches; II, length 3.15-3.62, brown or yellowish brown; III, length 1.26-1.51, brown to fuscous; IV, length 0.86-0.95, brown to fuscous. Pronotum: mesal length 0.86-1.01, posterior width 1.57-1.73; pronotal disk pale gray or grayish yellow, deeply tinged with brown or fuscous, lateral margins often more intensely darkened with fuscous; basal submargin of disk with transverse, fuscous band and 4-6 weakly elevated points, extreme basal margin pale; collar fuscous with pale median spot; calli mottled with reddish brown to fuscous; propleura fuscous, apical 3rd pale. Scutellum: extensively tinged or marked with brown or fuscous; apex broadly pale and marked with two reddish brown to fuscous, parallel, stripes. Hemelytra: grayish white or pale gray, extensively marked with brown to fuscous; inner margin of clavus, middle and apex of corium, and base of cuneus with distinct pale regions; membrane densely conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings

mostly on apical half of segment; hind femora extensively darkened and marked with pale spots, leading edge usually with 3 or 4 large pale spots; tibiae pale with reddish brown to fuscous markings; front and middle tibiae with 3 or 4 dark annuli; dark annuli of front tibiae distinctly broader than pale annuli. Vestiture: dorsum with long, dark, simple setae intermixed with broad, flattened, black setae and sericeous, white setae. Genitalia: Figure 115.

Female. Similar to male in color and vestiture. Length 6.48-6.70 mm, width 2.10-2.16. Head: width across eyes 0.99-1.04, vertex 0.42-0.45. Rostrum: length 3.11-3.20, extending well beyond apices of hind coxae. Antennae: I, 1.33-1.39; II, 3.01-3.18; III, 1.26-1.35; IV, 0.81-0.90. Pronotum: mesal length 0.90-0.94, posterior width 1.57-1.66.

REMARKS. - *Phytocoris tobrendae* is widely distributed in the Intermountain Sagebrush Province of eastern California, Nevada, and western Utah where it has been collected at elevations between 2100 m and 3100 m. This species also occurs on the Wasatch Plateau of central Utah. In the northern portion of the Intermountain Sagebrush Province (northern California, eastern Oregon, eastern Washington, southern Idaho) and the northern Wasatch Plateau, *P. tobrendae* seems to be largely replaced by the allied species, *P. dumicola*. Nymphs and adults of *P. tobrendae* have been collected on *Cercocarpus ledifolius*. Several males also were taken at light. The range of occurrence is from July 16 to August 12.

Phytocoris angustatus Knight

Figure 116

Phytocoris angustatus Knight, 1961:483-484, fig. 2; 1968:223.

TYPES AND TYPE LOCALITY. - This species was described from six specimens taken at Prescott, Yavapai Co., Arizona, 4 August 1917, H.H. Knight. One female specimen from the paratype series was

omitted from the original description; label data: Williams Ariz., Aug. 4 1917, H.H. Knight. The holotype male and four paratypes are retained in the Knight Collection (USNM); one male paratype was not located.

DIAGNOSIS. - Length 6.1-6.8 mm. *Phytocoris angustatus* is distinguished from other species of the *aurora* group by the following combination of characters. The ratio of length of antennal segment I to posterior width of pronotum ranges from 0.85:1 to 0.95:1 for males. The apical pale annulus on the front tibiae is only slightly narrower than the preceding dark annulus, and the middle tibiae are marked with 3 or 4 narrow, fuscous annuli. The dorsal process of the left clasper is broad and extends above the apex of the sensory lobe (fig. 116b). Right clasper and sclerotized process as in figures 116d&e.

REMARKS. - *Phytocoris angustatus* is known only from the type material collected in Coconino Co. and Yavapai Co., Arizona. The host plant is not known, but this species probably inhabits a shrubby plant, possibly in the family Rosaceae (e.g., *Cercocarpus*, *Purshia*).

Phytocoris sagax Van Duzee

Figure 117

Phytocoris sagax Van Duzee, 1920:352; Carvalho 1959:215.

TYPES AND TYPE LOCALITY. - *Phytocoris sagax* was described from a pair of specimens taken at Mt. Shasta City, Siskiyou Co., California, 24 July 1918, E.P. Van Duzee. The holotype male (No. 707) and allotype (No. 708) are deposited in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 5.8-7.6 mm. *Phytocoris sagax* keys to the couplet with *P. angustatus* but differs from the latter species by the absence of distinct dark annuli on the middle tibiae (sometimes with

a single narrow band apically), and by the form of the male genitalia. Also, the cuneus of P. sagax is often tinged with red. The dorsal protuberance on the arm of the left clasper is small, broadly rounded, and well removed from the apex of the sensory lobe (fig. 117b). The right clasper is very large (fig. 117d) and extends to the base of the left clasper. Finally, the sclerotized process is larger and more elongate than in P. angustatus (fig. 117e).

REMARKS. - Phytocoris sagax is widely distributed in the Sierra Nevada Mts. and Cascade Range as far north as Mt. Hood, Oregon. This species also occurs in the San Bernardino Mts. of southern California and throughout the Blue Mts. complex of northeastern Oregon. Adult specimens have been collected from Abies concolor (Gord. & Glend.) and A. grandis (Dougl.), and several nymphs were reared from branches of Larix occidentalis Nutt. Males of this species are attracted to light. I have examined 170 specimens with collection dates ranging from July 14 to October 10.

Phytocoris lattini new species

Figure 118

TYPES AND TYPE LOCALITY. - Holotype male: Corvallis, Benton Co., Oregon, 21 August 1959, taken at light, J.D. Lattin (USNM). Paratypes: OREGON. Benton Co.: 1 male, same data as holotype (AMNH); 1 male, same data as holotype except 28 September 1956 (OSU): 1 male, same data as holotype except 21 August 1958, ex. Rosa sp. (OSU); 1 male, same data as holotype except 23 August 1959 (CAS); 1 male, same data as holotype except 23 September 1968 (OSU); 2 males and 1 female, Corvallis, Crystal Lk. Cemetery, 27 July 1979, ex. Salix sp., G.M. Stonedahl (OSU); 1 male, Corvallis, Willamette R., 18 August 1960, ex. Salix sp., J.D. Lattin (OSU); 21 females, Willamette Pk., 16 October 1980, ex. Salix sp., J.D. Lattin (AMNH, CAS, OSU); 3 females, Willamette R., 12 October 1977, ex. Salix sp., J.D. Lattin (OSU); 2 females, Willamette R., 1 mi. S. Corvallis, 12 October 1971,

J.D. Lattin (OSU). Linn Co.: 2 females, Botany Farm, 1 mi. E Corvallis, 26 October 1971, J.D. Lattin (OSU). Polk Co.: 1 male, Zena, 17 November 1960, taken at light, J. Fisher (OSU). CALIFORNIA. Siskiyou Co.: 2 males, Mt. Shasta City, 13 August 1958, taken at light, J. Powell (UCB). UTAH. Cache Co.: 1 male, Logan Cyn., 18 August 1939, taken at light, G.F. Knowlton (USU).

DIAGNOSIS. - *Phytocoris lattini* is easily distinguished from other species of the *aurora* group by the long first antennal segment and elongate sclerotized process that extends above the apex of the right lobe of the vesica (fig. 118e). The ratio of length of antennal segment I to posterior width of pronotum ranges from 1.10:1 to 1.20:1 for males and 1.15:1 to 1.25:1 for females.

DESCRIPTION. - Male. Length 6.43-7.29 mm, width 1.80-2.18; brownish general coloration. Head: width across eyes 1.04-1.10, vertex 0.28-0.32; pale yellow; buccula, jugum, lorum, and tylus marked with reddish brown to fuscous; frons moderately convex, meeting tylus along shallow indentation, with 6-8 dark striae either side of middle. Rostrum: length 2.66-2.88, extending to 5th or 6th abdominal segment. Antennae: I, length 1.64-1.87, white or pale yellow with large fuscous patches; II, length 3.37-3.78, brownish yellow; III, length 1.67-1.85, brownish yellow to brown; IV, length 1.10-1.33, brownish yellow to brown. Pronotum: mesal length 0.77-0.86, posterior width 1.40-1.62; pronotal disk pale yellow or grayish yellow, tinged with brown, lateral margins sometimes more intensely darkened; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points, extreme basal margin pale; collar and calli with reddish brown to fuscous markings; propleura fuscous, apical 3rd pale. Scutellum: pale yellow, moderately to extensively darkened with brown or fuscous; pale median region broadening near apex; apex with two small, reddish marks. Hemelytra: pale yellow or grayish yellow, lightly tinged with brown and marked with scattered brown to fuscous patches particularly along veins, outer margin of corium, and margins of cuneus; cuneus sometimes with

reddish markings along edges; membrane moderately to densely conspurcate, often with distinct pale patches medially. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly on apical half of segment; darkened regions of hind femora broken by pale spots; tibiae pale with reddish brown to fuscous markings; front and middle tibiae with 3 or 4 fuscous annuli, pale annuli on front tibiae as broad or broader than dark annuli. Vestiture: dorsum with simple, dark setae intermixed with broad, flattened, black setae and sericeous, white setae; legs and first antennal segment with long, bristle-like, pale setae. Genitalia: Figure 118.

Female. Similar to male in color and vestiture; wing membrane slightly shorter than that of male. Length 5.78-6.64 mm, width 1.80-2.12. Head: width across eyes 1.01-1.05, vertex 0.42-0.44. Rostrum: length 2.95-3.06, extending to between 5th and 7th abdominal segments. Antennae: I, 1.65-1.80; II, 3.33-3.63; III, 1.76-1.85; IV, 1.22-1.31. Pronotum: mesal length 0.77-0.86; posterior width 1.39-1.53.

REMARKS. - *Phytocoris lattini* is known only from the type material collected in western Oregon; Siskiyou Co., California; and Cache Co., Utah. The host plant of this species appears to be *Salix*, but it may inhabit other deciduous trees as well. Males are attracted to light. Collection dates are from July 27 to October 16.

Phytocoris ceanothicus new species

Figure 119

TYPES AND TYPE LOCALITY. - Holotype male: Mill Crk., San Bernardino Mts., 1830 m, San Bernardino Co., California, 23 July 1939, ex. *Ceanothus cordulatus* Kell., Timberlake (UCR). Paratypes: CALIFORNIA. Calaverus Co.: 1 male, Mokelumne Hill, 5 July 1950, A.T. McClay (UCD). Mariposa Co.: Yosemite, 1183-1219 m: 3 females, 17 June 1928, E.O. Essig (UCB); 2 males and 3 females, 7 June 1931

(LACM, UCB, UCD); 1 female, 8 June 1931 (LACM). Riverside Co.: 1 male and 1 female, Pine Flat, San Jacinto Mts., 1768 m, 15 June 1940, ex. Ceanothus sp., F.H. Rindge (UCB). San Bernardino Co.: 1 male, same data as holotype (UCR). Shasta Co.: 1 male, 3 mi. NE Burney, 15 July 1965, R.L. Langston (UCB).

DIAGNOSIS. - Phytocoris ceanothicus is distinguished from other species of the aurora group by the following combination of characters. The ratio of length of antennal segment I to posterior width of pronotum ranges from 0.95:1 to 1.05:1 for males. The sensory lobe of the left clasper is acutely produced (fig. 119b) and the right clasper lacks preapical spines. The sclerotized process of the vesica is long and narrow (fig. 119e).

DESCRIPTION. - Male. Length 6.53-6.69 mm, width 1.94-2.07; brownish general coloration. Head: width across eyes 1.01-1.12, vertex 0.28-0.34; pale yellow with reddish brown markings; frons weakly convex, with 6-8, often poorly defined, striae either side of middle. Rostrum: length 2.50-2.61, extending to 5th or 6th abdominal segment. Antennae: I, length 1.39-1.57, dark reddish brown or fuscous with pale patches on dorsal aspect, ventral surface sometimes pale apically; II, length 2.97-3.53, brown or brownish yellow; III, length 1.44-1.76, brown or dark brown; IV, length 0.95-1.13, brown or dark brown. Pronotum: mesal length 0.76-0.88, posterior width 1.46-1.57; pronotal disk brownish yellow, extensively marked with fuscous, lateral margins and basal submargin often broadly darkened, extreme basal margin pale; collar reddish brown to fuscous with pale spot medially; calli extensively marked or tinged with reddish brown to fuscous; propleura fuscous, apical 3rd pale. Scutellum: pale with fuscous patch either side of middle running to lateral margin; apex usually with two reddish marks, sometimes joined together. Hemelytra: grayish white, lightly to moderately marked with brown or dark brown particularly along veins, margins of corium, and on cuneus; corium usually with large fuscous patch at outer posterior angle and another between anal ridge and radial vein; outer

margin of corium and margins of cuneus often lightly tinged with red; membrane densely mottled with fuscous. Legs: femora white or pale yellow with reddish brown to fuscous markings, apical 1/4 and leading edge extensively darkened and marked with pale spots; tibiae pale with reddish brown to fuscous markings; front and middle tibiae with 3 or 4 dark annuli, hind tibiae sometimes with 2 or 3 poorly defined, dark annuli. Vestiture: dorsum with simple, black setae intermixed with broad, flattened, black setae and sericeous, white setae. Genitalia: Figure 119.

Female. Similar to male in color and vestiture. Length 5.67-6.48 mm, width 1.75-2.07. Head: width across eyes 0.91-1.02, vertex 0.40-0.43. Rostrum: 2.57-2.75, extending to 4th or 5th abdominal segment. Antennae: I, 1.48-1.64; II, 3.04-3.36; III, 1.71-1.80; IV, 0.99-1.19. Pronotum: mesal length 0.76-0.92; posterior width 1.39-1.62.

REMARKS. - *Phytocoris ceanothicus* has been collected in the San Jacinto Mts., San Bernardino Mts., San Gabriel Mts., and the Sierra Nevada Mts. of California as far north as Burney in Shasta County. Adult specimens have been taken on *Ceanothus cordulatus* and *Ceanothus* sp.

SPECIMENS EXAMINED. - In addition to type material, 15 specimens were examined from the following localities: Fresno Co.: Huntington Lk. (CAS); Kings R. Cyn. (CAS). Los Angeles Co.: Mt. Wilson (CAF&A, CAS). Nevada Co.: Soda Springs Smt., 1830 m (CAS). San Bernardino Co.: Forest Home (CAS); Mill Crk. Cyn. (CAS). San Diego Co: Unknown locality (CAS). The range of occurrence is from July 4 to October 18. The specimen from Soda Spgs. Smt., Nevada County was incorrectly designated a female paratype of *P. fraterculus* by E.P. Van Duzee, and the specimen from San Diego County was similarly misplaced as a paratype female of *P. sonorensis*. These specimens now bear my identification label for *P. ceanothicus* and are retained in the collection of the CAS.

Phytocoris aurora Van Duzee

Figure 120

Phytocoris aurora Van Duzee, 1920:340-341; Carvalho 1959:191.

TYPES AND TYPE LOCALITY. - This species was described from a single male specimen collected at Cayton, Shasta Co., California, 19 July 1918, E.P. Van Duzee. The holotype (No. 689) is retained in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 5.9-7.9 mm. This species keys to the couplet with P. ceanothicus but is easily distinguished by the form of the male genitalia. The sensory lobe of the left clasper is rounded; dorsal protuberance arising between apex of lobe and angle (fig. 120b). The right clasper is set with 3 or 4 preapical spines on the dorsal surface (fig. 120d), and the sclerotized process of the vesica is short with an acute apex (fig. 120e). Specimens of P. aurora also tend to be slightly larger and with fewer fuscous markings than P. ceanothicus.

REMARKS. - This species occurs in the Coast and Cascade ranges of Oregon and northern California. Specimens have been collected as far north as Marys Pk., Benton Co., Oregon. The southernmost record is from Johnsville, Plumas Co., California. Adults have been taken on Castanopsis chrysophylla (Dougl.) and Quercus garryana Dougl. Fourty-two specimens were examined with collection dates ranging from August 9 to October 10.

Juniperanus Species - Group

DESCRIPTION. - Small to moderate-sized, 3.3-5.8 mm, reddish, greenish, or yellowish brown to dark brown species; vestiture of dorsum composed of suberect, simple setae intermixed with narrow, flattened, white to golden setae and usually broad, flattened, dark brown or black setae. Head: antennae variously colored and marked; segment I sometimes with brush of long, pale setae on ventral surface; length of segment I usually less than or equal to width of head across eyes; segment II sometimes with pale, median annulus; frons weakly to moderately arched, evenly convex, meeting tylus along distinct indentation; tylus weakly to strongly produced at base; eyes large, length equal to or greater than width of vertex. Pronotum: basal submargin of pronotal disk, in darker species, with transverse, fuscous band or 4-6 weakly elevated, fuscous points; propleura pale, often lightly marked with red to fuscous, basal margin sometimes narrowly infuscated. Hemelytra: white, pale yellow, or pale green ground color, variously marked with red, reddish brown, brown, or fuscous (exception: *P. vanduzeei* is uniformly yellowish green to bright green); membrane moderately to densely conspurcate, spots often coalescing to form larger fuscous patches. Legs: femora pale yellow or greenish with red, brown, or fuscous markings, particularly on apical half of segment; hind femora often with reticulate pattern; tibiae color patterns variable, sometimes with alternating light and dark annuli. Male genitalia: genital segment with distinct tubercle above clasper bases, tubercles variable in size and shape, sometimes set with dense brush of stout, dark setae basally. Left clasper: sensory lobe moderately to prominently produced; shaft slightly expanded preapically, outer margin of expanded region flattened dorsoventrally; apex acute or narrowly truncate. Right clasper: simple lanceolate shape, similar for all members of group; apex acute. Vesica: multilobed, lobes often with spinulate region(s); left basal region of vesica sometimes encompassing a small sclerotized plate or elongate strap; basal lobes of vesica variable in size and shape, right lobe usually much larger than left lobe;

basal process well sclerotized, extending above level of gonopore; sclerotized process elongate to narrowly lanceolate or teardrop-shaped (exception: sclerotized process of P. juniperanus more triangular in shape), often gently curved or twisted especially in basal region, lateral margins sometimes slightly reflexed, connected to basal process by narrow membranous strap.

REMARKS. - The juniperanus group is comprised of 15 species that occur predominantly in the arid central and southern portions of the western United States. Several members of this group are known only from the chaparral region and central valley of California, but the majority of species are distributed in one or more of the following ecoregions of Bailey (1978): American Desert, Colorado Plateau, Intermountain Sagebrush, Mexican Highland. Two exceptions are P. occidentalis which occurs in forested regions of California, Oregon, Washington and southern British Columbia, and P. breviusculus, a species that is widely distributed in eastern North America but is not known to occur west of the Rocky Mountains.

All species of the juniperanus group inhabit shrubby plants or small trees. At least four members of this group are associated with various species of juniper and two are found only on pines. Other host plants of this group are Acacia, Adenostoma, Atriplex, Ephedra, Larrea, Prosopis, and Rhamnus.

Members of the juniperanus group are extremely variable in general coloration but are easily recognized by their small size, 3.3-5.8 mm; short first antennal segment, length of segment usually less than or equal to width of head across eyes; broad, flattened, dark setae on the hemelytra (absent in several pale species); and the structure of the male genitalia, in particular the lanceolate or teardrop-shaped sclerotized process and the well developed tubercle above the base of the left clasper (see species figures for examples). The species of this group share many characters with members of the conspurcatus group to which they appear to be closely related. The two groups are distinguished primarily on the basis of characters of the male genitalia but in general, juniperanus species are much smaller and the first antennal segment is shorter than for members of the conspurcatus group.

Key to the Species of the juniperanus Group

Portions of the following key serve only in the separation of male specimens based on characteristics of the genitalia. In these cases, identification of females is possible only by means of association with known males.

1 Hemelytra pale green, yellowish green, or bright green 2

\- Hemelytra not green 3

2(1) Hemelytra pale green with small dusky flecks . . . . cuneotinctus Knight, p. 304

\- Hemelytra yellowish green to bright green, without dusky flecks . . . . vanduzeei Reuter, p. 305

3(1) Corium distinctly marked or tinged with red 4

\- Corium without red markings but cuneus sometimes lightly marked with red 7

4(3) Erect, bristle-like setae on first antennal segment dark brown or black; genital tubercle above base of left clasper densely set with stout setae (fig. 123a) . . . . adenostomae n. sp., p. 307

\- Erect setae on first antennal segment pale; genital tubercle without or with only a few stout setae (figs. 124a-126a) 5

5(4) Length 4.5-5.8 mm; left genital tubercle large and distinctly tapered (fig. 124a) . . . . occidentalis Stonedahl, p. 309

\- Length 3.3-4.4 mm; left genital tubercle smaller, not distinctly tapered (figs. 125a&126a) 6

6(5) Scutellum with reddish median line . . . . acaciae Knight, p. 310

\- Scutellum mottled with red but lacking distinct median line . . . . miniatus Knight, p. 311

7(3) Antennal segment I densely set with long, pale setae on ventral surface 8

- Antennal segment I with short, predominantly dark setae on ventral surface 9

8(7) Grayish white or pale gray general coloration; abdomen with a black, longitudinal line on each side extending to 8th segment; base of left genital tubercle sparsely set with pale setae (fig. 127a) . . . . . ventralis Van D., p. 312

- Brownish general coloration; abdomen without black, longitudinal lines; base of left genital tubercle densely set with stout, dark setae (fig. 128a) . . . . . tricinctus Knight, p. 314

9(7) Left genital tubercle moderately to densely set with erect, bristle-like setae (figs. 129a-132a) . . . 10

- Left genital tubercle without, or with only a few bristle-like setae (figs. 125a&133a-135a) 13

10(9) Genital tubercle large and bulky, apex broadly rounded (figs. 129a&130a) 11

- Genital tubercle smaller, apex angulate fig. 131a) or narrowly rounded (fig. 132a) 12

11(10) Shaft of left clasper distinctly expanded preapically (fig. 129c); membranous lobes of vesica small, left basal lobe with sclerotized structure apically; genital tubercle as in figure 129a . . . . . nigrisquamus n. sp., p. 315

- Shaft of left clasper only slightly expanded preapically (fig. 130c); membranous lobes of vesica larger, left basal lobe without apical sclerotized structure; genital tubercle as in figure 130a . . . . . adustus n. sp., p. 317

12(10) Ventral surface of antennal segment I dark reddish brown or fuscous, ratio of segment length to width of head across eyes less than 0.85:1 for males; left genital tubercle moderately set with long, pale setae (fig. 131a) . . . . . monophyllae n. sp., p. 318

- Ventral surface of antennal segment I pale, ratio of segment length to width of head across eyes greater than 0.90:1 for males; left genital tubercle densely set with dark, bristle-like setae (fig. 132a) . . . . . *juniperanus* Knight, p. 320

13(9) Antennal segment II with pale, median annulus 14

- Antennal segment II without pale, median annulus . . . . . *breviusculus* Reuter, p. 322

14(13) Scutellum with fuscous, median line . . . . . *acaciae* Knight, p. 310

- Scutellum mottled with fuscous but lacking distinct median line 15

15(14) Scutellum strongly deflexed apically; ratio of length of antennal segment I to width of head across eyes 0.65:1 to 0.75:1 for males and 0.75:1 to 0.95:1 for females . . . . . *brevicornis* Knight, p. 324

- Scutellum evenly convex, not strongly deflexed apically; ratio of length of antennal segment I to width of head across eyes 0.85:1 to 1.00:1 for males and 1.05:1 to 1.20:1 for females . . . . . *albifrons* Knight, p. 325

Phytocoris cuneotinctus Knight

Figure 121

Phytocoris cuneotinctus Knight, 1925a:55-56; Carvalho 1959:196; Knight 1968:216.

TYPES AND TYPE LOCALITY. - This species was described from 30 specimens collected in southwestern New Mexico. The holotype male, allotype, and 24 paratypes were taken at Mesilla Park, Dona Ana Co., 12 July 1917, H.H. Knight. The holotype, allotype, and 21 paratypes are retained in the Knight Collection (USNM) and one paratype is deposited in the collection of UAZ. Six paratypes were not located.

DIAGNOSIS. - Length 4.2-4.9 mm. Phytocoris cuneotinctus is distinguished from other species of the juniperanus group by the pale greenish coloration and small, dusky flecks on the hemelytra. Externally, this species is somewhat similar to another greenish species, P. vanduzeei, but differs by the flecks on the hemelytra and longer first antennal segment; ratio of segment length to width of head across eyes 0.85:1 to 1.00:1.

REMARKS. - Phytocoris cuneotinctus has been collected in Arizona, California, Nevada, New Mexico, Oregon, and Utah. Specimens have been taken as far north as Harney Co., Oregon; east and south to Dona Ana Co., New Mexico; and west to Inyo Co., California. The host plant of this species is Atriplex. I have examined 32 specimens with collection dates ranging from June 15 to October 17.

Phytocoris vanduzeei Reuter

Figure 122

Lygus vividus Uhler, 1894:260-261 (preoc. by Lygaeus vividus Fabricius 1803:235; see Stål 1868:87); Van Duzee 1917a:344 (cat.).

Dichrooscytus marmoratus Van Duzee, 1910:78-79 (preoc. by Phytocoris marmoratus Douglas & Scott 1869:261); Henry and Stonedahl 1983:in press.

Phytocoris vanduzeei Reuter, 1912:30 (n.n. for Dichrooscytus marmoratus Van Duzee); Van Duzee 1912:512, 1917a:320 (cat.). (syn. by Knight 1917:640).

Phytocoris vividus, Knight 1917:640 (n.comb. for Lygus vividus Uhler); Knight 1968:216.

Phytocoris vanduzeei, Van Duzee 1923:149; Carvalho 1959:220; Knight 1968:217.

Phytocoris nigripubescens Knight, 1925a:55; Carvalho 1959:208; Knight 1968:216 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Lygus vividus was described from a single male specimen collected at Comondu, Baja California Sur, March 1889, C.D. Haines. This specimen is deposited in the collection of the CAS (type number 561) and bears a red lectotype label which was probably applied by E.P. Van Duzee. In my opinion, this specimen is a holotype because it appears to be the only insect on which the description was based (see Uhler, 1894).

Dichrooscytus marmoratus was described from an unknown number of specimens collected at Alamogordo, Otero Co., New Mexico. I have examined 16 specimens from the original syntype series with collection dates ranging from 8 April to 10 May 1902. Fifteen of these specimens are tagged with orange paratype labels which were apparently applied by E.P. Van Duzee after publication of the original description. The remaining specimen (female, CAS) bears a

red "allotype" label and a second red label reading "TYPE". These labels also appear to have been applied by Van Duzee, but there is no published record of a type designation for this species. A male specimen from the syntype series was designated a lectotype by Henry and Stonedahl (1983). The lectotype and 13 paralectotypes are retained in the Van Duzee Collection (CAS) and two paralectotypes are deposited in the collection of the USNM.

The junior synonym, P. nigripubescens, was described from seven specimens collected at Tucson, Pima Co., Arizona, 5 April - 3 May 1924, A.A. Nichol. The holotype male (5 April), allotype, and one female paratype are retained in the Knight Collection (USNM). Two paratypes are deposited in the collection of the UAZ, one paratype is deposited in the collection of the CAS, and one paratype was not located.

DIAGNOSIS. - Length 4.2-5.7 mm. Phytocoris vanduzeei is easily recognized by the yellowish green to bright green general coloration and short first antennal segment; ratio of segment length to width of head across eyes 0.40:1 to 0.60:1. The genital tubercle of the male is well developed (fig. 122a) and the shaft of the left clasper is distinctly expanded preapically (fig. 122c). The vesica has a single elongate sclerotized process arising near the apex of the basal process (fig. 122e).

REMARKS. - Phytocoris vanduzeei is widely distributed in the southwestern United States where it occurs on Larrea divaricata Cav. Specimens have been collected as far north as Inyo Co., California; Nye Co., Nevada; and Washington Co., Utah. This species is found throughout much of Arizona and New Mexico, and also occurs in western Texas and northern Mexico. The southern coast ranges form the western boundary of the distribution in California. I have examined 900 specimens with collection dates ranging from January 6 to December 17.

Lygaeus vividus was described by Fabricius (1803) and moved to the genus Phytocoris by Stål (1868). Lygus vividus was described by

Uhler (1894) and moved to the genus Phytocoris by Knight (1917). As a result of these actions, the names P. vividus (Fabricius) and P. vividus (Uhler) were brought together in secondary homonymy.

Dichrooscytus marmoratus was described by Van Duzee (1910) and moved to the genus Phytocoris by Reuter (1912). At this time, Reuter proposed the new specific name, vanduzeei, because the combination, Phytocoris marmoratus, was preoccupied by a European species (Douglas and Scott, 1869). Phytocoris vanduzeei Reuter was placed in synonymy with P. vividus (Uhler) by Knight (1917). Since P. vividus (Uhler) is clearly a junior secondary homonym, the name must be rejected and P. vanduzeei becomes the correct name for this species by priority.

Phytocoris vanduzeei and P. vividus (Uhler) were once again recognized as distinct species by Knight (1968) in the Nevada Test Site study. Knight presents characters to distinguish these species but does not address the problem created by his earlier synonymy of P. vanduzeei. I have examined type material of both nominal taxa and believe that they are conspecific.

Phytocoris adenostomae new species

Figure 123

TYPES AND TYPE LOCALITY. - Holotype male: Oak Grove, San Diego Co., California, 10 September 1975, ex. Adenostoma sparsifolium Torr., J.D. Pinto (UCR). Paratypes: 4 males and 4 females, same data as holotype (UCR).

DIAGNOSIS. - Phytocoris adenostomae is distinguished from other species of the juniperanus group by the reddish general coloration and dark, bristle-like setae on the first antennal segment. The densely set, bristle-like setae on the genital tubercle will further differentiate males of P. adenostomae from other reddish species of this group.

DESCRIPTION. - Male. Length 3.94-4.48 mm, width 1.26-1.57; reddish yellow general coloration. Head: width across eyes 0.75-0.84, vertex 0.33-0.36; yellow or grayish yellow with red markings; frons moderately and evenly arched. Rostrum: length 1.57-1.76, extending to 4th or 5th abdominal segment. Antennae: I, length 0.57-0.67, red to reddish brown with white spots and 8-12 erect, dark setae; II, length 1.40-1.57, brownish yellow; III, length 0.91-1.04, dark yellowish brown to fuscous; IV, length 0.64-0.72, brown to fuscous. Pronotum: mesal length 0.59-0.75, posterior width 1.06-1.31; pronotal disk yellow or grayish yellow, tinged with red; propleura yellowish, usually lightly marked with red. Scutellum: yellow with red markings. Hemelytra: pale yellow to grayish yellow, tinged with red; inner apical angle of corium, borders of claval suture, inner margin of cuneus, and apex of cuneus usually infuscated; membrane infuscated, marked with scattered pale spots, outer margin with two oblique, pale marks. Legs: femora yellow with red to reddish brown markings; hind femora more extensively reddened on apical half and marked with pale spots; tibiae red to reddish brown with pale spots. Vestiture: dorsum with dark, simple setae intermixed with flattened, black setae and flattened, white setae. Genitalia: Figure 123. Genital tubercle of male densely set with dark bristle-like setae (fig. 123a).

Female. Similar to male in color and vestiture. Length 3.94-4.48 mm, width 1.31-1.53. Head: width across eyes 0.76-0.81, vertex 0.37-0.40. Rostrum: length 1.66-1.84, extending to 5th or 6th abdominal segment. Antennae: I, 0.59-0.72; II, 1.46-1.67; III, 0.95-1.08; IV, 0.61-0.74. Pronotum: mesal length 0.61-0.72, posterior width 1.15-1.33.

REMARKS. - *P. adenostomae* has been collected in Riverside Co. and San Diego Co., California. The host plant of this species is *Adenostoma sparsifolium*. Both males and females have been taken at light.

SPECIMENS EXAMINED. - In addition to type material, 64 specimens were examined from the following localities: CALIFORNIA. Riverside Co.: Andreas Cyn. (UCR); Deep Cyn. (UCR); 5 mi. S Palm Spgs. (UCR); San Jacinto Mts.: Herkey Crk. (UCB), Pine Mdw. (UCR), Pinyon Flat (UCB), Vandevanter Flat (UCB). San Diego Co.: Anza (KU); 3 mi. E Anza (UCR); 5 mi. N Borrego Spgs. (UCB); Boulevard (KU, SDNH); Campo (KU); 7.7 mi. S Oak Grove (UCR). Collection dates range from May 21 to November 1.

Phytocoris occidentalis Stonedahl

Figure 124

Phytocoris occidentalis Stonedahl, 1983a:in press.

TYPES AND TYPE LOCALITY. - This species was described from 17 specimens collected 4 mi. NE Cave Jct. on US Hwy. 199, Josephine Co., Oregon, 8 & 24 August 1979, ex. *Pinus ponderosa* Dougl., G.M. Stonedahl. The holotype male and two paratypes are deposited in the collection of the USNM, a pair each are deposited in the collections of the AMNH and CAS, and 10 paratypes are retained in the collection of OSU.

DIAGNOSIS. - *Phytocoris occidentalis* is very similar to *P. adenostomae* but differs by the larger size, 4.4-5.8 mm; pale, erect setae on the first antennal segment; and sparsely set, pale setae on the left genital tubercle of the male (fig. 124a). The large size also will distinguish this species from *P. acaciae* and *P. miniatus*.

REMARKS. - *Phytocoris occidentalis* is widely distributed along the west coast of North America from Goldstream, British Columbia to San Diego Co., California. Specimens have been collected as far east as Grant Co., Oregon and east to the Cascade Range and Sierra Nevada Mts. in California. This species also occurs in the western mountain ranges of southern California. Adult specimens have been collected

on Pinus attenuata Lemmon, P. contorta Dougl., P. ponderosa Dougl., P. radiata D. Don., and P. sabiniana Dougl. I have examined 75 specimens with collection dates ranging from May 2 to October 1.

Phytocoris acaciae Knight

Figure 125

Phytocoris acaciae Knight, 1925a:53-54; Carvalho 1959:189; Knight 1968:249.

Phytocoris minuendus Knight, 1968:243-244, fig. 298 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris acaciae was described from 54 specimens collected in Arizona and New Mexico. The holotype male, allotype, and 27 paratypes were taken at Texas Pass, Arizona, 20 July 1917, ex. Acacia greggi Gray., H.H. Knight. The holotype, allotype, and 39 paratypes are retained in the Knight Collection (USNM). Two paratypes are deposited in the collection of the UAZ and a pair are in the CAS collection. Eight paratypes were not located.

The holotype male of the junior synonym, P. minuendus, was collected along the Santa Cruz R., Pima Co., Arizona, 20 April 1926, A.A. Nichol and is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 3.7-4.5 mm, hemelytra distinctly marked with red or rarely reddish brown to fuscous. Phytocoris acaciae most closely resembles P. adenostomae but differs by the pale, erect setae on antennal segment I; pale, median annulus on antennal segment II; reddish, median line on the scutellum; and absence of dark, bristle-like setae on the genital tubercle of the male.

REMARKS. - Phytocoris acaciae is widely distributed in southern Arizona. The northernmost record is from Yarnell in Yavapai County. Several specimens also have been collected in Riverside and San Diego counties, California and Hidalgo Co., New Mexico. Knight (1968) records this species from Texas, but does not list a specific

locality. Adults and nymphs of P. acaciae have been collected on Acacia greggi. Males and females of this species are attracted to light. I have examined 52 specimens with collection dates ranging from April 28 to September 23.

The male holotype of P. minuendus is an unusually dark specimen of P. acaciae. All other features including the structure of the genitalia are typical of the latter species. Additional dark-colored specimens were examined from Arizona and all are conspecific with P. acaciae. On the basis of this information, P. minuendus has been placed in synonymy with P. acaciae.

Phytocoris miniatus Knight

Figure 126

Phytocoris miniatus Knight, 1961:480-481, 1968:225.

TYPES AND TYPE LOCALITY. - This species was described from seven specimens taken at Tucson, Pima Co., Arizona, 12 May 1929, E.D. Ball. The holotype male, allotype, and one male paratype are retained in the Knight Collection (USNM). The remaining four paratypes were not located.

DIAGNOSIS. - Phytocoris miniatus is distinguished from other species of the juniperanus group by the following combination of characters. The corium is distinctly marked with red. The scutellum is mottled with red but lacks a distinct median line. The erect, bristle-like setae on the first antennal segment are pale. The genital tubercle of the male is small and sparsely set with stout, pale setae (fig. 126a). This species is most similar to P. breviusculus but differs by the smaller size, 3.3-3.9 mm, reddish markings on the dorsum, and form of the male genitalia. Phytocoris miniatus also resembles P. brevicornis and P. albifrons but is easily distinguished from these species by the reddish markings on the

dorsum and uniformly brownish yellow second antennal segment without pale, median annulus.

REMARKS. - In addition to type material, six specimens of *P. miniatus* were examined from Salt River Cyn., Apache Lk., Maricopa Co., Arizona, 28 April 1981, D.A. & J.T. Polhemus (JTP). Knight (1968) reports this species from St. George, Washington Co., Utah, 30 June 1965. The host plant of *P. miniatus* is not known.

Phytocoris ventralis Van Duzee

Figure 127

Phytocoris ventralis Van Duzee, 1918:287-288; Carvalho 1959:220; Knight 1968:216.

Phytocoris ephedrae Knight, 1961:478-479, fig. 2, 1968:216 (NEW SYNONYMY).

Phytocoris quadricinctus Knight, 1968:256-257, fig. 316 (NEW SYNONYMY).

Phytocoris contrastus Knight, 1968:259, fig. 318 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris ventralis* was described from three specimens collected 7 mi. W Coachella, Riverside Co., California, 16 May 1917, taken on "palo-verde", E.P. Van Duzee. The holotype female (No. 406), allotype (No. 407), and single female paratype are deposited in the Van Duzee Collection (CAS). The allotype of *P. ventralis* is not conspecific with the holotype. This specimen is teneral and in somewhat poor condition, but I believe that it is an example of *P. brevicornis*.

The junior synonym, *P. ephedrae*, was described from 10 specimens collected in southeastern Arizona and western Texas. The holotype male was taken at Bowie, Cochise Co., Arizona, 15 July 1917, H.H. Knight. The holotype, allotype, and five paratypes are retained in the Knight Collection (USNM). Three paratypes were not located.

The junior synonym, P. quadricinctus, was described from five specimens collected in Gila Co., Arizona and Brewster Co., Texas. The holotype male, allotype, and two female paratypes were taken in the Salt River Mts., 396 m, Gila Co., Arizona, 9 May 1926, ex. Lycium sp., A.A. Nichol. All type material is deposited in the Knight Collection (USNM) except one female paratype that was not located.

The junior synonym, P. contrastus, was described from four specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male, allotype, and one male paratype were taken in Area 5M (TB), Nevada Test Site, 19 July 1965, E. Beck and J. Merino. All type material is retained in the Knight Collection (USNM) except one male paratype that was not located.

DIAGNOSIS. - Length 3.8-5.1 mm; gray or yellowish gray general coloration; antennae pale, segments III and IV, and apical 3rd of segment II fuscous; segment I with brush of long, pale setae on ventral surface; segment II sometimes divided by dark annuli; frons weakly convex; tylus strongly produced at base; pronotal disk gray, basal submargin with transverse fuscous band or series of fuscous spots, rarely without dark markings; collar and calli lightly to densely marked with fuscous; propleura pale, anterior margin sometimes marked with fuscous; hemelytra grayish white or pale gray, lightly marked with fuscous along veins, rarely more extensively darkened; cuneus narrowly fuscous at apex; membrane lightly to moderately sprinkled with dark spots; femora grayish white or pale grayish yellow, apical 3rd marked with fuscous especially along anterior margin; tibiae pale, narrowly infuscated basally; front tibiae with three, often indistinct, dark annuli; abdomen with black, longitudinal line on each side extending through 8th segment.

Phytocoris ventralis is easily distinguished from other species of the juniperanus group by the grayish general coloration; brush of long, pale setae on ventral surface of antennal segment I; and by the dark line on each side of the abdomen.

REMARKS. - Phytocoris ventralis is widely distributed in the southwestern United States where it occurs on various species of Ephedra. Specimens have been collected as far north as Inyo Co., California; White Pine Co., Nevada; and Millard Co., Utah. This species is distributed throughout Arizona and New Mexico, and also occurs in western Texas. The westernmost records are from Anza-Borrego Desert St. Pk., San Diego Co., California. Adult specimens have been collected from Ephedra nevadensis Wats., E. torreyana Wats., and E. trifurca Torr. Van Duzee (1918) collected the type series of this species on "palo-verde". Both males and females of P. ventralis are attracted to light. I have examined 100 specimens with collection dates ranging from April 28 to September 28.

Phytocoris contrastus, P. ephedrae, and P. quadricinctus are placed in synonymy with P. ventralis on the basis of identical genital structures of the males. The holotypes of P. contrastus and P. quadricinctus differ from typical P. ventralis only by the darker general coloration. These specimens have distinct dark annuli on the second antennal segment which caused Knight (1968) to place them in a different group from P. ventralis. I have examined additional dark-colored specimens from Arizona, but they are relatively uncommon in collections. The holotype of P. ephedrae is essentially identical to the allotype male of P. ventralis. The characters provided by Knight (1961) to distinguish these two species are subject to variation and are not consistent with his identifications of specimens collected at the Nevada Test Site (Knight, 1968).

Phytocoris tricinctus Knight

Figure 128

Phytocoris tricinctus Knight, 1968:256, fig. 315.

TYPES AND TYPE LOCALITY. - This species was described from 13 specimens collected in Pima and Pinal counties, Arizona. The

holotype male and nine paratypes were taken at Superior, Pinal Co., 1 August 1930, E.D. Ball. The holotype, allotype, and seven paratypes are retained in the Knight Collection (USNM). One paratype is deposited in the collection of BYU and four paratypes were not located.

DIAGNOSIS. - Length 4.0-4.6 mm. *Phytocoris tricinctus* is similar to *P. ventralis* but differs by the brownish general coloration; absence of black, longitudinal lines on the abdomen; and the dense brush of dark, bristle-like setae on the left genital tubercle of the male (fig. 128a). The shaft of the left clasper is only slightly expanded preapically (fig. 128c) and the sensory lobe is less prominent than that of *P. ventralis* (fig. 128b). Also, the left basal lobe of the vesica has an elongate patch of spinulae not found in *P. ventralis*.

REMARKS. - This species is known from Cochise, Maricopa, Pima, Pinal, and Santa Cruz counties in Arizona. Several specimens also were collected near Moctezuma, Chihuahua, Mexico. I have examined 22 specimens with collection dates ranging from April 27 to November 16. The specimens taken near Moctezuma were collected from *Rhamnus* sp.

Phytocoris nigrisquamus new species

Figure 129

TYPES AND TYPE LOCALITY. - Holotype male: Poway, Green Valley, San Diego Co., CALIFORNIA, 12 June 1978, R. Kappel (SDNH). Paratypes: California. Contra Costa Co.: 2 females, Mt. Diablo, east slope, 27 June 1931, R.L. Usinger (USNM). Sacramento Co.: 1 male, Sacramento, 17 June 1968 (OSU). San Diego Co.: 1 male and 2 females, same data as holotype (SDNH); 1 male, Little Cedar Cyn., 16 June 1978 (SDNH).

DIAGNOSIS. - *Phytocoris nigrisquamus* is distinguished from other species of the *juniperanus* group by the following combination of characters. The hemelytra are grayish yellow with brown to fuscous markings. The genital tubercle of the male is large, broadly rounded, and set with long, pale setae (fig. 129a). The shaft of the left clasper is distinctly expanded preapically (fig. 129c). The membranous lobes of the vesica are small; left basal lobe with apical sclerotized structure.

DESCRIPTION. - Male. Length 4.16-4.75 mm, width 1.48-1.55; grayish yellow ground color with light reddish brown to fuscous markings. Head: width across eyes 0.76-0.82, vertex 0.30-0.33; pale yellow; jugum, lorum, and base of tylus marked with red or reddish brown; frons moderately convex, sometimes lightly marked with red. Rostrum: length 1.98-2.11, extending well beyond hind coxae. Antennae: I, length 0.77-0.94, fuscous with pale spots; II, length 1.78-1.89, yellowish brown or brown with pale, median annulus; III, length 1.08-1.15, brown to fuscous; IV, length 0.85, brown to fuscous. Pronotum: mesal length 0.63-0.76, posterior width 1.15-1.26; pronotal disk grayish white, basal submargin with transverse, fuscous line and 4-6 weakly elevated points; collar reddish brown to fuscous with pale, median spot; calli marked or tinged with red or brown; propleura pale, anterior margin with pair of reddish brown to fuscous marks. Scutellum: pale with dusky spot either side before apex. Hemelytra: pale grayish yellow; corium with fuscous patch between anal ridge and radial vein, sometimes extending anteriorly along claval suture; inner margin and apex of cuneus marked with fuscous; membrane densely conspurcate. Legs: femora white or pale yellow with red to fuscous markings particularly on apical half of segment; hind femora more extensively darkened on apical half; tibiae pale with fuscous spots; front tibiae with three dark annuli; middle and hind tibiae sometimes annulated. Vestiture: dorsum with suberect, simple setae intermixed with broad, flattened, black setae and narrow, flattened, white setae. Genitalia: Figure

129. Genital tubercle of male large and broadly rounded; set with long, pale setae on dorsal surface (fig. 129a).

Female. Similar to male in color and vestiture. Length 4.27-4.64 mm, width 1.44-1.62. Head: width across eyes 0.76-0.81, vertex 0.34-0.40. Rostrum: length 2.02-2.18, extending to base of ovipositor. Antennae: I, 0.85-0.94; II, 1.85-2.09; III, 1.13-1.15; IV, 0.80-0.90. Pronotum: mesal length 0.61-0.70, posterior width 1.13-1.33.

REMARKS. - This species is known only from the type material collected in California. The host plant is not known, but like similar species of the *juniperanus* group, *P. nigrisquamus* probably occurs on juniper.

Phytocoris adustus new species

Figure 130

TYPES AND TYPE LOCALITY. - Holotype male: Lucerne, 550 m, Lake Co., California, 28 June 1966, ex. *Juniperus californica* Carr., C.W. O'Brien (UCB). Paratypes: CALIFORNIA. 1 male, same data as holotype (UCB). Tehema Co.: 1 male, Red Bluff, 27 June 1935, R.H. Beamer (KU).

DIAGNOSIS. - *Phytocoris adustus* is distinguished from other brownish or grayish species of the *juniperanus* group by characters of the male genitalia. The left genital tubercle is large, broadly rounded, and set with erect, bristle-like setae dorsally (fig. 130a). The shaft of the left clasper is slightly expanded preapically (fig. 130c). The membranous lobes of the vesica are well developed; left basal lobe without apical, sclerotized structure.

DESCRIPTION. - Male. Length 4.32-4.54 mm, width 1.53-1.57; pale grayish yellow ground color with fuscous markings. Head: width across eyes 0.78-0.83, vertex 0.34-0.36; pale yellow; jugum, lorum,

and base of tylus with red to fuscous markings; frons moderately convex, with 6-8 dark striae. Rostrum: length 1.98-2.16, extending to 7th or 8th abdominal segment. Antennae: brown to fuscous; I, length 0.85-0.93, with scattered pale spots on dorsal surface; II, length 1.73-2.09, with pale annulus medially; III, length 1.06-1.26; IV, length 0.67-0.79. Pronotum: mesal length 0.68-0.72, posterior width 1.24-1.28; pronotal disk pale grayish yellow to brownish yellow, lateral margins narrowly infuscated, basal submargin with transverse fuscous line and 4-6 weakly elevated points; collar fuscous with pale, median spot; calli marked with reddish brown to fuscous; propleura pale, basal margin and anteriomedial stripe fuscous. Scutellum: pale with dusky spot either side before apex. Hemelytra: grayish white to pale grayish yellow; clavus with elongate, fuscous patch medially; corium with large fuscous patch between anal ridge and radial vein, extending forward along claval suture; outer margin of corium and cuneus marked with fuscous; membrane moderately conspurcate. Legs: femora white or pale yellow, marked with reddish brown to fuscous particularly on apical half of segment; pattern on hind femora somewhat reticulate; tibiae pale with three dark annuli. Vestiture: dorsum with suberect, simple setae intermixed with flattened, black setae and flattened, white setae. Genitalia: Figure 130.

Female. The female of this species is not known.

REMARKS. - *Phytocoris adustus* is known only from the type material collected in Lake Co. and Tehema Co., California. The only host plant record for this species is *Juniperus californica*.

Phytocoris monophyllae new species

Figure 131

TYPES AND TYPE LOCALITY. - Holotype male: Pinyon Flat, San Jacinto Mts., Riverside Co., California, 1 September 1951, ex. *Pinus monophylla* Torr. & Frem., Timberlake (UCR). Paratypes: 1 male,

California, Riverside Co., San Bernardino Nat. For., Pinyon Flat Cmpgd. nr. Hwy. 74, 20-21 September 1975, J.D. Pinto (UCR); 1 female, Nevada, Washoe Co., 4 mi. SE jct. Hwy. 395 on Hwy. 17, 11 August 1980, ex. Pinus monophylla, G.M. Stonedahl (OSU).

DIAGNOSIS. - This species is very similar to P. juniperanus but differs by the shorter first antennal segment with darkened ventral surface, reddish tinge on the cuneus, and form of the male genitalia. The ratio of length of antennal segment I to width of head across eyes is less than 0.85:1 for males. The left genital tubercle is set with 10-15 long, pale setae; apex angulate (fig. 131a). The sclerotized process of the vesica is lanceolate-shaped with the lateral margins slightly reflexed (fig. 131e).

DESCRIPTION. - Male. Length 4.16-4.48 mm, width 1.31-1.39; pale grayish yellow general coloration. Head: width across eyes 0.76-0.78, vertex 0.31-0.32; pale yellow, lightly marked with red; frons weakly convex. Rostrum: length 2.05, extending well beyond hind coxae. Antennae: I, length 0.61-0.63, dark reddish brown to fuscous with three large, white patches on dorsal surface; II, length 1.66-1.73, brownish yellow, tinged with red; III, length 1.08-1.10, yellowish brown or brown; IV, length 0.65-0.68; brown. Pronotum: mesal length 0.65, posterior width 1.13-1.15; pronotal disk pale grayish yellow, basal submargin with transverse, fuscous line; collar and calli marked with red; propleura pale with reddish line across middle. Scutellum: pale yellow with red markings; a faint dusky spot either side before apex. Hemelytra: pale grayish yellow; clavus, inner apical angle and basal 1/3 of corium, and apex of cuneus lightly to moderately marked with brown; cuneus distinctly tinged with red; membrane conspurcate, outer margin with two oblique, pale marks. Legs: femora grayish white or pale grayish yellow, lightly marked with reddish brown to fuscous; dark markings on hind femora forming 2 or 3 interrupted bands; tibiae pale with three dark annuli. Vestiture: dorsum with suberect, simple setae intermixed

with broad, flattened, black setae and narrow, flattened, white setae. Genitalia: Figure 131.

Female. Similar to male in color and vestiture. Length 4.43 mm, width 1.64. Head: width across eyes 0.84, vertex 0.36. Rostrum: length 2.07, extending to base of ovipositor. Antennae: I, 0.79; II, 1.98; III, missing; IV, missing. Pronotum: mesal length 0.71, posterior width 1.28. The female of P. monophyllae is known from a single specimen.

REMARKS. - Phytocoris monophyllae is known only from the type material taken in Riverside Co., California and Washoe Co., Nevada. Although these specimens were collected from Pinus monophylla, it is likely that this species also occurs on Juniperus spp. in Pinyon-Juniper Woodland associations.

Phytocoris juniperanus Knight

Figure 132

Phytocoris juniperanus Knight, 1968:238-239, fig. 302.
Phytocoris chiricahuae Knight, 1968:239, fig. 296 (NEW SYNONYMY).
Phytocoris flaviatus Knight, 1968:241, fig. 297 (NEW SYNONYMY).
Phytocoris santaritae Knight, 1968:245, fig. 294 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris juniperanus was described from eight male specimens collected nr. Mercury, Nye Co., Nevada (Nevada Test Site). The holotype and five paratypes were taken in Area 401 M, Nevada Test Site, 19 June 1965, ex. Juniperus osteosperma (Torr.), H. Knight and J. Merino. All type material is retained in the Knight Collection (USNM) except one paratype deposited in the collection of BYU and one paratype that was not located.

The junior synonym, P. chiricahuae, was described from two male specimens collected in the Chiricahua Mts., 1890 m, Cochise Co., Arizona, 20 June 1928, A.A. Nichol. The holotype is retained in the Knight Collection (USNM); the single paratype was not located.

The holotype male of the junior synonym, P. flaviatus, was taken at Grand Canyon, Coconino Co., Arizona, 6 September 1931, H.H. Knight. This specimen is retained in the Knight Collection (USNM).

The junior synonym, P. santaritae, was described from a single male specimen collected in the Santa Rita Mts., Santa Cruz Co., Arizona, 26 September 1925, A.A. Nichol. This specimen is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 3.8-4.8 mm; grayish white ground color with fuscous markings; antennae brown to fuscous except segment I pale with fuscous markings on dorsal surface, segment II usually with pale annulus medially; frons moderately convex; pronotal disk grayish white or pale gray with dark, setigerous spots; basal submargin of disk with transverse, fuscous line and 4-6 weakly elevated points; propleura pale, basal margin and median line fuscous; scutellum pale, usually with dark spot either side before apex; hemelytra grayish white, lightly to moderately marked with fuscous particularly along veins, at inner apical angle of corium, and on cuneus; femora white or pale yellow with brown to fuscous markings particularly on apical half of segment; tibiae pale with dark spots; front and middle tibiae with 3 or 4 dark annuli.

This species is distinguished from other grayish or brownish members of the juniperanus group by the pale ventral surface of antennal segment I and tapered genital tubercle of the male with dense brush of dark, bristle-like setae basally (fig. 132a). The ratio of length of antennal segment I to width of head across eyes is greater than 0.90:1 for males.

REMARKS. - Phytocoris juniperanus is widely distributed in the western United States. I have examined 84 specimens from the following states: Arizona, California, Colorado, Nevada, New Mexico, Oregon, and Utah. Specimens have been collected as far north as Wasco Co., Oregon; east to Arapahoe Co., Colorado and Quay Co., New Mexico; and south to Cochise and Santa Cruz counties in Arizona. The western boundary of the distribution is formed by the Cascade Range and Sierra Nevada Mts in the north and the Mojave and Sonoran Deserts

in the south. The only record of this species in California is from Shasta County. Phytocoris juniperanus inhabits a number of Juniperus species across its range of distribution. Both males and females are attracted to light. Collection dates range from April 28 to September 23.

Phytocoris chiricahuae, P. flaviatus, and P. santaritae have been placed in synonymy with P. juniperanus on the basis of identical genital structures of the males. In each case, the sclerotized process of the vesica is distinctly triangulate as is typical of P. juniperanus (fig. 132e). Except for minor variation, the right and left claspers of these taxa are indistinguishable from those of the senior synonym. In my opinion, the external characteristics used by Knight (1968) to separate these four species represent intraspecific variation and not species specific differences. Knight certainly would have arrived at the same conclusion if he had examined the male genital structures more closely.

Phytocoris breviusculus Reuter

Figure 133

Phytocoris breviusculus Reuter, 1876:68, 1909:21-22; Van Duzee 1917a: 320; Knight 1927a:44, 1941:190-191; Froeschner 1949:183; Carvalho 1959:193; Knight 1968:225; Wheeler and Henry 1977: 639-641, 643, figs. 12-13; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - Phytocoris breviusculus was described from an unknown number of specimens collected in Texas. I have examined five specimens that appear to be from the original syntype series of this species. Two males and two females of this series are deposited in the Swedish Museum of Natural History, Stockholm, Sweden and a single female is deposited in the Zoological Museum, Helsinki, Finland. A male specimen from the SMNH was designated a lectotype by Henry and Stonedahl (1983).

DIAGNOSIS. - Length 3.9-4.6 mm; yellowish brown general coloration with brown to fuscous markings; antennae brownish yellow, segment I with reddish brown to fuscous markings; frons weakly convex, with 5-7 reddish striae; jugum, lorum, and tylus marked with reddish brown; pronotal disk yellowish brown, basal submargin with transverse fuscous line and 4-6 weakly elevated points; collar and calli marked with red or reddish brown; propleura pale, basal 2/3 lightly infuscated; hemelytra yellowish brown with dark markings along claval vein, apex of clavus, and inner and apical margins of corium; basal 1/3 of corium with fuscous median patch; cuneus marked with red, narrowly fuscous at apex; membrane mottled with fuscous, outer margin with two pale spots; femora white or pale yellow with reddish brown to fuscous markings; apical half of hind femora extensively darkened and marked with pale spots; tibiae pale with fuscous spots and 3 or 4 dark annuli; dorsum with flattened, white and golden setae but lacking dark brown or black, flattened setae.

Phytocoris breviusculus is easily distinguished from other brownish species of the juniperanus group by the absence of dark, flattened setae on the dorsal surface and by the uniformly brownish yellow second antennal segment, without pale median annulus. The left genital tubercle of the male is only sparsely set with bristle-like setae (fig. 133a) and the vesica is armed with an elongate sclerotized strap (fig. 133e') to the left of the sclerotized process.

REMARKS. - Phytocoris breviusculus is widely distributed in the eastern United States from Kansas to Pennsylvania, south to Alabama, Mississippi, and Texas. Knight (1968) reported this species from Arizona, but it appears that these records pertain to the closely related species, P. brevicornis. Phytocoris breviusculus occurs on a wide variety of plants in the eastern United States, but is reported by Wheeler and Henry (1977) to be most common on Juniperus species. Knight (1927a) noted that P. breviusculus is attracted to light and later reported "mesquite" as the host plant of this species. Data collected in Missouri (Froeschner, 1949) and Pennsylvania (Wheeler

and Henry, 1977) suggest that P. breviusculus is bivoltine with a range of occurrence from May to September. I have examined 44 specimens from Texas with collection dates ranging from June 2 to August 3. Wheeler and Henry (1977) present evidence suggesting that P. breviusculus is at least partially predaceous on scale insects and mites.

Phytocoris brevicornis Knight

Figure 134

Phytocoris brevicornis Knight, 1968:237-238, fig. 304.

TYPES AND TYPE LOCALITY. - This species was described from four specimens collected in Pima Co., Arizona. The holotype male and two paratypes were taken in Sabino Cyn., Santa Catalina Mts., 26 April 1916, J.F. Tucker. The allotype was collected at Tucson, 12 May 1929 by E.D. Ball. All type material is retained in the Knight Collection (USNM) except one paratype that was not located.

DIAGNOSIS. - Length 3.9-4.8 mm. Phytocoris brevicornis closely resembles P. breviusculus but differs by the brown to fuscous second antennal segment with pale median annulus, strongly convex scutellum, and form of the male genitalia. The left genital tubercle is much smaller than in P. breviusculus (fig. 134a). The sensory lobe of the left clasper is more prominent (fig. 134b) and the right clasper has a distinct protuberance on the inner surface of the arm. The vesica does not have an elongate strap to the left of the sclerotized process as in P. breviusculus. Phytocoris brevicornis also resembles P. albifrons but is distinguished by the shorter first antennal segment, strongly convex scutellum, and narrow genital tubercle. The ratio of length of antennal segment I to width of head across eyes is 0.65:1 to 0.75:1 for males and 0.75:1 to 0.95:1 for females.

REMARKS. - The distribution of P. brevicornis includes most of Arizona and western New Mexico east to Dona Ana and Socorro counties. Specimens also have been collected in Imperial and San Diego counties, California and Washington Co., Utah. I have examined 25 specimens with collection dates ranging from April 8 to October 17. Several specimens have been taken on mesquite, Prosopis juliflora (SW.).

Phytocoris albifrons Knight

Figure 135

Phytocoris albifrons Knight, 1968:241-242.

TYPES AND TYPE LOCALITY. - Phytocoris albifrons was described from a single female specimen collected at Tucson, Pima Co., Arizona, 24 May 1924, A.A. Nichol. The female holotype is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 3.7-4.3 mm. This species is very similar to P. brevicornis and P. breviusculus but is distinguished by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes is 0.85:1 to 1.00:1 for males and 1.05:1 to 1.20:1 for females. The second antennal segment is fuscous with a pale, median annulus. The scutellum is evenly convex; not strongly deflexed apically as in P. brevicornis. Also, the left genital tubercle of the male is much broader in P. albifrons (fig. 135a).

REMARKS. - Phytocoris albifrons is known only from Pima County in Arizona. The host plant association of this species is not known. I have examined seven specimens with collection dates ranging from April 26 to August 11.

Phytocoris albellus Knight

Phytocoris albellus Knight, 1934:14-15; Carvalho 1959:189: Knight 1968:225.

TYPES AND TYPE LOCALITY. - This species was described from a single female holotype collected at Payson, Gila Co., Arizona, 3 August 1929, E.D. Ball. The type is deposited in the Knight Collection (USNM).

REMARKS. - The female type of *P. albellus* is very similar to other species of the *juniperanus* group and cannot be distinguished from the latter until more specimens are available for study. At present, many species in this group can be positively identified only by examining male genital structures. I have examined a male specimen in the Knight Collection (USNM) with the same label data as the holotype of *P. albellus*. This specimen is a typical example of *P. juniperanus* and is considerably darker than the *albellus* type. There is a possibility however, that the latter specimen is nothing more than an unusually pale specimen of *P. juniperanus*.

I have examined a pair of specimens in the Knight Collection (USNM) that were identified by Knight (1968) as *P. albellus*; label data: Mountain Springs, 2 mi. W, California, 23 August 1924, E.P. Van Duzee. These specimens could not be positively identified because of the teneral condition of the male, but they appear to be conspecific with *P. nigrisquamus* and now bear my identification label for this species.

Conspurcatus Species - Group

DESCRIPTION. - Moderate-sized, 4.4-6.8 mm, reddish brown to dark brown species; dorsum with suberect, black, simple setae intermixed with narrow, flattened, white setae and broad, flattened, dark brown or black setae. Head: antennae yellowish brown to fuscous; segment I with pale spots on dorsal aspect, ventral surface mostly pale; segment II usually with pale annulus medially, dark basal half of segment sometimes broken by 1 or 2 pale spots on dorsal aspect; frons weakly and evenly arched, meeting tylus along shallow indentation; tylus weakly to moderately produced at base; eyes large, obovate. Pronotum: basal submargin of pronotal disk with transverse fuscous line and 4-6 weakly elevated points; propleura pale, narrowly to broadly fuscous basally, anterior margin sometimes dissected by dark line. Hemelytra: grayish white or pale grayish yellow, moderately to extensively marked with reddish brown to fuscous (exception: hemelytra uniformly brownish yellow in *P. ramosus*); corium with large pale patch at inner apical angle; membrane moderately to densely conspurcate, spots often coalescing to form larger fuscous patches. Legs: femora white or pale yellow, moderately to extensively marked with brown or dark brown, dark regions broken by pale spots; hind femora sometimes with pale, preapical band; tibiae pale with fuscous markings; front and middle tibiae, except in *P. ramosus*, with 3 or 4 dark annuli. Male genitalia: genital segment with well developed tubercles above clasper bases; left tubercle cylindrical, often distinctly tapered, sometimes with several dark, bristle-like setae on dorsal surface. Left clasper: sensory lobe moderately to strongly produced; shaft slightly expanded preapically and flattened dorsoventrally; apex narrowly rounded. Right clasper: narrowly to broadly lanceolate; apex acute. Vesica: multilobed, lobes often weakly sclerotized in part, and set with patch(es) of small spines, sometimes also with smaller accessory lobes; right basal lobe well developed, left basal lobe small or indistinct; basal process well sclerotized, narrow, extending slightly above level of gonopore; sclerotized process lance-shaped, flattened or gently twisted,

sometimes with 1 or 2 longitudinal ridges, connected to apex of basal process by narrow membranous strap.

REMARKS. - This is perhaps the most difficult group of *Phytocoris* in western North America. Externally, the species are very similar, and it is usually necessary to examine male genital structures to attain accurate species identifications. The presence and position of spinulate regions on the lobes of the vesica and the length of the first antennal segment are particularly useful characters for separating species. The size and shape of the left genital tubercle and sclerotized process will further differentiate many species of this group.

Members of the *conspurcatus* group are readily recognized by the broad, flattened, dark setae on the dorsum; cylindrical, often tapered left genital tubercle of the male; and by the flattened, lance-shaped sclerotized process of the vesica. *Conspurcatus* group species are very similar to certain members of the *juniperanus* group, but differ by the larger size, longer first antennal segment, and weakly sclerotized regions on the lobes of the vesica. Externally, *conspurcatus* species closely resemble *aurora* group species, but are easily distinguished by the pale, median annulus on antennal segment II, and by the form of the male genital structures.

Members of the *conspurcatus* group are distributed throughout western North America where they occur on a wide variety of trees and shrubs. One species, *P. conspurcatus*, also is distributed across southern Canada (Kelton, 1980) and the midwestern and northeastern United States (Knight, 1941). The majority of species appear to be inhabitants of bark, especially those associated with coniferous and deciduous trees. The dark mottled pattern of the hemelytra and legs blends with the color of the bark and associated lichens, making these species nearly invisible when at rest.

Presently, there are 11 species included in the *conspurcatus* group, but I have tentatively recognized four additional undescribed taxa in California and Oregon, as well as several unplaced forms from Arizona and New Mexico. I am withholding treatment of these taxa

until more specimens are available for study and the host plant associations are better known.

Key to the Species of the *conspurcatus* Group
(males only)

1 Genital segment with two large tubercles above base of left clasper (fig. 136a) . . . . . *bituberis* n. sp., p. 332

\- Genital segment with a single tubercle above base of left clasper 2

2(1) Genital segment with several long, dark, bristle-like setae on and above base of left tubercle (figs. 137a&138a); left basal lobe of vesica with spinulate region apically 3

\- Genital segment without dark, bristle-like setae above base of left tubercle, but sometimes with finer, pale hairs in this region; left basal lobe of vesica without apical spinulate region 4

3(2) Ratio of length of antennal segment I to width of head across eyes 0.90:1 to 1.10:1; extreme right lobe of vesica undivided, outer surface of lobe weakly sclerotized . . . . . *relativus* Knight, p. 334

\- Ratio of length of antennal segment I to width of head across eyes 1.15:1 to 1.40:1; extreme right lobe of vesica deeply divided, outer surface of lobe membranous . . . . . *californicus* Knight, p. 335

4(2) Ratio of length of antennal segment I to width of head across eyes less than 1.10:1 5

- Ratio of length of antennal segment I to width of head across eyes equal to or greater than 1.10:1 6

5(4) Ratio of length of antennal segment I to width of head across eyes 0.65:1 to 0.85:1; front tibiae without dark annuli . . *ramosus* Uhler, p. 336

- Ratio of length of antennal segment I to width of head across eyes 0.90:1 to 1.05:1; front tibiae with three dark annuli . . . . . *juliae* n. sp., p. 338

6(4) Extreme left lobe of vesica with patch of small spines; genital segment with small ridge-like swelling above base of left tubercle 7

- Extreme left lobe of vesica without spinulate region; genital segment without ridge-like swelling above base of left tubercle . . . . . *empirensis* Knight, p. 340

7(6) Extreme right lobe of vesica with small spinulate region apically . . . . . *calli* Knight, p. 341

- Extreme right lobe of vesica without apical spinulate region 8

8(7) Ratio of length of antennal segment I to width of head across eyes 1.10:1 to 1.25:1; extreme right lobe of vesica small, not extending above apex of lobe to immediate left 9

- Ratio of length of antennal segment I to width of head across eyes 1.25:1 to 1.40:1; extreme right lobe of vesica elongate, extending well above apex of lobe to immediate left 10

9(8) Cuneus marked or tinged with red to reddish brown; sclerotized process of vesica short and broad, apex narrowly produced (fig. 146e) . . . . . *ketinelbi* Bliven, p. 346

\- Cuneus with brown to fuscous markings; sclerotized process elongate, strongly twisted basally (fig. 143e) . . *conspurcatus* Knight, p. 342

10(8) Hemelytra, especially cuneus, distinctly marked or tinged with red; distributed in southern California . . . . . *calvus* Van D., p. 344

\- Hemelytra without or with only limited red markings; known only from Cache and Sevier counties in Utah . . . . . *utahensis* Knight, p. 345

Phytocoris bituberis new species

Figure 136

TYPES AND TYPE LOCALITY. - Holotype male: Terminus Res. Camp, 5 mi. W Three Rivers, Tulare Co., California, 16 June 1971, M.H. Sweet (SHF). Paratypes: CALIFORNIA. Butte Co.: 1 male, Oroville, 3 September 1975, taken at light, T.R. Haig (CAF&A). Sacramento Co: 4 males, Fair Oaks, 12 August 1933, A. Bellue (CAF&A). San Bernardino Co.: 1 male, Mill Crk. Cyn., 24 September 1923, taken on "Oak", E.P. Van Duzee (CAS). Santa Barbara Co.: 1 male, 6 mi. SW New Cuyama, 9 July 1965, M.R. Gardner (UCD). Santa Clara Co.: 2 males, Alma, 30 August 1933, H.H. Keifer (CAS). Shasta Co.: 1 male, Castle Craigs St. Pk., August - September 1975, taken at light, R. McGaugh (AMNH). Siskiyou Co.: 1 male, Mt. Shasta City, 13 August 1958, taken at light, J. Powell (UCB). Stanislaus Co: 1 male, La Grange, 31 May 1970, taken at light, R.P. Allen (OSU). Tulare Co.: 2 males, same data as holotype (SHF).

DIAGNOSIS. - This species is easily distinguished from other members of the conspurcatus group by the two large tubercles on the genital segment above base of left clasper and by the short first antennal segment, ratio of segment length to width of head across eyes 0.85:1 to 1.05:1 for males.

DESCRIPTION. - Male. Length 4.64-5.62 mm, width 1.67-1.98; brown to dark brown general coloration. Head: width across eyes 0.92-1.02, vertex 0.29-0.32; pale yellow; base and middle of tylus, jugum, lorum and buccula marked with red to reddish brown; frons weakly convex, marked with 6-8 red to fuscous striae. Rostrum: length 2.03-2.34, extending to 6th or 7th abdominal segment. Antennae: brown to dark brown, segment I sometimes reddish brown; I, length 0.79-1.03, with pale spots on dorsal aspect, ventral surface mostly pale; II, length 1.76-2.12, with distinct pale annulus medially; III, length 1.04-1.31, with poorly defined pale annulus

medially; IV, length 0.70-0.76. Pronotum: mesal length 0.76-0.88, posterior width 1.39-1.58; pronotal disk pale grayish yellow, tinged with brown to fuscous especially behind calli and along lateral margins; basal submargin of disk with wavy fuscous line and 4-6 weakly elevated points, extreme basal margin pale; calli moderately to extensively marked with reddish brown to fuscous; propleura fuscous basally, apical half pale. Scutellum: pale yellow with reddish brown to fuscous markings, usually with dark spot on apex and each side before apex. Hemelytra: grayish yellow, lightly to extensively tinged or marked with brown to fuscous especially on clavus, along inner margin of corium, and on cuneus; borders of claval commissure and patch at apex of corium pale; membrane densely conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly restricted to apical half of segment; hind femora extensively darkened and marked with pale spots; tibiae pale with 3 or 4 fuscous annuli, bands on hind tibiae less distinct. Vestiture: dorsum with simple, dark setae intermixed with broad, flattened, black setae and narrow, flattened, white setae. Genitalia: Figure 136. Genital segment with two large tubercles above base of left clasper (fig. 136a).

Female. Similar to male in color and vestiture. Length 5.13 mm, width 1.80. Head: width across eyes 0.92, vertex 0.39. Rostrum: length 2.34, extending well beyond apices of hind coxae. Antennae: I, 0.99; II, 2.07; III, 1.24; IV, 0.74. Pronotum: mesal length 0.79, posterior width 1.48. The female of this species is known from a single specimen.

REMARKS. - *Phytocoris bituberis* has been collected in California from Mill Crk. Cyn., San Bernardino County north through the interior valley to Mt. Shasta City, Siskiyou County. Several specimens also were taken in Benton Co., Oregon. Adult specimens have been taken on *Quercus garryana* Dougl. and *Quercus* sp.

SPECIMENS EXAMINED. - In addition to the type material, five specimens of P. bituberis were collected on Quercus garryana at Corvallis, Benton Co., Oregon, 26 July - 9 August.

Phytocoris relativus Knight

Figure 137

Phytocoris relativus Knight, 1968:240-241, fig. 299.
Phytocoris albiscutellatus Knight, 1968:242-243, fig. 301 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris relativus was described from nine specimens collected in Arizona and Utah. The holotype male was taken near the end of bright Angel Trail, Grand Cyn. Nat. Pk., 2 August 1917, H.H. Knight. All type material is retained in the Knight Collection (USNM) except one male paratype from Richfield, Sevier Co., Utah that was not located. Upon examination, the allotype female, also from Richfield, Utah, was found to be conspecific with P. empirensis. It is likely that the male paratype from Richfield also is conspecific with P. empirensis.

The junior synonym, P. albiscutellatus, was described from three specimens (holotype male, allotype, and female paratype) taken in the Chiricahua Mts., Cochise Co., Arizona, 1890 m, 20 June 1928, A.A. Nichol and one female paratype collected in Area 19M, Nevada Test Site, Nye Co., Nevada, 22 June 1965, ex. Artemisia tridentata Nutt., H.H. Knight & J.M. Merino. All type material is retained in the Knight Collection (USNM) except the specimen from Nevada that was not located.

DIAGNOSIS. - Length 4.4-6.5 mm. Phytocoris relativus is very similar to P. californicus but differs by the shorter first antennal segment, ratio of segment length to width of head across eyes 0.90:1 to 1.10:1, and by the undivided extreme right lobe of the vesica. This species is distinguished from other members of the conspurcatus

group by the long, bristle-like setae on the genital segment above the base of the left genital tubercle (fig. 137a), and by the small spinulate region at the apex of the left basal lobe of the vesica.

REMARKS. - *Phyrocoris relativus* is widely distributed in the western United States from the San Jacinto Mts. in California, north along both slopes of the Sierra Nevada Mountains and east of the Cascade Range in Oregon to Deschutes and Baker counties. This species also occurs across southern Idaho and throughout much of Nevada, Utah, Arizona, and western Colorado. The major host plants of this species are *Cercocarpus ledifolius* Nutt. and *C. betuloides* Nutt., but specimens also have been collected on *Artemisia tridentata* Nutt., *Cowania mexicana* var. *stansburiana* (Torr.), *Crataegus douglasii* Lindl., *Purshia tridentata* (Pursh.), *Ribes cereum* Dougl., and *Sorbus scopulina* Greene. Males and females of this species are attracted to light. I have examined 208 specimens with collection dates ranging from February 14 to October 17.

Phytocoris albiscutellatus is placed in synonymy with *P. relativus* on the basis of identical male genital structures and external similarities of the holotypes. The extent of the fuscous markings on the scutellum, used by Knight (1968:237) to separate *P. albiscutellatus* and *P. relativus*, is subject to considerable variation.

Phytocoris californicus Knight

Figure 138

Phytocoris californicus Knight, 1968:244-245, fig. 303.

TYPES AND TYPE LOCALITY. - This species was described from a single male taken at Santa Ana, Orange Co., California, 1 March 1935, ex. *Salvia mellifera* Greene., E.L. Paddock. The holotype is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 4.8-6.8 mm. *Phytocoris californicus* is distinguished from other species of the *conspurcatus* group by the following combination of characters. The genital segment of the male is set with a series of long, dark, bristle-like setae near the base of the left genital tubercle (fig. 138a). The ratio of length of antennal segment I to width of head across eyes is between 1.15:1 and 1.40:1 for males. The left basal lobe of the vesica has a small spinulate region apically, and the extreme right lobe of the vesica is deeply divided. *Phytocoris californicus* is very similar to *P. relativus* but differs by the longer first antennal segment and divided right lobe of the vesica.

REMARKS. - *Phytocoris californicus* is widely distributed in California, but is uncommon in the arid southeastern portion of the state. The distribution extends into Oregon on the west side of the Cascade Range as far north as Marion County. Specimens also have been collected in Walla Walla Co., Washington and Lemhi Co., Idaho. *Phytocoris californicus* inhabits a number of shrubby plants but is most frequently taken on *Ceanothus* (e.g., *C. cordulatus* Kell., *C. crassifolius* Torr., *C. integerrimus* M.&H., *C. velutinus* Dougl.). Other host plant records are *Beloperone californica* Benth., *Eriogonum latifolium* Sm., *Hazardia squarrosus* H.&A., *Rhamnus crocea* Nutt., *Salvia apiana* Jeps., and *S. mellifera* Greene. Both sexes are attracted to light. I have examined 375 specimens with collection dates ranging from January 13 to December 17.

Phytocoris ramosus Uhler

Figure 139

Phytocoris ramosus Uhler, 1894:252-253; Van Duzee 1917a:319; Carvalho 1959:214; Knight 1968:216; Henry and Stonedahl 1983:in press.
Phytocoris covilleae Knight, 1925a:54-55; Carvalho 1959:214 (synonymy).

TYPES AND TYPE LOCALITY. - In the original description of *P. ramosus*, Uhler refers to specimens collected at Cape St. Lucas, Mexico; San Bernardino and Los Angeles, California; and Flagstaff, Arizona. Unfortunately, Uhler did not designate a type specimen or indicate how many specimens were present in the type series. I have examined three female specimens in the CAS collection that appear to be from the original syntype series; label data: 1, "S(an) Berna(r)dino Co., Cal."; 2, "Uhler type". One specimen bears a red lectotype label and the others are tagged with orange paratype labels. The colored type labels were probably applied by E.P. Van Duzee, but a type designation has never been published for this species. The specimen with the lectotype label was designated as such by Henry and Stonedahl (1983). The lectotype (No. 555) and both paralectotypes are retained in the CAS collection.

The junior synonym, *P. covilleae*, was described from seven specimens collected on *Larrea divaricata* Cav., at Tucson, Pima Co., Arizona, 19 April 1924, A.A. Nichol. The holotype male and three paratypes are retained in the Knight Collection (USNM), one paratype each is deposited in the collections of the CAS and UAZ, and one paratype was not located.

DIAGNOSIS. - Length 4.5-6.2 mm. *Phytocoris ramosus* is easily recognized by the short first antennal segment, ratio of segment length to width of head across eyes 0.65:1 to 0.85:1 for males; the uniformly pale yellow to brownish yellow hemelytra, sometimes lightly tinged with red; and by the absence of distinct dark annuli on the front tibiae.

REMARKS. - *Phytocoris ramosus* is distributed throughout the Mojave and Sonoran deserts, the Mexican Highland Province of southeastern Arizona, and the Chihuahuan Desert Province of southern New Mexico and western Texas. This species breeds on *Larrea divaricata* Cav. and is often encountered in great abundance. Males and females are attracted to light. I have examined 616 specimens with collection dates ranging from February 16 to December 17.

Phytocoris juliae new species

Figure 140

TYPES AND TYPE LOCALITY. - Holotype male: Lehman Crk. Cmpgd., Humboldt Nat. For., White Pine Co., Nevada, 2286 m, 12 August 1980, ex. Abies concolor (Gord.&Glend.), G.M.&J.A. Stonedahl (USNM). Paratypes: COLORADO. Boulder Co.: 2 males and 1 female, 6 mi. W Boulder, 8-12 August 1973, J.C. Schaffner (SHF). Jefferson Co.: 3 males and 2 females, Deer Crk. Cyn., 10 July 1979, J.T. Polhemus (JTP); 4 males and 4 females, same data as above except 15 July 1980 (JTP). NEVADA. White Pine Co.: 2 males and 14 females, same data as holotype (AMNH, CAS, OSU, USNM).

DIAGNOSIS. - Phytocoris juliae is distinguished from other species of the conspurcatus group by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes ranges from 0.90:1 to 1.05:1 for males. The base of the left genital tubercle is not set with long, dark, bristle-like setae; and the left basal lobe of the vesica lacks an apical spinulate region. Phytocoris juliae keys to the couplet with P. ramosus but is easily differentiated from this species by the longer first antennal segment, grayish brown general coloration, and by the distinct dark annuli on the front tibiae.

DESCRIPTION. - Male. Length 5.02-6.00 mm, width 1.71-2.09; grayish brown general coloration. Head: width across eyes 0.92-0.99, vertex 0.32-0.35; pale yellow; buccula, jugum, lorum, and tylus marked with reddish brown to fuscous; frons weakly convex, usually with 5-6 poorly defined, reddish striae. Rostrum: length 2.48-2.79, extending to 7th or 8th abdominal segment. Antennae: I, length 0.85-0.97, grayish white with reddish brown to fuscous markings on dorsal aspect; II, length 2.00-2.38, yellowish brown, sometimes with poorly defined pale region medially; III, length

1.26-1.42, brown or dark brown; IV, length 0.86-1.01, brown or dark brown. Pronotum: mesal length 0.76-0.90, posterior width 1.37-1.57; pronotal disk pale yellow to grayish yellow, often tinged with brown; basal submargin of disk with transverse fuscous line and 4-6 weakly elevated points, extreme basal margin narrowly pale; calli lightly to moderately marked with red or reddish brown; propleura fuscous on basal half, sometimes broken anteriorly by a pale line, apical half pale. Scutellum: grayish white or pale grayish yellow with reddish brown to fuscous markings; usually with dark spot either side before apex and a third spot apically. Hemelytra: grayish white, moderately to extensively marked with brown or fuscous; apex and middle of corium with distinct pale region; cuneus pale, apical 1/3-1/2 marked with fuscous; membrane densely conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings mostly restricted to apical half of segment; dark markings on hind femora broken by pale spots, spots coalescing preapically to form transverse pale band; tibiae pale with 3 or 4 fuscous annuli; hind tibiae usually with only 2 dark annuli. Vestiture: dorsum with simple, black setae intermixed with broad, flattened, black setae and sericeous, white setae. Genitalia: Figure 140.

Female. Similar to male in color and vestiture. Length 5.13-5.94 mm, width 1.84-2.16. Head: width across eyes 0.93-1.00, vertex 0.36-0.40. Rostrum: 2.63-2.88, extending to or slightly beyond base of ovipositor. Antennae: I, 0.94-1.03; II, 2.25-2.48; III, 1.26-1.54; IV, 0.90-1.13. Pronotum: mesal length 0.77-0.92, posterior width 1.38-1.67.

REMARKS. - This species is known from specimens collected in the Snake Mt. Range of eastern Nevada, the Wasatch Plateau of north central Utah, and the Rocky Mts. in northern Colorado. A single specimen also was taken at Bozeman, Gallatin Co., Montana. The only host plant record for *P. juliae* is *Abies concolor* (Gord.&Glend.) but this species also may occur on *Abies lasiocarpa* (Hook.) or *Picea engelmannii* Parry in Colorado.

SPECIMENS EXAMINED. - Besides type material, 11 specimens of *P. juliae* were examined from the following localities: COLORADO. Douglas Co.: Chatfield St. Pk. (JTP); Sedalia (JTP). MONTANA. Gallatin Co.: Bozeman (MSU). UTAH. Box Elder Co.: Snowville (USU). Cache Co.: Logan (USU). Juab Co.: Mt. Nebo (USU). Utah Co.: Provo (USU).

Phytocoris empirensis Knight

Figure 141

Phytocoris empirensis Knight, 1968:246, fig. 293.
Phytocoris rinconae Knight, 1968:246-247, fig. 295 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris empirensis* was described from two specimens taken in the Empire Mts., Pima Co., Arizona, 1525 m, 20 May 1928, A.A. Nichol. The holotype male and allotype are retained in the Knight Collection (USNM).

The junior synonym, *P. rinconae*, was described from a single male collected in the Rincon Mts., Pima Co., Arizona, 1006 m, 27 May 1928, A.A. Nichol. This specimen is deposited in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.0-6.6 mm. *Phytocoris empirensis* is distinguished from other species of the *conspurcatus* group by the following combination of characters: ratio of length of antennal segment I to width of head across eyes 1.10:1 to 1.40:1 for males; genital segment of male without dark, bristle-like setae above base of left tubercle; extreme left lobe and left basal lobe of vesica lacking patch(es) of small spines.

REMARKS. - *Phytocoris empirensis* is widely distributed in Utah and Arizona but does not occur in the Bonneville Saltbush section of western Utah or the Sonoran Desert region of southwestern Arizona. The host plant association of this species is not known, but several

males have been taken at light. I have examined 42 specimens with collection dates ranging from May 2 to September 22.

Phytocoris rinconae is here placed in synonymy with P. empirensis on the basis of identical genital structures of the male holotypes. The characters used by Knight (1968:237) to separate rinconae and empirensis are subject to variation and in my opinion do not provide species specific differences.

Phytocoris calli Knight

Figure 142

Phytocoris calli Knight, 1934:11-12; Carvalho 1959:193; Knight 1968:240, fig. 292.
Phytocoris laticeps Knight, 1968:243, fig. 300 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris calli was described from a single male collected on Mt. Timpanogos, nr. Aspen Grove, Utah Co., Utah. This specimen is deposited in the Knight Collection (USNM).

The junior synonym, P. laticeps, was described from a single specimen taken at light in Richfield, Sevier Co., Utah, 15 August 1929. The male holotype is retained in the Knight Collection (USNM).

DIAGNOSIS. - Length 5.8-6.5 mm. Phytocoris calli is distinguished from other species of the conspurcatus group by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes is between 1.10:1 and 1.30:1 for males. The base of the left genital tubercle is without long, dark, bristle-like setae. The extreme right lobe of the vesica has a small spinulate region apically, but the left basal lobe is without spinulae. Phytocoris calli is similar to P. empirensis with regard to the above characters but differs by having a small patch of spinulae on the extreme left lobe of the vesica and by the small ridge-like swelling on the genital segment above the left tubercle.

REMARKS. - Although P. calli is not well collected, the available records suggest that this species is broadly distributed in the northwestern United States. Specimens have been collected in the Coast and Cascade Ranges of Oregon, east to central and southern Idaho, and south on the Wasatch Plateau of central Utah to Sevier County. A single specimen each also was examined from Johnsville, Plumas Co., California and Elwha Cmp., Olympic Nat. Pk., Washington. The majority of specimens were collected from Abies concolor (Gord.& Glend.) and A. grandis (Dougl.), but several examples in Oregon were taken on Larix occidentalis Nutt., Pinus contorta Dougl., and Pseudotsuga menziesii (Mirb.). I have examined 22 specimens with collection dates ranging from July 14 to September 29.

Upon examination of external and genitalic characters, the holotype male of P. laticeps was found to be conspecific with P. calli and is here placed in synonymy with the latter species.

Phytocoris conspurcatus Knight

Figure 143

Phytocoris conspurcatus Knight, 1920:61-62, pl. I, fig. 16, 1923:626, fig. 149; Blatchley 1926:705, pl. XI, fig. 16; Knight 1941: 188-189, figs. 174, 175; Froeschner 1949:183; Carvalho 1959:195; Knight 1968:240, fig. 290; Kelton 1980:178-179, fig. 128, map 54.

TYPES AND TYPE LOCALITY. - This species was described from 28 specimens collected in Connecticut, Massachusetts, Michigan, Minnesota, New York, Ohio, Washington, D.C., and Ontario, Canada. The holotype male, allotype, and four female paratypes were taken at Batavia, Genesee Co., New York, 17 August 1916, H.H. Knight. One male paratype not included in the original description has the following label data: Batavia, NY, 31 July 1916, H.H. Knight, on hickory bark. The holotype, allotype, and six paratypes are retained

in the Knight Collection (USNM). The remaining 20 paratypes were not located.

DIAGNOSIS. - Length 5.6-6.8 mm. The following combination of characters will separate this species from other members of the *conspurcatus* group. The ratio of length of antennal segment I to width of head across eyes is 1.10:1 to 1.25:1 for males. The male genital segment is without long, dark, bristle-like setae near the base of the left tubercle. The left basal lobe of the vesica lacks an apical spinulate region. The extreme right lobe of the vesica also lacks spinulae, and does not extend above the apex of the lobe to the immediate left.

REMARKS. - *Phytocoris conspurcatus* is widely distributed in the midwestern and northeastern United States, and across southern Canada where it occurs on bark of deciduous trees (e.g., *Acer*, *Pyrus*, *Salix*, *Tilia*). This species has been reported as far west as Colorado, Kansas, South Dakota, and North Dakota (Knight, 1968). *Phytocoris conspurcatus* also occurs west of the Rocky Mountains in Colorado, Wyoming, Montana, Idaho, Washington, Oregon, and British Columbia. Specimens have been collected from the following host plants in western North America: *Alnus rubra* Bong., *Pinus ponderosa* Dougl., *Pseudotsuga menziesii* (Mirb.), *Pyrus* sp., *Salix* spp., and *Tilia platyphylla* Scop. I have examined 36 specimens with collection dates ranging from July 11 to September 25.

Phytocoris conspurcatus is most easily confused with *P. calli* which has a similar distribution in the northwestern United States. *Phytocoris conspurcatus* is distinguished from *P. calli* by the narrower, more elongate left genital tubercle and by the absence of an apical spinulate region on the extreme right lobe of the vesica. Also, *P. conspurcatus* usually has a pale, median annulus on antennal segment III, and a pale line dividing the dark basal region of the propleuron. These markings are absent or poorly defined in *P. calli*.

Phytocoris calvus Van Duzee

Figure 144

Phytocoris calvus Van Duzee, 1920:343-344; Carvalho 1959:193; Knight 1968:240, fig. 289.

TYPES AND TYPE LOCALITY. - This species was described from a single specimen taken on Mt. Wilson, San Gabriel Mts., Los Angeles Co., California, 10 August 1909, F. Grinnell, Jr. The holotype male (No. 2003) is deposited in the Van Duzee Collection (CAS).

DIAGNOSIS. - Length 5.6-6.4 mm. This species is easily recognized by the reddish cuneus; long first antennal segment, ratio of segment length to width of head across eyes 1.25:1 to 1.40:1 for males; and by the long, narrow left genital tubercle (fig. 144a). The extreme right lobe of the vesica is elongate and lacks an apical spinulate region. Phytocoris calvus is most similar to P. californicus but differs by the absence of dark, bristle-like setae on the base of the left genital tubercle and by the absence of an apical spinulate region on the left basal lobe of the vesica.

REMARKS. - The distribution of P. calvus seems to be restricted to the chaparral zone of southwestern California. Specimens have been taken from Lompoc, Santa Barbara County, south to Alpine, San Diego County. Adults have been collected on Ceanothus integerrimus H.&A. and Ceanothus leucodermis Greene. I have examined 21 specimens with collection dates ranging from June 26 to August 9.

Phytocoris utahensis Knight

Figure 145

Phytocoris utahensis Knight, 1961:473-474, fig. 2, 1968:240, fig. 291.

TYPES AND TYPE LOCALITY. - This species was described from four specimens taken at light in Richfield, Sevier Co., Utah, 15 July & 15 August 1929, 8 July 1930. The holotype male, allotype, and one male paratype are retained in the Knight Collection (USNM); one male paratype was not located.

DIAGNOSIS. - Length 6.1-6.6 mm. This species is distinguished from other members of the conspurcatus group by the following combination of characters. The ratio of length of antennal segment I to width of head across eyes ranges from 1.25:1 to 1.40:1 for males. The genital segment of the male is without long, dark, bristle-like setae above the base of the left tubercle. The left basal lobe and extreme right lobe of the vesica are not set with small spines apically, but the extreme left lobe has a large patch of spinulae which will distinguish this species from P. empirensis. Phytocoris utahensis keys to the couplet with P. calvus but lacks the reddish tinge on the hemelytra that is distinctive of the latter species.

REMARKS. - Phytocoris utahensis is known only from the type material collected at Richfield, Sevier Co., Utah and a single male specimen taken at Logan, Cache Co., Utah, 12 August 1942 (USNM). The host plant association of this species is not known.

Phytocoris ketinelbi Bliven

Figure 146

Phytocoris ketinelbi Bliven, 1966:118, pl. X, figs. 12&13.
Phytocoris kahtahbi Bliven, 1966:117-118, pl. X, figs. 10&11 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - Phytocoris ketinelbi was described from 31 specimens collected in Humboldt and Trinity counties, California. The holotype male (No. 13876) was taken at Kneeland, Humboldt Co., 12 September 1937, B.P. Bliven. All type material is retained in the collection of the CAS. In the original description, Bliven (1966) states that many of the specimens from the type series were taken on "willow".

The junior synonym, P. kahtahbi, was described from a holotype male and allotype female collected at Weymouth, Humboldt Co., California, 5 September 1954, ex Baccharis sp., B.P. Bliven. Both specimens are deposited in the CAS collection (type number 13875).

DIAGNOSIS. - Length 5.1-6.3 mm. The following combination of characters will distinguish P. ketinelbi from other species of the conspurcatus group. The cuneus is distinctly marked or tinged with red to reddish brown. The ratio of length of antennal segment I to width of head across eyes ranges from 1.10:1 to 1.25:1. The base of the left genital tubercle is without long, dark, bristle-like setae. The extreme left lobe of the vesica is set with a patch of small spines; the left basal lobe lacks an apical spinulate region. The extreme right lobe of the vesica is small, not extending above apex of lobe to immediate left, and is without a patch of small spines apically. The sclerotized process of the vesica is short and broad, and the apex is narrowly produced (fig. 146e).

REMARKS. - This species occurs at low to moderate elevations in coastal mountain ranges from Benton Co., Oregon to San Diego Co., California. Adult specimens have been collected from *Arctostaphylos tomentosa* (Pursh), *Baccharis* sp., *Lithocarpus densiflora* (H.&A.), *Myrica californica* Cham. & Schlecht, *Salix* sp., and *Tilia platyphylla* Scop. Males are attracted to light. I have examined 64 specimens with collection dates ranging from July 5 to November 3.

Species of questionable group affinity

The species included in this secion do not satisfactorily fit any of the previously described groups. Some of these species share characteristics with species belonging to different groups, making their placement in any one specific group uncertain. Others are simply too different from species included in existing groups to be adequately placed. Finally, several of the taxa included here belong to groups whose species are distributed predominantly outside of western North America (e.g., P. neglectus, P. varipes).

Phytocoris becki Knight

Figure 147

Phytocoris becki Knight, 1968:214-215, fig. 259.

TYPES AND TYPE LOCALITY. - This species was described from 56 specimens collected near Mercury, Nye Co., Nevada (Nevada Test Site). The holotype male, allotype, and 28 paratypes were taken in Area TM (Tippipah Spgs.), Nevada Test Site, 14 June 1965, ex. Ephedra nevadensis Wats., D.E. Beck, H.H. Knight, and J.M. Merino. All type material is retained in the Knight Collection (USNM) except eight paratypes deposited in the collection of BYU and three paratypes that were not located.

DIAGNOSIS. - Phytocoris becki is readily recognized by the light yellowish green hemelytra, pale gray pronotum with fuscous markings, reddish yellow femora, and uniformly brownish yellow antennae (see frontispiece of Knight, 1968). The pronotum is clothed with sericeous, white setae and scattered narrow, flattened, black setae.

DESCRIPTION. - Length 6.0-7.0 mm; vestiture of dorsum composed of pale, simple setae intermixed with white or silvery, sericeous setae; pronotum also with narrow, flattened, black setae. Head:

pale yellow; tylus strongly produced at base, sometimes marked with red medially. Antennae: uniformly brownish yellow, segment I about twice as thick as segment II, sometimes lightly tinged with red. Pronotum: pronotal disk pale gray with fuscous markings particularly around calli and along basal margin; basal submargin of disk with four well developed tubercles; collar fuscous to nearly black; propleura pale, sometimes tinged with fuscous basally. Scutellum: pale yellow, often lightly marked or tinged with red medially. Hemelytra: uniformly pale yellowish green; membrane moderately flecked with fuscous, areole cells dusky yellow. Legs: femora pale yellow, often becoming pale brownish yellow apically, moderately tinged with red producing reddish yellow or reddish orange coloration; tibiae pale yellow to brownish yellow, sometimes lightly marked with red basally. Male genitalia: Figure 147.

REMARKS. - I have examined 45 specimens of *P. becki* from Inyo Co., California; Nye Co., Nevada; and San Juan Co., Utah. Collection dates are from May 16 to July 12. Adults and nymphs have been taken on *Ephedra nevadensis*, which appears to be the host plant of this species.

Phytocoris canescens Reuter

Figure 148

Phytocoris canescens Reuter, 1909:30; Van Duzee 1914:19, 1917a:316, 1917b:262, 1918:285; Carvalho 1959:193; Knight 1968:223; Henry and Stonedahl 1983:in press.

TYPES AND TYPE LOCALITY. - This species was described from an unknown number of specimens collected at Claremont, Los Angeles Co., California by D. Baker. I have examined eight specimens that appear to be from the original type series: one male with abdomen missing (Zoological Museum, Helsinki, Finland); three males and one female (CAS); one male and one female (Knight Collection, USNM); one male

(LACM). The male specimen from the Knight Collection was designated a lectotype by Henry and Stonedahl (1983).

DIAGNOSIS. - *Phytocoris canescens* is distinguished from other western species of the genus by the following characteristics: brown or grayish brown general coloration; dorsal surface with fuscous, setiferous dots but lacking flattened, dark setae; antennal segment I longer than posterior width of pronotum; antennal segment II without pale, median annulus; front tibiae usually with four dark annuli including narrow band at base, and three pale annuli, dark annuli sometimes poorly defined or obsolete; propleura pale with fuscous line across middle; legs with brown to fuscous spots and reticulations. Externally, this species closely resembles *P. gracillatus*, but differs by the structure of the male genitalia and by the strongly brachypterous condition of the female.

DESCRIPTION. - Length: male 5.1-7.0 mm, female 3.9-4.9; female strongly brachypterous; vestiture of dorsum composed of dark, suberect, simple setae intermixed with sericeous, white setae. Head: white or pale yellow; base of buccula, jugum, lorum, and tylus marked with fuscous; frons moderately convex, marked with 6 or 7 fuscous striae. Antennae: I, white with numerous brown to fuscous spots; II, yellowish brown with narrow pale annulus at base; III & IV, yellowish brown to dark brown. Pronotum: pronotal disk grayish white to pale brownish yellow with fuscous, setiferous spots; basal submargin of disk with 4-6 slightly elevated fuscous points; collar and calli usually marked with fuscous; propleura pale with fuscous line across middle. Scutellum: brownish yellow with fuscous bordering narrow, median line; usually with dark mark either side before apex. Hemelytra: grayish white to pale brownish yellow, with fuscous setiferous spots; darker specimens distinctly tinged with fuscous and sometimes with outer half of clavus, inner apical region and outer apical angle of corium, and apex of cuneus more extensively infuscated; membrane moderately to densely conspurcate. Legs: femora white to pale grayish yellow with brown to fuscous

reticulations; hind femora extensively darkened and marked with numerous, small, pale spots; tibiae pale with brown to fuscous markings; front tibiae usually with four dark annuli including narrow band at base, dark annuli sometimes poorly defined or obsolete. Male genitalia: Figure 148.

REMARKS. - *Phytocoris canescens* is widely distributed in the chaparral region of California from the San Francisco Bay area south to San Diego County. This species also occurs along the northern coast of California from Humboldt County to Marin County. Adult specimens have been collected from a variety of shrubby plants including *Artemisia californica* Less., *A. douglasiana* Bess., *Baccharis pilularis* DC., *Eriogonum fasciculatum* Benth., *Haplopappus propinquus* Blake., *Mimulus longiflorus* (Nutt.), and *Salvia mellifera* Greene. Males of this species have been taken at light. I have examined 230 specimens with collection dates ranging through every month of the year.

Phytocoris decurvatus Knight

Figure 149

Phytocoris decurvatus Knight, 1968:226, fig. 273.

TYPES AND TYPE LOCALITY. - Described from a single male collected in Area 12M, Nevada Test Site, Nye Co., Nevada, 9 August 1965, taken at light, J.M. Merino. This specimen is deposited in the Knight Collection (USNM).

DIAGNOSIS. - *Phytocoris decurvatus* closely resembles *P. omani* but is distinguished by the larger eyes, weakly convex frons, male genital structures, and macropterous condition of the female. Like *P. omani*, this species sometimes has a few narrow, flattened, black setae on the dorsal surface, but these are difficult to distinguish from the simple setae. *Phytocoris decurvatus* also resembles

P. gracillatus but is differentiated by the more brownish general coloration, uniformly fuscous basal 2/3 of the propleuron, and by the form of the male genitalia.

DESCRIPTION. - Length 5.3-6.6 mm; brownish general coloration; vestiture of dorsum composed of suberect, dark, simple setae intermixed with sericeous, white setae, sometimes also with limited narrow, flattened, black setae. Head: white or pale yellow with dark reddish brown to fuscous markings; frons weakly convex, usually with 6-8 poorly defined dark striae either side of middle; eyes large. Antennae: I, white or pale yellow, with fuscous markings on dorsal aspect; II, brown or yellowish brown, narrowly pale at base; III & IV, brown to fuscous. Pronotum: pronotal disk pale yellow, moderately to extensively darkened with brown to fuscous, basal submargin with transverse fuscous line or series of dark spots, extreme basal margin pale; propleura fuscous, apical 1/3 pale. Scutellum: pale yellow with fuscous markings; usually with distinct fucsous mark either side before apex. Hemelytra: white or pale yellow, mottled with fuscous; apex of corium with large pale patch preceded by oblique fuscous mark; outer margin of cuneus sometimes tinged with red; membrane moderately to densely conspurcate. Legs: femora white or pale yellow, reticulated with fuscous, dark regions often broken by pale spots; tibiae pale with fuscous markings; front and middle tibiae with three dark annuli. Male genitalia: Figure 149. Genital segment without tubercles above clasper bases.

REMARKS. - Phytocoris decurvatus is widely distributed in the southwestern United States where it occurs on Quercus. Specimens have been collected as far north as Weber Co., Utah; east to Fremont Co., Colorado and Lincoln Co., New Mexico; and south to the Chiricahua Mtns. in Arizona. The westernmost record is the holotype from Nye Co., Nevada. I have examined 28 specimens with collection dates ranging from May 2 to October 7. Several male specimens have been taken at light.

Phytocoris histriculus Van Duzee

Figure 150

Phytocoris histriculus Van Duzee, 1920:346-347; Carvalho 1959:201; Knight 1968:249.

TYPES AND TYPE LOCALITY. - Described from 10 specimens collected by E.P. Van Duzee at La Jolla, 4 July 1914 and Sweetwater Valley, nr. Alpine, 18 June 1913, San Diego Co., California. The holotype male (No. 715), allotype (No. 716), and six paratypes are retained in the Van Duzee Collection (CAS). The remaining two paratypes are deposited in the Knight Collection (USNM).

Two of the P. histriculus paratypes are not conspecific with the holotype. A teneral, male specimen at the USNM with label data: "San Diego Co., Cal., 7-4-14, E.P. Van Duzee" is tentatively identified as P. californicus; and a female specimen at the CAS with the same label data except "6-18-13" is placed in the conspurcatus group. The latter specimen could not be identified to the species level.

DIAGNOSIS. - Externally, P. histriculus resembles certain species of the conspurcatus group, but is easily distinguished by the absence of broad, flattened, dark setae on the dorsum and by the genital structures of the male. Phytocoris histriculus also resembles P. dimidiatus and P. populi of the tiliae group, but differs by the smaller size; long, pale, bristle-like setae on antennal segment I; and by the smaller sclerotized process of the vesica with fewer tooth-like serrations (fig. 150e).

DESCRIPTION. - Length 5.0-6.3 mm; light brown general coloration; vestiture of dorsum composed of dark, simple setae intermixed with white, sericeous setae and sometimes with a few narrow, flattened, black setae. Head: pale yellow with reddish brown to fuscous markings; frons moderately convex, with 5 or 6 dark

striae. Antennae: I, pale with reddish brown to fuscous markings on dorsal aspect, moderately set with long, pale, bristle-like setae; II, brown or yellowish brown, pale annulus at base and broader less distinct band medially; III, brown to fuscous with pale annulus medially; IV, brown to fuscous. Pronotum: pronotal disk pale yellow, extensively tinged with fuscous, basal submargin with 4-6 slightly elevated fuscous points, extreme basal margin pale; collar and calli lighter yellow with reddish brown to fuscous markings; propleura pale, basal margin and median line fuscous. Scutellum: pale with fuscous markings, and dark spot either side before apex. Hemelytra: grayish white or pale grayish yellow, with fuscous markings, sometimes with faint pinkish tinge; corium usually with distinct pale region medially and at apex, apical pale region preceded by angular fuscous patch; membrane moderately mottled with spots and larger patches of fuscous. Legs: femora white or pale yellow with limited reddish brown to fuscous markings, mostly on apical half of segment; hind femora more extensively darkened apically and with pale preapical band, dark regions broken by pale spots; tibiae pale with fuscous markings, front and middle pair with three dark annuli. Male genitalia: Figure 150; genital segment without tubercles above clasper bases.

REMARKS. - *Phytocoris histriculus* is known from San Diego County and Santa Cruz Island, California. Collection dates are from May 17 to July 4. The host plant association of this species is not known.

Phytocoris maritimus Van Duzee

Figure 151

Phytocoris maritimus Van Duzee, 1920:349-350; Carvalho 1959:205; Knight 1968:226.

Phytocoris sequoiae Bliven, 1954:112-114, fig. 3; Carvalho 1959:216 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris maritimus* was described from six specimens collected at Carmel, Monterey Co., California, 24 March 1919, ex. "cypress", E.P. Van Duzee. The holotype male (No. 701), allotype (No. 702), and two paratypes are retained in the Van Duzee Collection (CAS). The remaining two paratypes are deposited in the Knight Collection (USNM).

The junior synonym, *P. sequoiae*, was described from 52 specimens taken at Eureka, Humboldt Co., California, 28 August - 6 November (holotype male, 7 September 1952), ex. *Sequoia sempervirens* (Lamb.), B.P. Bliven. All type material is retained in the collection of the CAS.

DIAGNOSIS. - Externally, this species resembles *P. politus* and *P. sagax*, but is distinguished from these taxa by the absence of flattened, black setae on the dorsum and by the male genital structures (fig. 151). Other diagnostic characteristics of *P. maritimus* are as follows: reddish brown to brown general coloration; length of antennal segment I greater than width of head but less than posterior width of pronotum; antennal segment III yellowish brown; ratio of eye length to width of vertex greater than 1.2:1; basal submargin of pronotal disk with transverse fuscous line; front tibiae annulated; genital segment of male without tubercle above base of left clasper.

DESCRIPTION. - Length 5.2-6.8 mm; brown or reddish brown general coloration; vestiture of dorsum composed of suberect, simple setae intermixed with silvery, sericeous setae. Head: pale grayish yellow with red to fuscous markings; frons weakly convex, meeting tylus along shallow indentation, striae each side of middle usually reddish; eyes large; vertex narrow. Antennae: yellowish brown, apical segment usually darker brown; segment I reticulated with reddish brown; segment II with pale annulus at base. Pronotum: pronotal disk grayish yellow to pale gray, often lightly to moderately tinged with red, basal submargin with transverse fuscous line; propleura grayish yellow, lightly infuscated in darker

specimens, often with dark anteromedial stripe. Scutellum: grayish yellow, tinged with red or reddish brown; usually with fuscous spot each side before apex. Hemelytra: pale grayish yellow, lightly to moderately tinged with red especially on cuneus; basal 1/3 of corium with large, transverse, fuscous patch; apex of corium with distinct pale region preceded by smaller fuscous patch; outer margin of corium, inner margin of cuneus, and apex of cuneus marked with fuscous in darker specimens; membrane moderately to densely sprinkled with fuscous spots. Legs: femora white or pale yellow, reticulated with brown or reddish brown, broadly pale basally; hind femora more extensively darkened anteriorly and marked with pale spots; tibiae pale; front and middle tibiae with three fuscous annuli, sometimes indistinct in paler specimens. Male genitalia: Figure 151; genital segment without tubercles above clasper bases.

REMARKS. - *Phytocoris maritimus* is distributed along the coast of California from Del Norte County to Monterey County. Adults and nymphs have been collected from *Cupressus* sp. and *Sequoia sempervirens*. I have examined 135 specimens with collection dates ranging from February 19 to November 26.

Specimens collected on *Cupressus* are usually much darker than those taken from *Sequoia*. However, the color pattern is the same for specimens found on both plants. There is minor variation in the shape of the sclerotized process (i.e., presence and number, 1 or 2, of small apical serrations), but this is not correlated with geography or host plant association. Other structures of the male genitalia display little or no variation over the range of distribution. On the basis of this information, I am placing *P. sequoiae* in synonymy with *P. maritimus*.

Phytocoris mesillae Knight

Figure 152

Phytocoris mesillae Knight, 1968:258-259, fig. 314.

TYPES AND TYPE LOCALITY. - Described from two male specimens collected at Mesilla Pk., Dona Ana Co., New Mexico, 12 July 1917, taken at light, H.H. Knight. The holotype is deposited in the Knight Collection (USNM); the paratype was not located.

DIAGNOSIS. - Externally, P. mesillae is most similar to members of the conspurcatus group, but differs by the form of the male genitalia. The genital segment has a broad, vertical tubercle well above the base of the left clasper (fig. 152a). The membranous region of the vesica is greatly reduced and lacks the sclerotized regions that are typical of conspurcatus species. The structure of the sclerotized process is similar to that of fraterculus group species; bulbous basally and tapering beyond middle to acute apex (fig. 152e). The narrow, fuscous annulus at the base of antennal segment II will further differentiate P. mesillae from members of the conspurcatus group.

DESCRIPTION. - Length 5.6-6.1 mm; grayish white ground color with fuscous markings; vestiture of dorsum composed of dark, simple setae intermixed with broad, flattened, black setae and patches of sericeous, white setae. Head: pale yellow with reddish brown to fuscous markings; frons weakly convex, with 5 or 6 poorly defined dark striae either side of middle; tylus prominent. Antennae: I, white or pale yellow with fuscous reticulations, ventral surface mostly pale; II, fuscous with pale annulus before base and slightly broader pale band medially, dark basal half of segment with 1 or 2 additional pale spots on dorsal aspect; III, fuscous, narrowly pale at base; IV, fuscous. Pronotum: pronotal disk grayish yellow with dark setiferous spots, basal submargin with transverse fuscous line

and four slightly elevated points; anterior angles, calli, and collar marked with reddish brown to fuscous; propleura pale with incomplete fuscous line medially. Scutellum: mostly pale, triangular region at base and spot either side before apex fuscous. Hemelytra: grayish white or pale grayish yellow, mottled with dusky brown to fuscous spots especially at bases of simple setae; cuneus tinged with red along outer margin; membrane densely conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous markings, mostly on apical half of segment; hind femora with reticulate pattern; tibiae pale with 3 or 4 dark annuli, bands on hind tibiae poorly defined. Male genitalia: Figure 152.

REMARKS. - I have seen only two specimens of *P. mesillae*; the holotype and one male specimen from nr. Columbus, Luna Co., New Mexico, August 1976 (UCR). The host plant association of this species is not known.

Phytocoris neglectus Knight

Figure 153

Phytocoris neglectus Knight, 1920:54, pl. I, fig. 3; Parshley 1921:20; Knight 1923:634-635, fig. 149; Blatchley 1926:719, pl. XI, fig. 3; Knight 1941:194, fig. 176; Froeschner 1949:183; Carvalho 1959:207; Kelton 1980:183-184, fig. 133, map 55.

Phytocoris yuroki Bliven, 1954:110-112, fig. 2; Carvalho 1959:221 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - This species was described from 53 specimens collected in Maine, Massachusetts, Michigan, Minnesota, and New York. The holotype male was taken at Batavia, Genesee Co., New York, 25 June 1915, H.H. Knight. Two specimens from the paratype series were omitted from the original description; label data: 1 male, Wyoming, N.Y., VI-25-1916, H.H. Knight; 1 female, Ithaca, N.Y., July 26, 1916, H.H. Knight. The holotype, allotype, and 15 paratypes

are retained in the Knight Collection (USNM). The remaining 36 paratypes were not located.

The junior synonym, P. yuroki, was described from 14 specimens collected at Eureka, Humboldt Co., California, September 2 - October 9, 1947-48, 1950-53, ex. Sequoia sempervirens (Lamb.) (in part), B.P. Bliven. The holotype male (27 September 1952), allotype, and all 12 paratypes are retained in the collection of the CAS.

DIAGNOSIS. - Phytocoris neglectus is recognized by the following combination of characters: brownish general coloration; dorsal surface without dark, flattened setae; antennae brown to fuscous, segment I longer than width of head across eyes, segment II without pale annulus medially; propleura fuscous, apical 3rd pale; front tibiae with three dark annuli and three pale annuli; genital segment of male without a tubercle above base of left clasper; shaft of left clasper long and strongly curved (fig. 153c); right clasper with an angulate process dorsally (fig. 153d); sclerotized process with 5 or 6 large tooth-like serrations (fig. 153e). Externally, this species closely resembles P. dimidiatus and P. populi of the tiliae group but is distinguished from these species by the absence of a pale, median annulus on antennal segment II and by the male genital structures. Phytocoris neglectus also resembles certain members of the conspurcatus group but is easily differentiated by the absence of flattened, dark setae on the dorsum.

DESCRIPTION. - Length 5.5-7.1 mm; brownish general coloration; vestiture of dorsum composed of dark, simple setae intermixed with white to golden, sericeous setae. Head: pale yellow with reddish brown to fuscous markings; frons weakly convex, meeting tylus along broad shallow indentation, with 6-8 red to fuscous striae. Antennae: brown to fuscous; segment I marked with pale spots, ventral surface mostly pale; segment II narrowly pale at base. Pronotum: pronotal disk pale brownish yellow, moderately to extensively darkened with brown to fuscous, basal submargin with wavy fuscous line or series of fuscous patches, extreme basal margin pale; collar and calli often

lighter grayish yellow with reddish brown to fuscous markings; propleura fuscous, apex pale. Scutellum: pale grayish yellow to brownish yellow, tinged with brown in darker specimens, with fuscous mark either side before apex which usually extends from lateral margin to middle of disk, anterior half of disk in darker specimens sometimes with pale median line bordered by fuscous. Hemelytra: grayish yellow or pale brownish yellow, moderately to densely tinged and marked with brown to fuscous; corium with distinct pale region medially and at apex, apical pale region preceded by large oblique fuscous patch; membrane mottled with fuscous, edges of dark areas sometimes breaking into small spots. Legs: femora white or pale yellow, mottled with dark reddish brown to fuscous, dark regions broken by pale spots; tibiae pale with three fuscous annuli, dark bands usually marked with pale spots. Male genitalia: Figure 153.

REMARKS. - *Phytocoris neglectus* is widely distributed in the midwestern and eastern United States and across southern Canada where it occurs on the bark of deciduous and coniferous trees. Kelton (1980) reported this species as far north and west as Lesser Slave Lk. in Alberta. *Phytocoris neglectus* also occurs west of Rocky Mountains in forested regions of Colorado, northern California, Idaho, Montana, Oregon, Washington, and British Columbia. A single specimen also was examined from the Chiricahua Mtns. in southeastern Arizona. Along the west coast, the northernmost and southernmost records are from Monterey Co., California and New Westminster, British Columbia. Specimens have been collected from the following plants in western North America: *Abies amabilis* (Dougl.), *A. procera* Rehd., *Acer macrophyllum* Pursh., *Alnus rubra* Bong., *Castanopsis chrysophylla* (Dougl.), *Lithocarpus densiflora* (H.&A.), *Myrica californica* Cham. & Schlecht., *Quercus* sp., *Pinus contorta* Dougl., *Pseudotsuga menziesii* (Mirb.), *Sequoia sempervirens* (Lamb.), *Tsuga heterophylla* (Raf.), and *T. mertensiana* (Bong.). I have examined 245 specimens with collection dates ranging from July 18 to October 24.

Phytocoris neglectus belongs to a large group of species (Group II of Knight, 1941) that are widely distributed east of the Rocky Mountains. At present, only P. neglectus is known to occur in western North America, but several other species are distributed as far west as South Dakota, Kansas, and eastern Colorado.

Phytocoris omani new species

Figure 154

TYPES AND TYPE LOCALITY. - Holotype male: 1.3 mi. E St. Hwy. 25 on Mytoge Mtn. Rd., 2621 m, Sevier Co., Utah, 16 July 1980, ex. Artemisia tridentata Nutt., G.M. Stonedahl and R.T. Schuh (AMNH). Paratypes: UTAH, Sevier Co.: 18 males and 17 females, same data as holotype (CAS, OSU, USNM); 8 males and 19 females, Dog Spg. Rd. off Rt. 25, 2688 m, 16 July 1980, ex. Artemisia tridentata, R.T. Schuh and G.M. Stonedahl (AMNH).

DIAGNOSIS. - Externally, P. omani closely resembles P. decurvatus and P. gracillatus but is distinguished from these species by the smaller eyes, strongly convex frons, male genital structures, and by the strongly brachypterous condition of the females. The genital segment of the male lacks a tubercle above the base of the left clasper (fig. 154a). The sensory lobe of the left clasper is prominent and has a large spine arising from the dorsal surface (fig. 154b); angle of left clasper sharp, V-shaped. Right clasper with two large dorsal spines (fig. 154d). Vesica with two elongate membranous lobes, right lobe bifurcate; sclerotized process as in figure 154e.

DESCRIPTION. - Male. Length 6.16-6.80 mm, width 1.89-2.20; pale gray ground color with fuscous markings. Head: width across eyes 0.95-0.97, vertex 0.38-0.40; pale grayish white with dark reddish brown or fuscous markings; frons strongly convex, with 6-8 fuscous striae either side of middle; eyes small, length only slightly

greater than width of vertex. Rostrum: length 2.50-2.74, extending to between 5th and 7th abdominal segments. Antennae: I, length 1.08-1.17, fuscous with large white patches on dorsal aspect, ventral surface pale; II, length 2.14-2.30, yellowish brown with narrow pale annulus at base; III, length 1.42-1.53, dark yellowish brown to fuscous, narrowly pale at base; IV, length 0.99-1.08, brown to fuscous. Pronotum: mesal length 0.79-0.86, posterior width 1.39-1.58; pronotal disk gray or grayish white with dark setiferous spots, usually tinged with fuscous; basal submargin of disk with transverse fuscous line and 4-6 weakly elevated points; dorsal surface of collar fuscous with pale spot medially; calli and region immediately behind calli marked with fuscous; propleura fuscous, basal 1/3 pale. Scutellum: pale yellow or pale grayish yellow with fuscous markings, usually lightly tinged with brown. Hemelytra: grayish white or pale gray with dark setiferous spots, moderately to extensively marked with fuscous particularly along veins, inner and outer margins of corium, and on cuneus; outer half of clavus and inner apical region of corium often extensively darkened; apex of corium with large pale patch medially; cuneus densely mottled with fuscous, apical 1/4 entirely darkened; membrane moderately to densely conspurcate. Legs: femora white or pale yellow, reticulated with fuscous mostly on apical 2/3 of segment, dark regions often broken by pale spots; tibiae pale with fuscous markings; front and middle tibiae with three dark annuli, bands on middle tibiae sometimes poorly defined. Vesiture: dorsal surface with long, black, simple setae intermixed with sericeous, white setae; sometimes also with a few narrow, flattened, black setae especially on dark apical region of corium. Genitalia: Figure 154. Genital segment without tubercles above clasper bases.

Female. Similar to male in color and vestiture; strongly brachypterous, wing membrane reduced to narrow flap. Length 3.78-4.70 mm, width 1.82-2.05. Head: width across eyes 0.93-1.00, vertex 0.44-0.48. Rostrum: length 2.68-2.84, extending to base of ovipositor or beyond. Antennae: I, 1.08-1.26; II, 2.07-2.32; III,

1.33-1.55; IV, 1.06-1.12. Pronotum: mesal length 0.67-0.72, posterior width 1.06-1.22.

REMARKS. - *Phytocoris omani* has been collected in Oneida Co., Idaho and Sevier Co., Utah on *Artemisia tridentata*. Collection dates range from June 2 to July 17.

SPECIMENS EXAMINED. - Thirty-four additional specimens were examined from the following localities: IDAHO. Oneida Co.: Holbrook (USU); 5 mi NW Holbrook (USU). UTAH. Sevier Co.: Fishlake Nat. For., T26S-R3E-Sec. 22, 2350 m (OSU); Salt Gulch, 12 mi. N St. Hwy. 24 on St. Hwy. 72, 2460 m (OSU); 24.7 mi. N St. Hwy. 24 on St. Hwy. 72, 2425 m (OSU); 2.3 mi. N Int. 70 on Rd. to Kanosh, 2130 m (OSU); 2.4 mi. S Int. 70 on Kanosh Rd., 2181 m (AMNH).

Phytocoris radiatae new species

Figure 155

TYPES AND TYPE LOCALITY. - Holotype male: Last Chance Rd., Santa Cruz Co., California, 6 February 1979, ex. *Pinus radiata* D. Don., C.P. Ohmart (USNM). Paratypes: CALIFORNIA. Santa Cruz Co.: 2 females, same data as holotype (AMNH, OSU); 2 males, same data as holotype except 27 September 1978 (AMNH, OSU); 1 female, same data as holotype except 7 November 1978 (USNM); 1 female, Swanton Rd., 20 April 1979, ex. *Pinus radiata*, W.G. Nolgt (CAS).

DIAGNOSIS. - *Phytocoris radiatae* is very similar to *P. alpestris* of the *stellatus* group, but differs by the paler propleura, yellowish brown second antennal segment with apical 1/4-1/3 fuscous, and by the male genital structures, especially the elongate right clasper (fig. 155d). The genital segment is swollen above the base of the left clasper but lacks a distinct tubercle (fig. 155a), and the sclerotized process has 12-14 tooth-like serrations (fig. 155e).

DESCRIPTION. - Male. Length 6.05-6.59 mm, width 1.80-1.91; pale reddish brown to brown general coloration. Head: width across eyes 0.98-1.06, vertex 0.27-0.30; pale brownish yellow; buccula, jugum, lorum, and basolateral margin of tylus marked with red; frons and tylus tinged with fuscous; frons weakly convex, meeting tylus along shallow indentation; eyes large. Rostrum: length 2.32-2.38, extending just beyond apices of hind coxae. Antennae: I, length 0.81-0.91, white or pale yellow with fuscous reticulations, ventral surface uniformly pale; II, length 2.27-2.56, brown or yellowish brown, narrow pale annulus at base, apical 1/4-1/3 fuscous; III, length 1.26-1.35, fuscous, narrowly pale at base; IV, fuscous. Pronotum: mesal length 0.72-0.77, posterior width 1.30-1.44; pronotal disk grayish brown, basal margin pale; collar and calli yellowish brown, calli usually with fuscous reticulations; propleura brownish yellow, apical 1/3 pale, usually with pair of faint reddish marks anteriorly. Scutellum: brownish yellow, extensively tinged with fuscous, apex pale. Hemelytra: grayish white, often translucent ground color, moderately to densely tinged with yellowish brown to fuscous, sometimes also lightly tinged with red especially on apical half of corium and along outer margins of corium and cuneus; corium with distinct pale patch medially and at apex; membrane lightly to moderately mottled with dusky to fuscous patches. Legs: femora pale yellow, reticulated with reddish brown to fuscous, dark regions often broken by pale spots; tibiae pale with fuscous markings; front and middle tibiae with three, sometimes poorly defined dark annuli. Vestiture: dorsum with black, simple setae intermixed with white, sericeous setae; pale regions on hemelytra usually more densely set with sericeous setae. Genitalia: Figure 155.

Female. Similar to male in color and vestiture. Length 5.56-5.72 mm, width 1.87-1.93. Head: width across eyes 0.94-1.00, vertex 0.39-0.41. Rostrum: length 2.32-2.41, extending to between hind coxae. Antennae: I, 0.76-0.86; II, 2.03-2.20; III, 1.28-1.33; IV, 0.90. Pronotum: mesal length 0.72-0.77, posterior width 1.35-1.46.

REMARKS. - Phytocoris radiatae is known only from Santa Cruz Co., California where it occurs on Pinus radiata. Collection dates are from February 6 to November 7. Externally, this species is very similar to members of the stellatus group, especially P. alpestris, but the genital structures (e.g., elongate right clasper, serrated sclerotized process, vesica with small sclerotized region abI e left margin of gonopore) are more similar to those of certain junceus group species.

Phytocoris roseotinctus Knight

Figure 156

Phytocoris roseotinctus Knight, 1925a:52-53; Carvalho 1959:214; Knight 1968:229.

TYPES AND TYPE LOCALITY. - This species was described from two males collected in the Sierrita Mtns., 1220 m, Pima Co., Arizona, 19 August 1924, ex. Acacia sp., A.A. Nichol. Both specimens are retained in the Knight Collection (USNM).

DIAGNOSIS. - Phytocoris roseotinctus is readily identified by the greenish yellow or pale green general coloration with the inner half of clavus bordering scutellum, outer margin of clavus, inner margin of corium, and paracuneus bright red. The legs and antennae are pale brownish yellow or greenish yellow; without red markings.

DESCRIPTION. - Length 6.7-7.6 mm; vestiture of dorsum composed of suberect, simple setae intermixed with silvery, sericeous setae. Head: pale greenish yellow, vertex and frons often more yellowish; frons strongly convex, meeting tylus along deep indentation. Antennae: I, greenish yellow to pale green, length greatly exceeding width of head across eyes; II-IV, pale brownish yellow. Pronotum: pronotal disk yellowish green, collar and calli often lighter yellow

or greenish yellow; propleura greenish yellow. Scutellum: uniformly greenish yellow, sometimes lightly tinged with red medially. Hemelytra: greenish yellow to pale green; inner half of clavus bordering scutellum, narrow outer margin of clavus, broader inner margin of corium, and paracuneus bright red; membrane densely mottled with spots and larger patches of dusky brown to fuscous. Legs: femora pale brownish yellow or greenish yellow with faint brown reticulations, mostly on apical half of segment; hind femora usually with distinct pale spots; tibiae pale yellow or light greenish yellow, apices darker brownish yellow. Male genitalia: Figure 156.

REMARKS. - *Phytocoris roseotinctus* is known from Cochise, Pima, and Santa Cruz counties in Arizona. Knight (1968) reported this species from New Mexico, but did not give a specific locality. The only host plant record comes from the type specimens collected on *Acacia* sp. Both sexes have been taken at light. I have examined 17 specimens with collection dates ranging from August 9 to October 9.

Externally, *P. roseotinctus* is very similar to *P. vigens* (Uhler), but differs by the form of the male genitalia and by the clavus, which is only partially reddened. Also, the distribution of *P. vigens* seems to be restricted to Baja California, Mexico.

Phytocoris shoshoni new species

Figure 157

TYPES AND TYPE LOCALITY. - Holotype male: nr. Redstone, Pitkin Co., Colorado, 8 July 1980, ex. *Pinus edulis* Engelm., J.T. & D.A. Polhemus (JTP). Paratypes: COLORADO. Eagle Co.: 2 males (one specimen with abdomen missing), Water Wheel Ranch, nr. Bond, 24 June 1978, J.T. Polhemus (JTP). Pueblo Co.: 1 female, 12 mi. W Pueblo on St. Hwy. 96, 15 June 1980, J.T. & D.A. Polhemus (JTP). UTAH. Grand Co.: 1 male and 3 females, South Beaver Mesa, La Sal Mtns., 4 July 1980, J.T. & D.A. Polhemus (JTP).

DIAGNOSIS. - Externally, P. shoshoni closely resembles P. chihuahuanae and P. simulatus of the fraterculus group, but is easily distinguished by the absence of dark annuli on the front tibiae, lack of flattened dark setae on the dorsal surface, and by the male genital structures (fig. 157). This species also resembles P. mellarius, but is differentiated by the fuscous third antennal segment, dark markings along the basal submargin of the pronotal disk, and distinct male genitalia.

DESCRIPTION. - Male. Length 5.45-6.00 mm, width 1.80-1.85; brownish yellow general coloration with limited fuscous markings. Head: width across eyes 0.94-0.97, vertex 0.29-0.32; pale yellow; buccula, jugum, lorum, and tylus marked with red; frons weakly convex, with 5 or 6 poorly defined reddish striae. Rostrum: length 2.65-2.81, extending to 7th or 8th abdominal segment. Antennae: I, length 0.63-0.72, pale yellow, dorsal surface with reddish brown to fuscous reticulations; II, length 2.11-2.30, yellowish brown, apical 1/4 fuscous; III, length 1.12-1.26, fuscous, narrowly pale at base; IV, length 0.85-0.88, fuscous. Pronotum: mesal length 0.81-0.86, posterior width 1.48-1.57; pronotal disk pale yellow to pale brownish yellow, basal submargin with transverse fuscous line or series of fuscous patches; collar and calli often lightly tinged with pale brownish orange; propleura pale, sometimes with red mark crossing anterior margin. Scutellum: pale yellow, sometimes lightly tinged with brown. Hemelytra: pale yellow, lightly tinged with brown; apical half of corium sometimes with faint reddish tinge medially; outer margin of clavus, basal 1/3 of corium, and inner margin of corium with fuscous markings; inner margin and apex of cuneus often marked with red; membrane uniformly infuscated or nearly so. Legs: femora pale yellow, spotted or reticulated with red to brown, mostly on apical 2/3 of segment; tibiae pale with limited brown to fuscous markings but lacking dark annuli. Vestiture: dorsum with suberect, simple setae intermixed with sericeous, white setae. Genitalia: Figure 157. Genital segment with small knob-like tubercle above base of left clasper.

Female. Similar to male in color and vestiture. Length 5.56-5.72 mm, width 1.84-1.96. Head: width across eyes 0.92-0.97, vertex 0.36. Rostrum: length 2.66-2.92, extending well beyond apices of hind coxae. Antennae: I, 0.67-0.76; II, 2.02-2.29; III, 1.13-1.21; IV, 0.79-0.90. Pronotum: mesal length 0.77-0.88, posterior width 1.49-1.62.

REMARKS. - *Phytocoris shoshoni* is known only from the type material collected in Colorado and eastern Utah. A single male specimen was collected from *Pinus edulis*, which is probably the host plant of this species. Collection dates are from June 15 to July 8. Although *P. shoshoni* is very similar to certain members of the *fraterculus* group in external appearances, it shows no relationship to these species with regard to the structure of the male genitalia.

Phytocoris varipes Boheman

Figure 158

Phytocoris varipes Boheman, 1852:107; Butler 1923:387; Kullenberg 1944:26-29, pl. II, fig. 8; Carvalho 1959:225 (see this catalogue for more complete listing of pre-1959 citations): Southwood & Leston 1959:298, figs. 124, 137, pl. 51, fig. 6; Wagner and Weber 1964:148, figs. 96d, 97d, 100d, 102a-c; Wagner 1971:231-232, figs. 151a&b, 154a, 166b,f,k,o; Stonedahl 1983b: in press.

DIAGNOSIS. - *Phytocoris varipes* is distinguished from other western *Phytocoris* species by the following combination of characters: brownish yellow general coloration; dorsum without flattened, dark setae; ratio of eye length to width of vertex less than 1.2:1; antennae pale yellow to brownish yellow, segment I slightly longer than width of head across eyes; front tibiae with three red to reddish brown annuli; anterior margin of male genital aperture with well developed tubercle in addition to tubercles above

clasper bases; sclerotized process of vesica with 10 or 11 small serrations (fig. 158e).

DESCRIPTION. - Length 5.6-7.3 mm; vestiture of dorsum composed of suberect, simple setae intermixed with silvery and golden brown, sericeous setae. Head: pale brownish yellow with red markings; frons moderately convex, meeting tylus along distinct indentation, with reddish striae either side of middle. Antennae: pale yellow to brownish yellow; segment I reticulated with reddish brown. Pronotum: pronotal disk brownish yellow or pale grayish yellow, usually darker brown along basal submargin; collar with faint red mark each side of pale median spot; propleura pale with broad reddish brown band across middle and narrower band basally. Scutellum: pale yellow to brownish yellow, sometimes lightly tinged with red; median line pale, bordered by reddish brown to fuscous. Hemelytra: pale brownish yellow, often with faint reddish cast; clavus and inner apical region of corium marked with darker brown; outer margin of corium and cuneus with red or reddish brown markings; membrane mottled with fuscous. Legs: femora pale yellow, reticulated with red or reddish brown; tibiae pale yellow to brownish yellow; front tibiae with three reddish brown to fuscous annuli, bands sometimes poorly defined. Male genitalia: Figure 158.

REMARKS. - *Phytocoris varipes* is a Palearctic species found throughout the British Isles and continental Europe except the extreme northern regions. This species also has been reported from Algeria, Turkestan, and the Bol'shoy Kavkaz Mountains in southwestern USSR (Butler, 1923; Wagner, 1971). In Europe, *P. varipes* occurs on a variety of grasses and herbs and is reported to be principally phytophagous (Kullenberg, 1944; Southwood and Leston, 1959). Adults are found from mid-June to October.

This species was first reported from North America by Stonedahl (1983b). It is distributed throughout much of western Oregon at low elevations on mixed grasses and herbs. The present distribution extends from Curry County north to Polk and Marion counties. I have

examined 210 specimens with collection dates ranging from June 21 to October 17.

Externally, P. varipes is most similar to a native grass-inhabiting species, P. roseipennis, but differs by the smaller size, dark bands on the front tibiae, macropterous condition of the female, and by the male genital structures, most noticeably the well developed tubercle on the anterior margin of the genital aperture. The anterior genital tubercle will distinguish P. varipes from all other Phytocoris species in western North America.

Phytocoris varius Knight

Figure 159

Phytocoris varius Knight, 1934:9-11; Carvalho 1959:220; Knight 1968:235, fig. 281.

TYPES AND TYPE LOCALITY. - This species was described from 10 specimens collected in Arizona and southeastern Colorado. The holotype male, allotype, and four paratypes were taken at Grand Canyon, Coconino Co., Arizona, 6 September 1931, ex. Juniperus sp., H.H. Knight. All type material is retained in the Knight collection except two paratypes that were not located.

DIAGNOSIS. - Phytocoris varius is recognized by the following combination of characters: pale grayish brown general coloration; body length 5.8-6.7 mm; ratio of eye length to vertex width greater than 1.10:1 for males and 1.00:1 for females; antennal segment I slightly longer than width of head across eyes; antennal segment II nearly twice as long as posterior width of pronotum; front tibiae without dark annuli; propleuron fuscous, apical 1/3 and line across base pale; dorsal surface of hind tibiae uniformly darkened anteriorly, without pale spots. Externally, this species closely resembles P. palmeri and P. schuhi of the fraterculus group, but

differs by the smaller size, absence of dark annuli on the front tibiae, and by the form of the male genitalia (fig. 159).

DESCRIPTION. - Pale gray or light brownish gray general coloration with limited fuscous markings; vestiture of dorsum composed of dark, simple setae intermixed with white, sericeous setae and broad, flattened, black setae. Head: pale yellow; jugum, lorum, and tylus moderately to extensively darkened; frons weakly convex, with 6-8 poorly defined, reddish to fuscous striae either side of middle; tylus prominent. Antennae: segment I pale yellow with reddish brown to fuscous spots or reticulations dorsally, ventral surface infuscated basally; segment II brownish yellow; segments III & IV yellowish brown to fuscous. Pronotum: pronotal disk pale yellow or light grayish yellow, lateral margins and basal submargin infuscated, extreme basal margin pale; disk with dusky spots at setae bases; two spots on collar and inner margins of calli fuscous; propleura fuscous, apical 1/3 and line across base pale. Scutellum: mostly fuscous, lateral margins and median line on apical half pale. Hemelytra: grayish white to pale grayish yellow with limited fuscous markings particularly along veins, outer margin of corium, and inner margin of cuneus; dusky spots at bases of simple setae; membrane moderately conspurcate. Legs: femora white or pale yellow with reddish brown to fuscous reticulations; hind femora extensively darkened on dorsal surface, anterior half without pale spots; tibiae pale with reddish brown to fuscous spots mostly on basal half of segment. Male genitalia: Figure 159.

REMARKS. - I have examined 18 specimens of *P. varius* from Cochise and Coconino counties, Arizona; La Plata and Montrose counties, Colorado; and White Pine Co., Nevada. Collection dates are from June 10 to September 6. The host plant of this species is *Juniperus*.

Phytocoris vau Van Duzee

Figure 160

Phytocoris vau Van Duzee, 1912:478, 1914:15, 1917a:318; Carvalho 1959:220; Knight 1968:249.

TYPES AND TYPE LOCALITY. - Described from a single male specimen taken at Pasadena, Riverside Co., California, 17 June 1909, F. Grinnell. The holotype (No. 1997) is deposited in the Van Duzee Collection (CAS).

DIAGNOSIS. - This striking species is readily recognized by the yellowish green hemelytra with the clavus, inner apical angle of corium, and inner margin and apex of cuneus deep rose red to dark brownish red. The legs and antennae also are extensively reddened.

DESCRIPTION. - Length 5.2-6.0 mm; vestiture of dorsum composed of suberect, simple setae intermixed with golden, sericeous setae on green colored regions and white, sericeous setae on reddened areas. Head: pale greenish yellow; jugum, lorum, buccula, and tylus red; frons strongly convex, meeting tylus along deep indentation. Antennae: deep rose red to dark reddish brown; segment I with small pale spots; segment II with narrow, pale annulus at base and broader pale band medially; segment III narrowly pale at base. Pronotum: pronotal disk uniformly yellowish green, calli sometimes lighter yellow; propleura yellowish green. Scutellum: uniformly yellowish green; weakly convex. Hemelytra: yellowish green; clavus, inner apical angle of corium, and inner margin and apex of cuneus deep rose red to dark brownish red; cuneus usually paler greenish yellow; membrane densely mottled with fuscous spots (note: the distinct yellowish green color of this species fades to pale brownish yellow with age). Legs: femora pale brownish yellow with extensive, fine reticulate pattern of red, also marked with faint pale spots; front tibiae uniformly rubescent; middle and hind tibiae pale with broad

red annulus at base, middle tibiae also narrowly reddened at apex. Male genitalia: Figure 160.

REMARKS. - *Phytocoris vau* is distributed in the chaparral zone of southwestern California from San Diego County north to Los Angeles County. The host plant of this species is *Adenostoma fasciculatum* H.&A. Both sexes have been taken at light. I have examined 31 specimens with collection dates ranging from May 14 to August 1.

Phytocoris vinaceus Van Duzee

Figure 161

Phytocoris vinaceus Van Duzee, 1917b:263; Carvalho 1959:221; Knight 1968:249.

Phytocoris hyampom Bliven, 1966:115, pl. X, figs. 6,7 (NEW SYNONYMY).

TYPES AND TYPE LOCALITY. - *Phytocoris vinaceus* was described from an unspecified number of specimens collected in California by E.P. Van Duzee, W.M. Giffard, and F. Grinnell. The holotype male (No. 334), allotype (No. 335), and six paratypes (two nymphs) were taken near Hobergs, Lake Co., 2 & 3 August 1916. These specimens are retained in the Van Duzee Collection (CAS), except one female paratype deposited in the Knight Collection (USNM). Ten additional paratypes including three nymphs were examined from Lake, Placer, Riverside, and Sonoma counties; all are deposited in the Van Duzee Collection (CAS).

The junior synonym, *P. hyampom*, was described from nine specimens collected along the Van Duzen Road, Trinity Co., California, July and August, ex. *Arctostaphylos*, B.P. Bliven. The holotype male, 4 August 1957 (No. 13874); allotype, 12 August 1951 (No. 13874); and all seven paratypes are deposited in the collection of the CAS.

DIAGNOSIS. - *Phytocoris vinaceus* is readily distinguished from other species of the genus in western North America by the nearly uniform deep wine red general coloration of the body and legs. Externally, this species is most similar to *P. nicholi* of the *rostratus* group but differs by the deeper red coloration of the pronotum and hemelytra, and by the form of the male genitalia (fig. 161).

DESCRIPTION. - Length 4.9-6.2 mm; deep red general coloration; vestiture composed of black, simple setae intermixed with narrow, flattened, black setae and sparsely distributed, flattened, white setae. Head: deep red, frons often more grayish yellow with red tinge; frons moderately convex, meeting tylus along shallow indentation. Antennae: I, dark red to reddish brown with pale spots on dorsal aspect; II & III, reddish brown to fuscous, pale annulus at base and middle; IV, fuscous. Pronotum: pronotal disk brownish yellow, moderately to extensively marked with red or reddish brown, often becoming fuscous along basal submargin; calli grayish yellow, usually only lightly tinged with red; propleura brownish yellow, moderately to densely tinged with red. Scutellum and Hemelytra: uniformly dark red, often with yellowish cast; wing membrane infuscated, sometimes marked with pale spots, veins red. Legs: femora dark red or reddish brown, usually darkest near apex, marked with small pale spots; tibiae dark red or reddish brown with pale spots; front tibiae with three pale annuli. Male genitalia: Figure 161.

REMARKS. - *Phytocoris vinaceus* is widely distributed in the coastal mountain ranges and Sierra Nevada Mtns. of California, north to Curry, Josephine, Jackson, and Klamath counties in Oregon. A single specimen also was taken in Chelan Co., Washington suggesting the possibility of a northward extension of the distribution along the eastern slopes of the Cascade Range. The southernmost record is from San Diego Co. in California. The host plant of this species is

Arctostaphylos. I have examined 93 specimens with collection dates ranging from May 8 to September 23.

Based on the structure of the male genitalia (e.g., elongate basal process, simple sclerotized process, cylindrical left genital tubercle with bristle-like setae on dorsal surface), this species appears to be most closely related to members of the *conspurcatus* and *juniperanus* groups. However, *P. vinaceus* is much larger than most species of the *juniperanus* group, and lacks the sclerotized regions on the membranous lobes of the vesica that are characteristic of *conspurcatus* group species.

Species excluded from *Phytocoris*

Lygocoris scrophulariae (Bliven) NEW COMBINATION

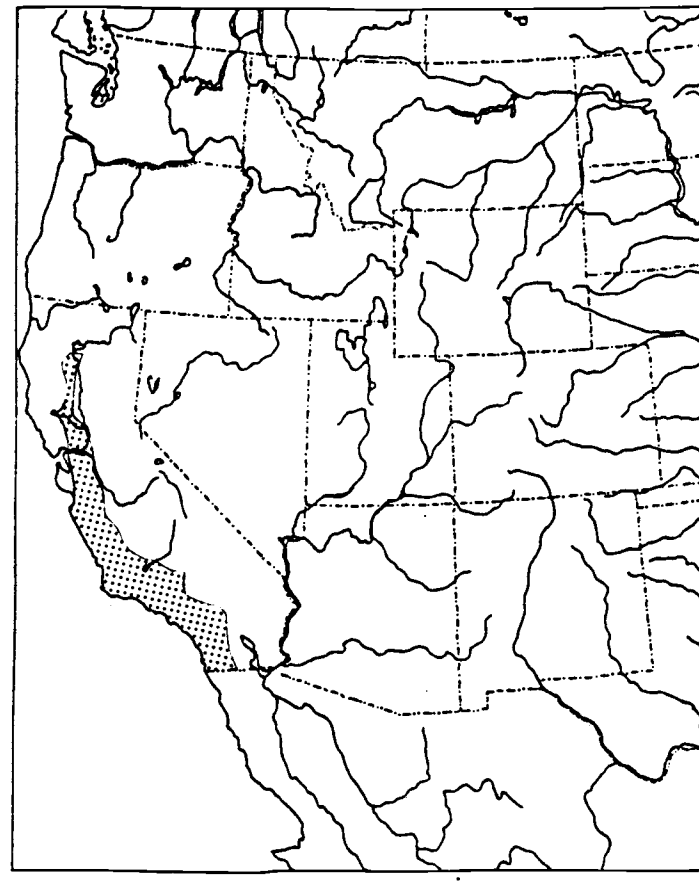
Phytocoris scrophulariae Bliven, 1956:15-16, pl. II, fig. 9.

TYPES AND TYPE LOCALITY. - The original description of *P. scrophulariae* is based on 28 specimens collected in Eureka, Humboldt Co., California by B.P. Bliven. The holotype (14 August 1948), allotype (2 October 1948), and 26 paratypes are retained in the collection of the CAS. Most of these specimens were collected from *Scrophularia californica* Cham & Schlecht.

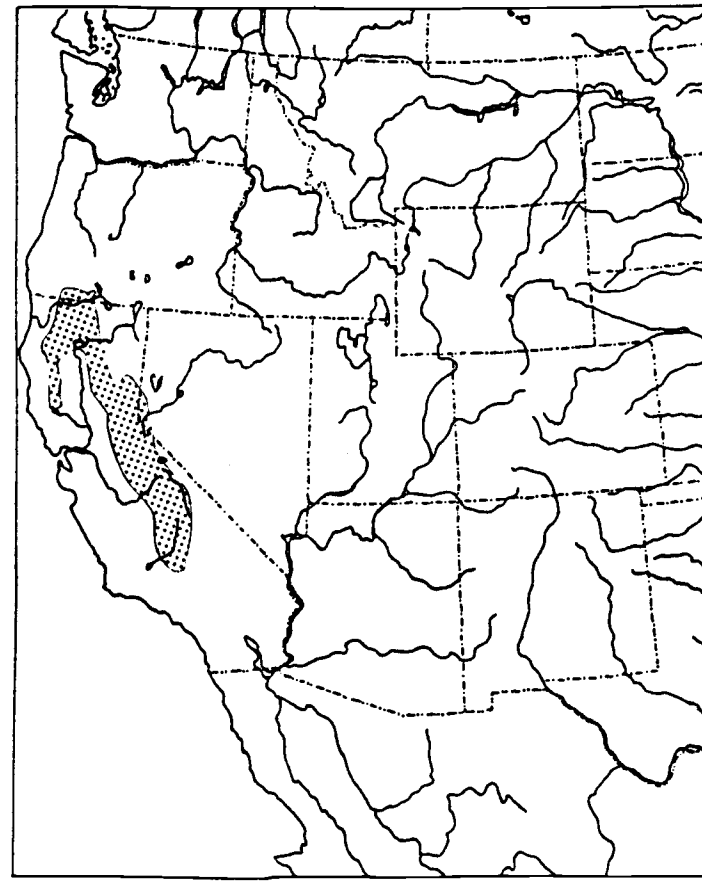
REMARKS. - I have examined all type material of *P. scrophulariae* and can now report that these specimens clearly belong to the genus *Lygocoris* Reuter. *Lygocoris scrophulariae* is very similar to *L. pabulinus* (Linnaeus) and it is likely that the two species are synonymous. The latter species is widely distributed in the Nearctic and Palearctic Regions (Clayton, 1982) and is reported from northern California by Kelton (1971).

Map 1. California Chaparral Province

Map 2. Sierran Forest Province



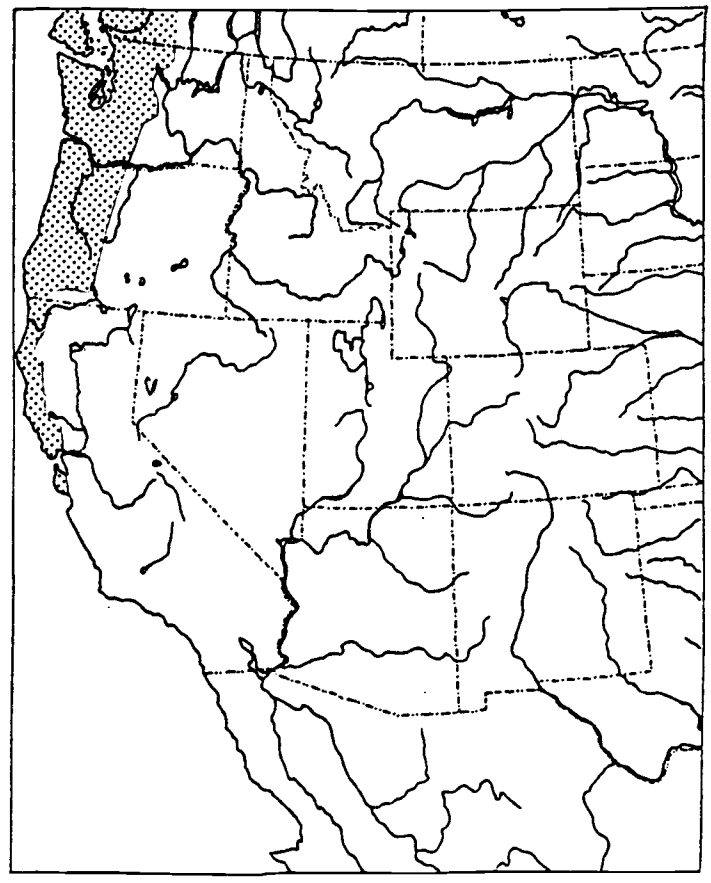
1



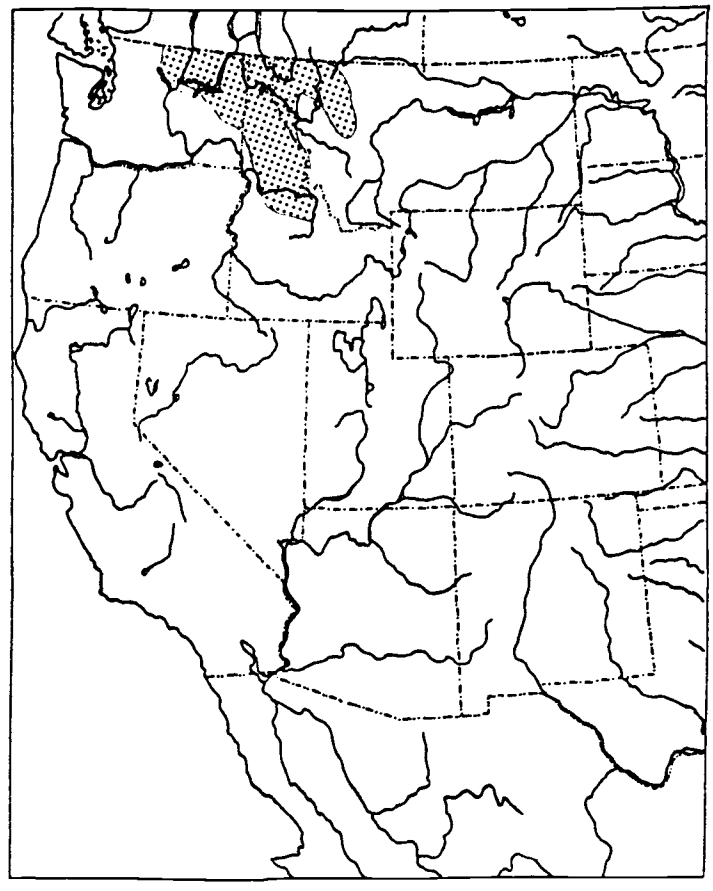
2

Map 3. Pacific Forest Province

Map 4. Columbia Forest Province



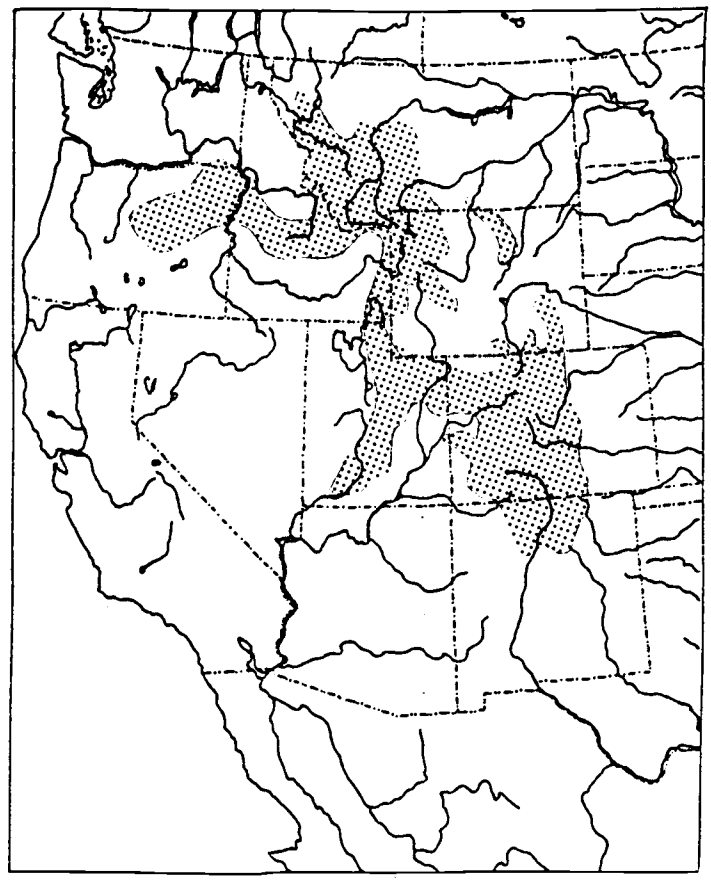
3



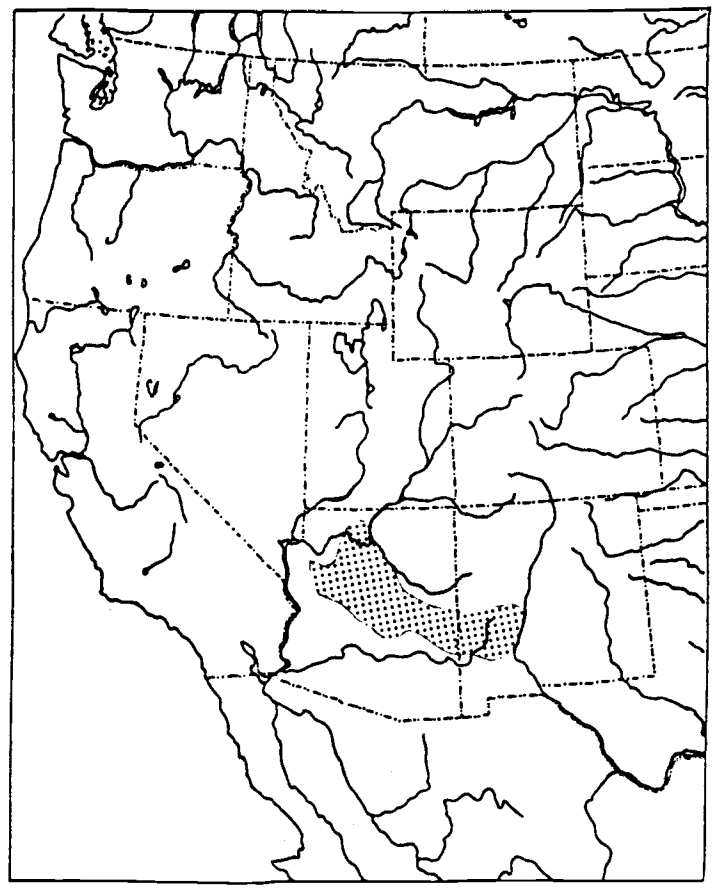
4

Map 5. Rocky Mountain Forest Province

Map 6. Upper Gila Mountains Forest Province



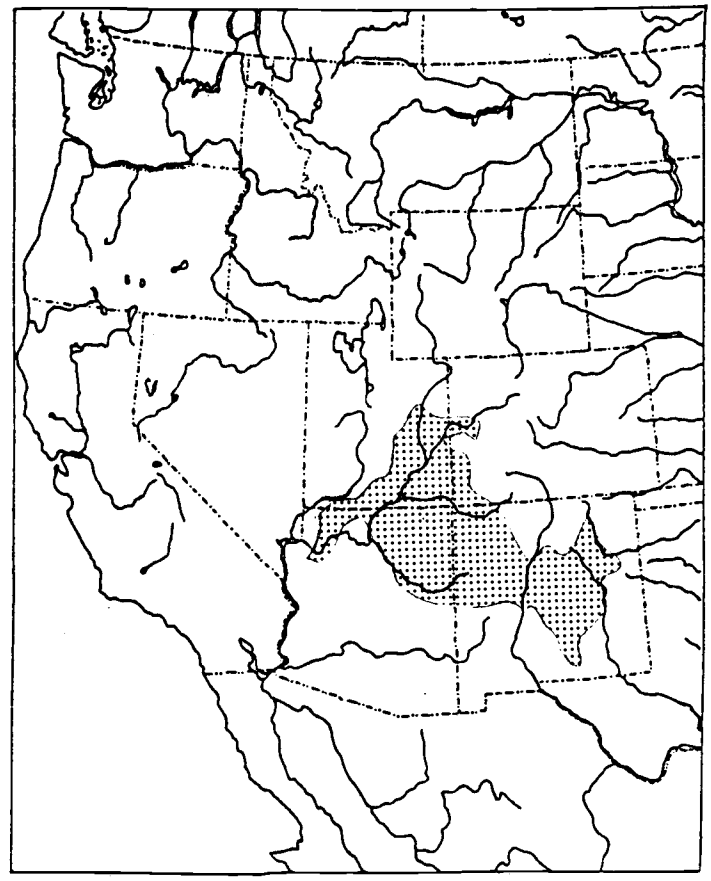
5



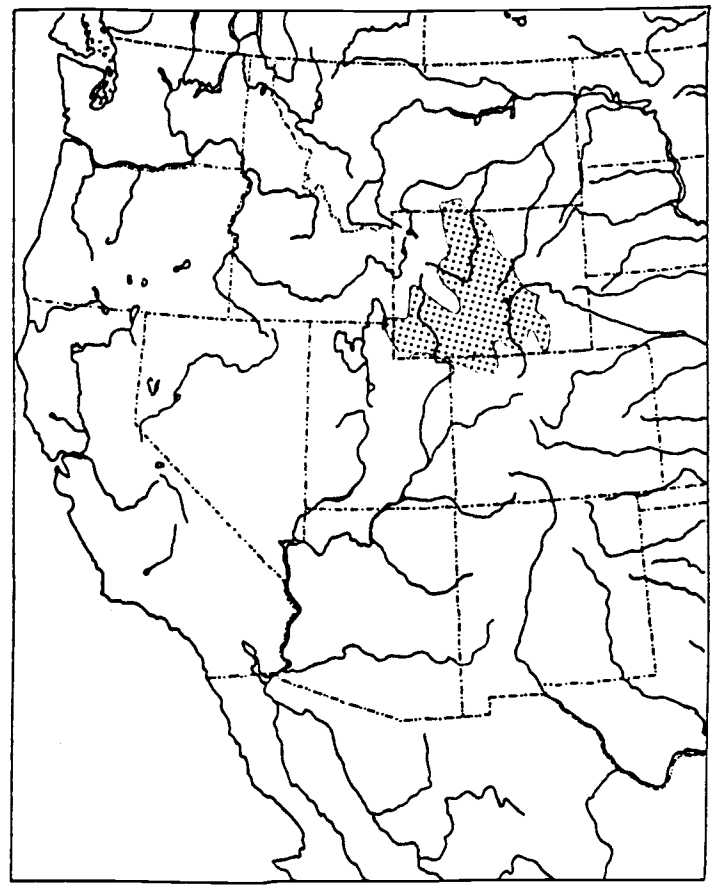
6

Map 7. Colorado Plateau Province

Map 8. Wyoming Basin Province



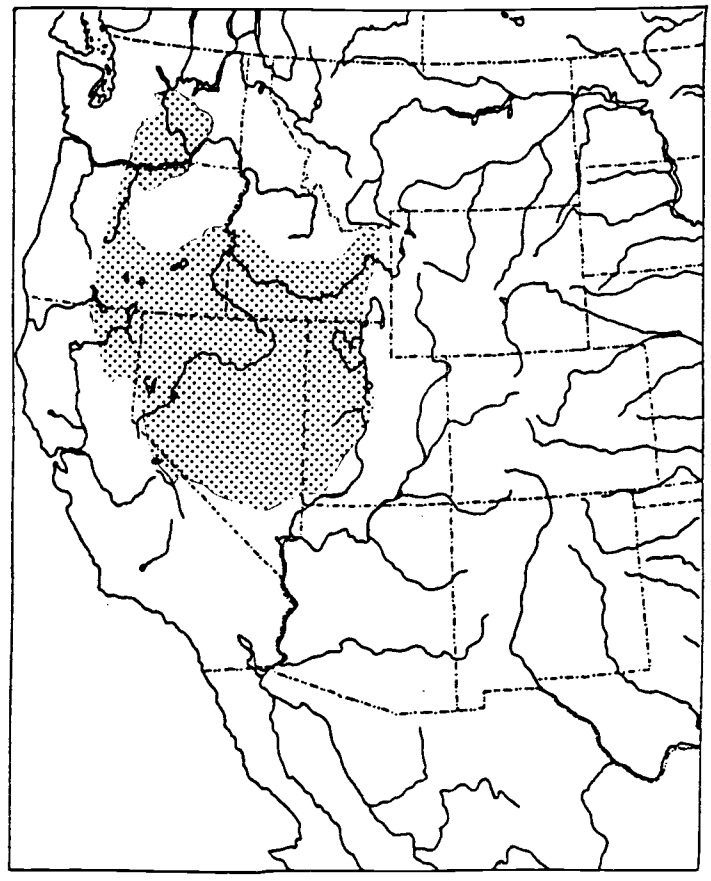
7



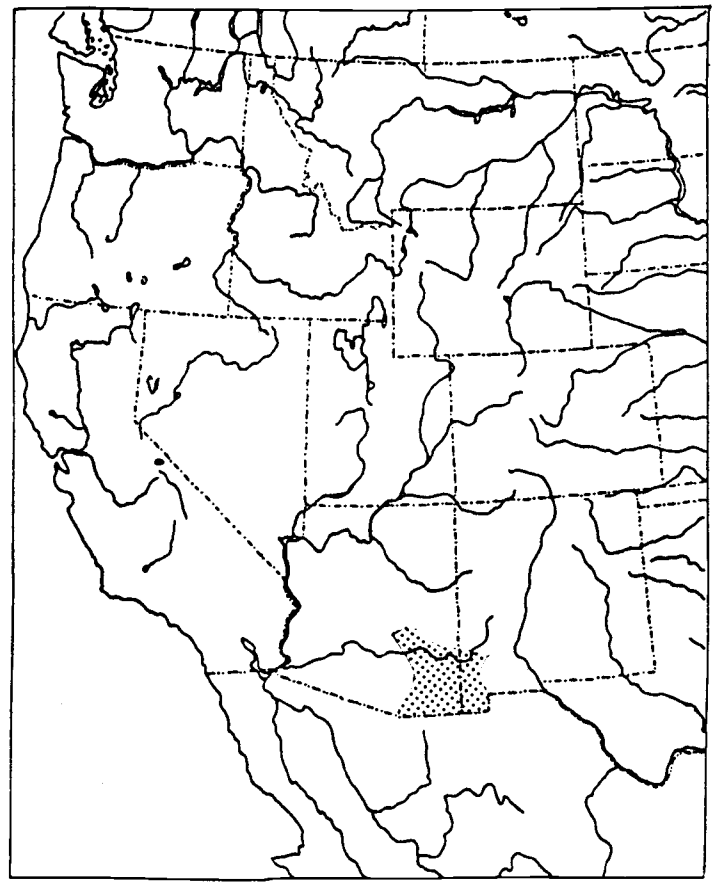
8

Map 9. Intermountain Sagebrush Province

Map 10. Mexican Highland Shrub Steppe Province



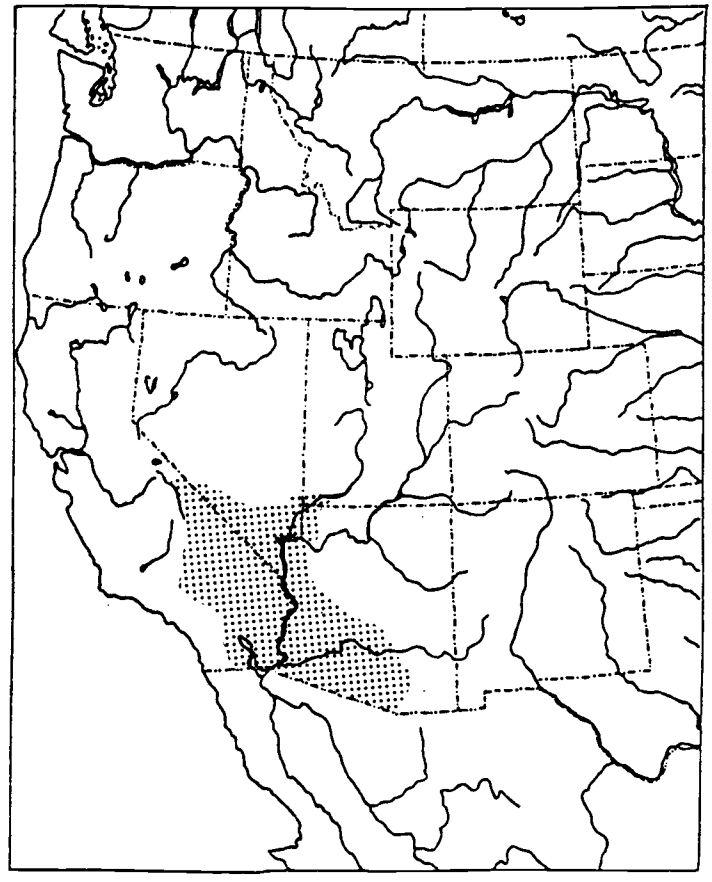
9



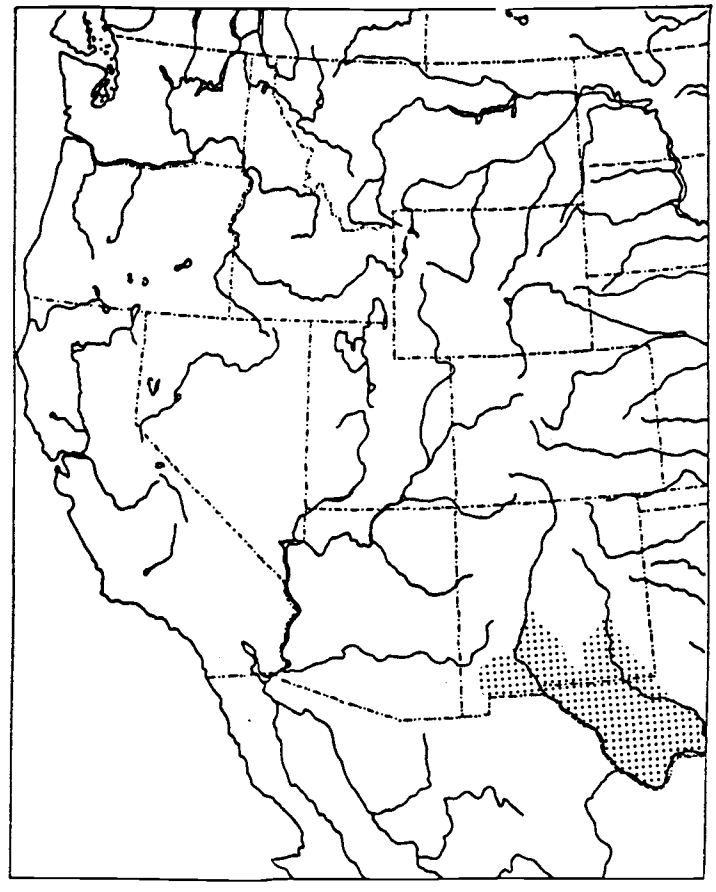
10

Map 11. American Desert Province

Map 12. Chihuahuan Desert Province

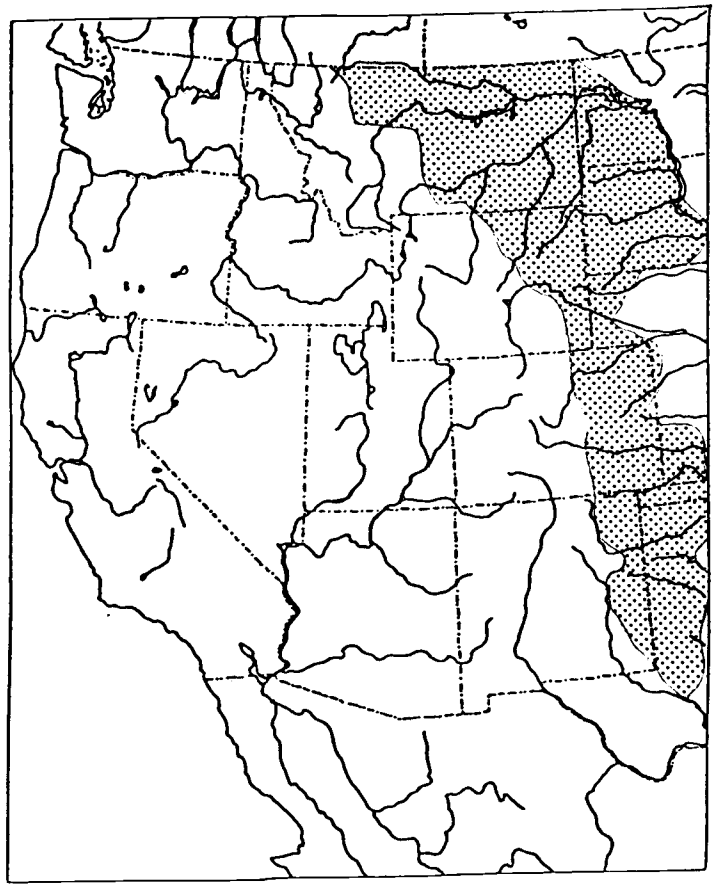


11



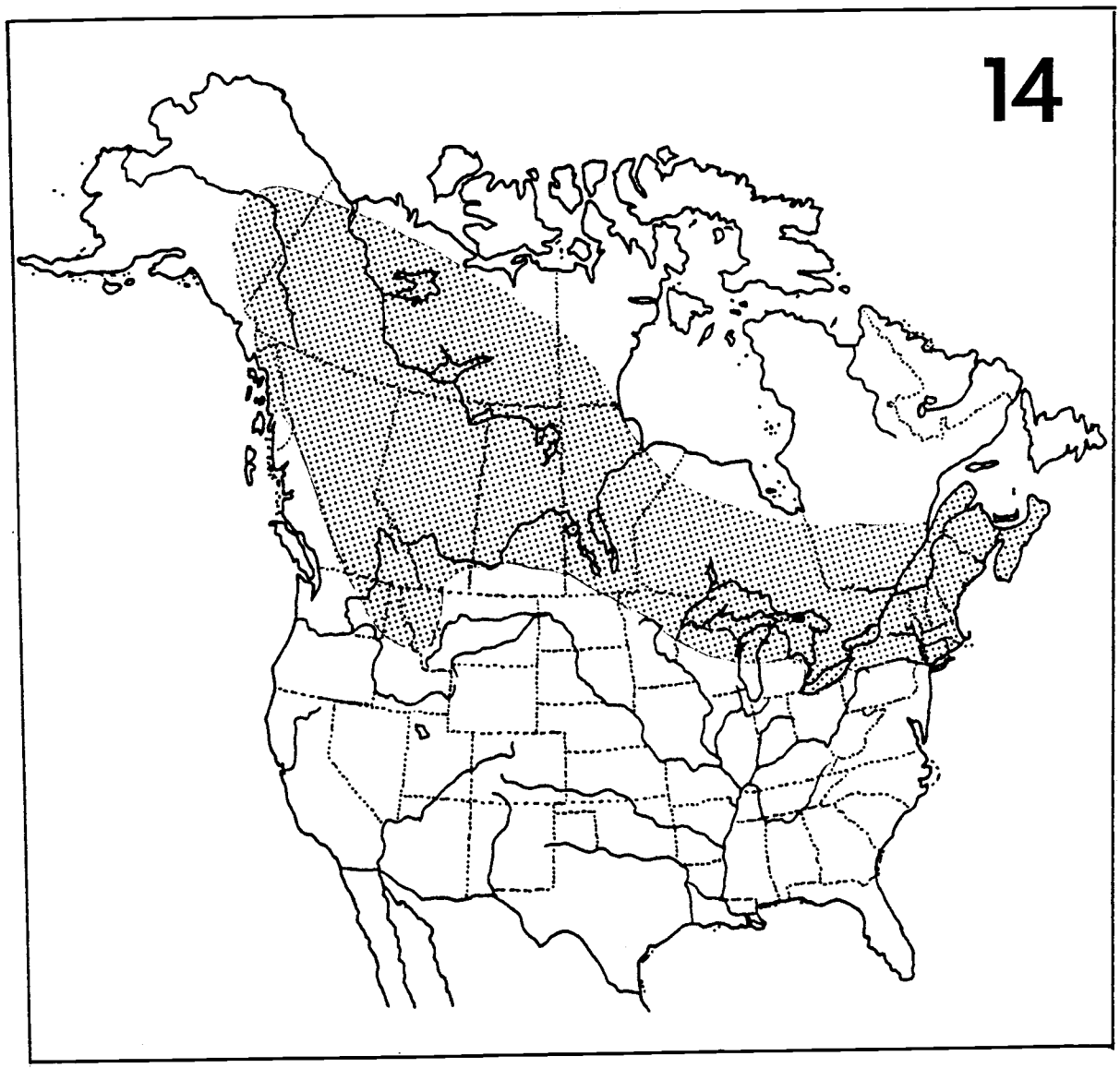
12

Map 13. Great Plains-Shortgrass Prairie Province



13

Map 14. Boreal (Northern) Distribution

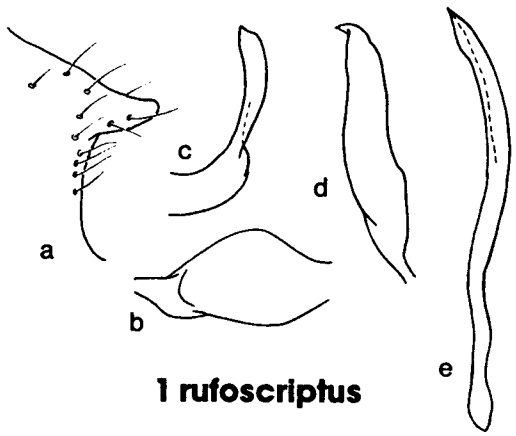

14

FIGURES OF MALE GENITAL STRUCTURES

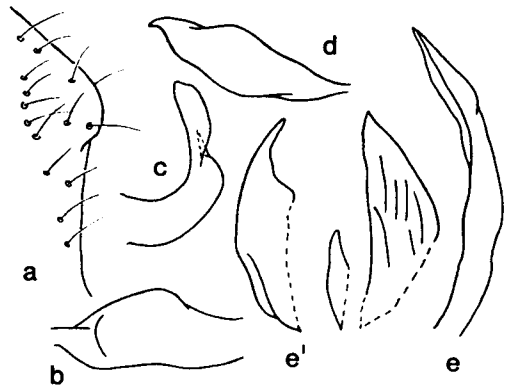
Figures 1-5. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. *cunealis* group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

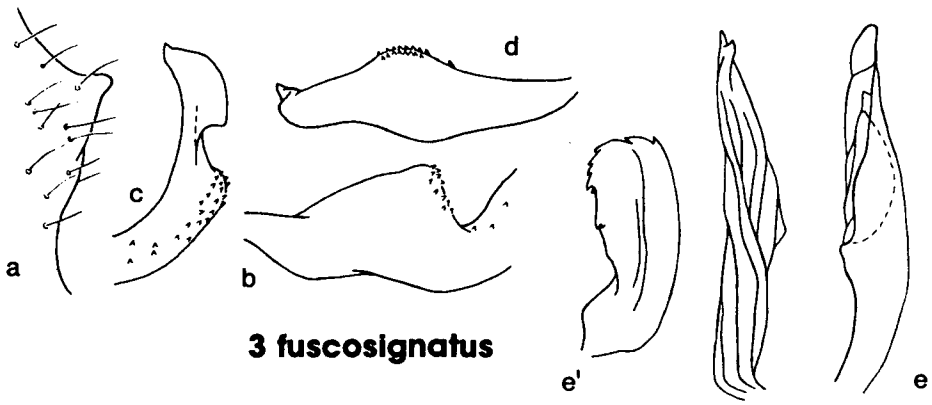
1. *P. rufoscriptus* (1)
2. *P. rubrimaculatus* (1)
3. *P. fuscosignatus* (1)
4. *P. sewardi* (1)
5. *P. hettenshawi* (1)



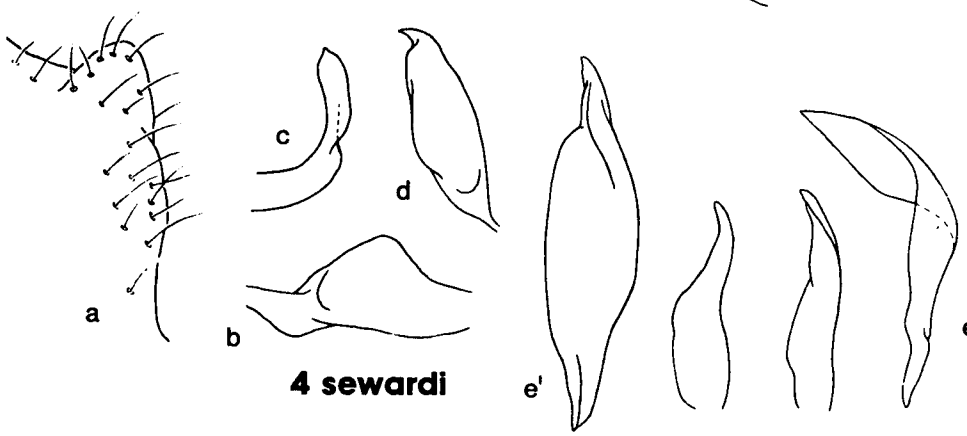
1 rufoscriptus



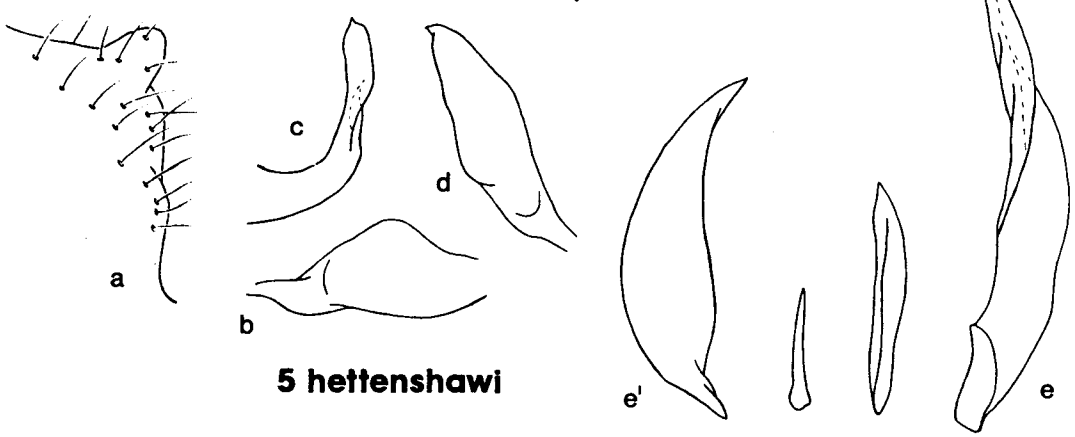
2 rubrimaculatus



3 fuscosignatus



4 sewardi

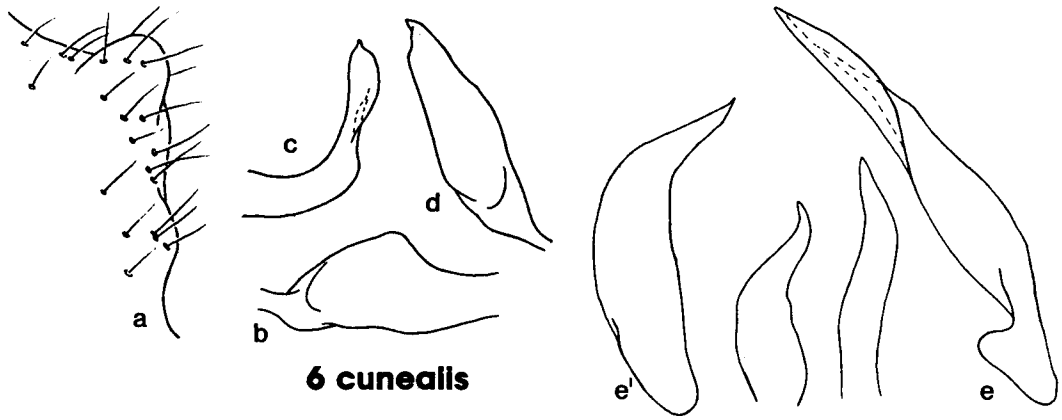


5 hettenshawi

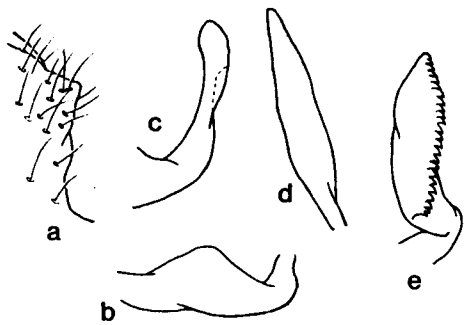
Figures 6-11. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

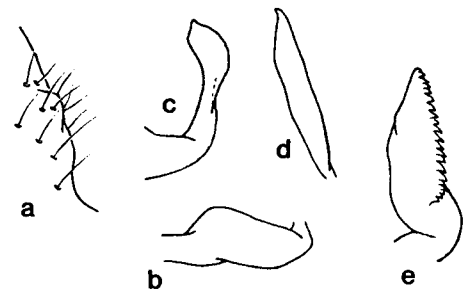
6. P. cunealis (1)
7. P. lasiomerus (1)
8. P. pallidicornis (1)
9. P. rubropictus (1)
10. P. validus (1)
11. P. planituberis (1)



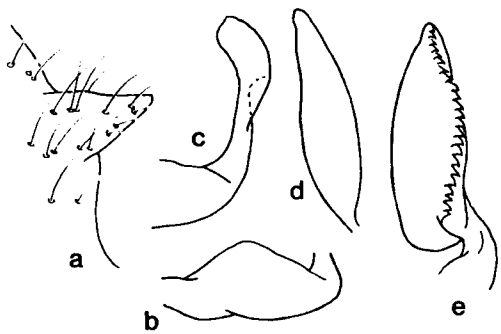
6 cunealis



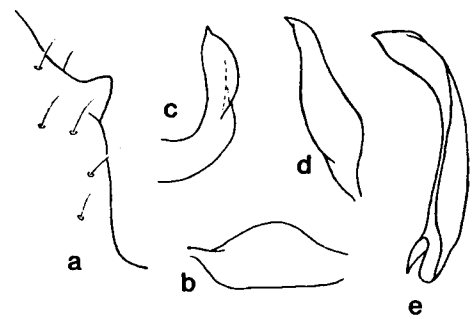
7 lasiomerus



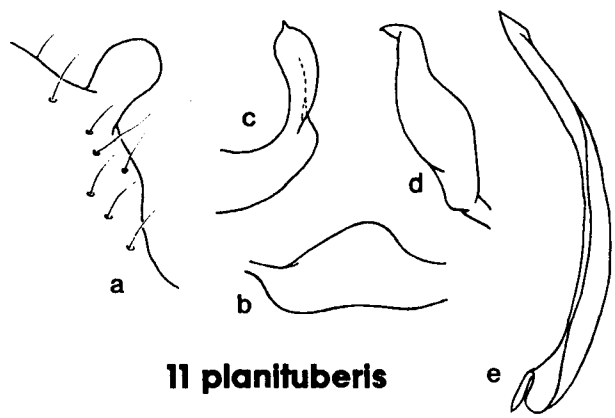
8 pallidicornis



9 rubropictus



10 validus

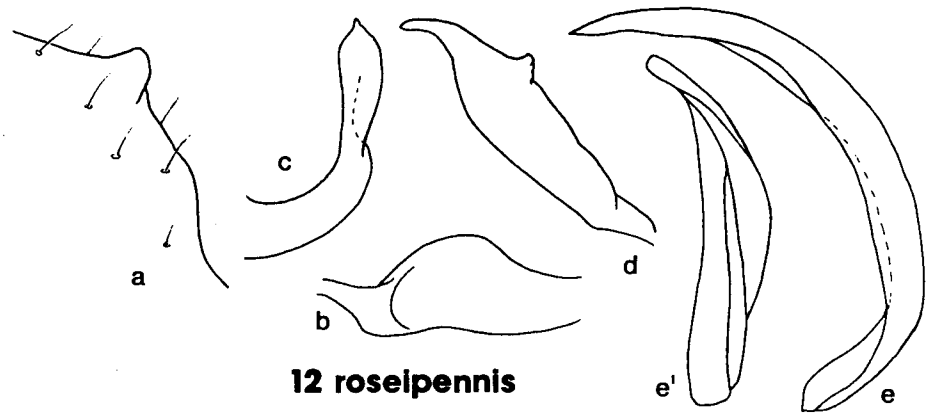


11 planituberis

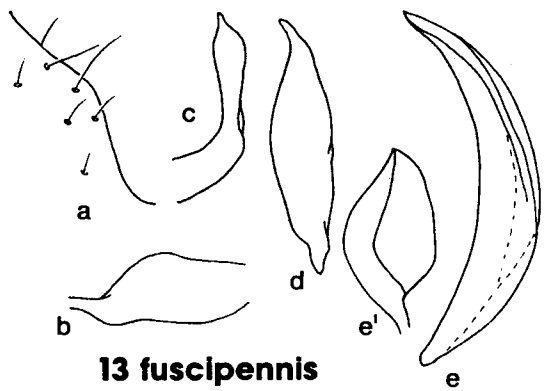
Figures 12-17. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

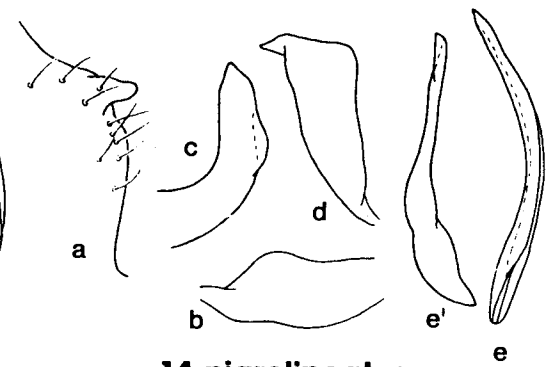
12. P. roseipennis (1)
13. P. fuscipennis (1)
14. P. nigrolineatus (1)
15. P. cinereus (1)
16. P. hopi (1)
17. P. sonorensis (1)



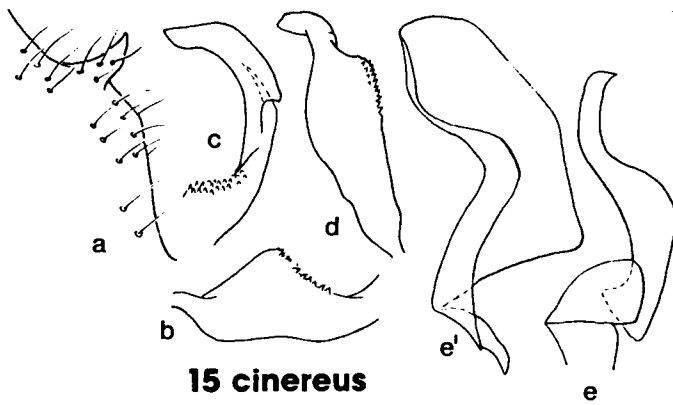
12 roseipennis



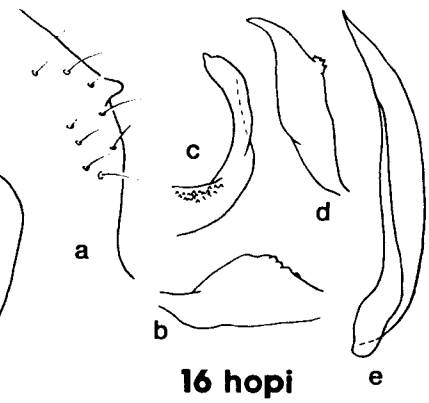
13 fuscipennis



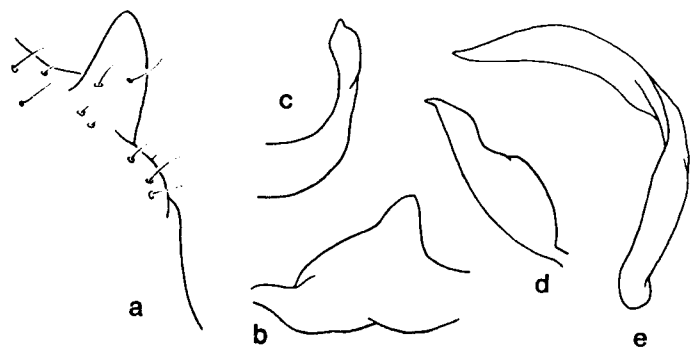
14 nigrolineatus



15 cinereus



16 hopi

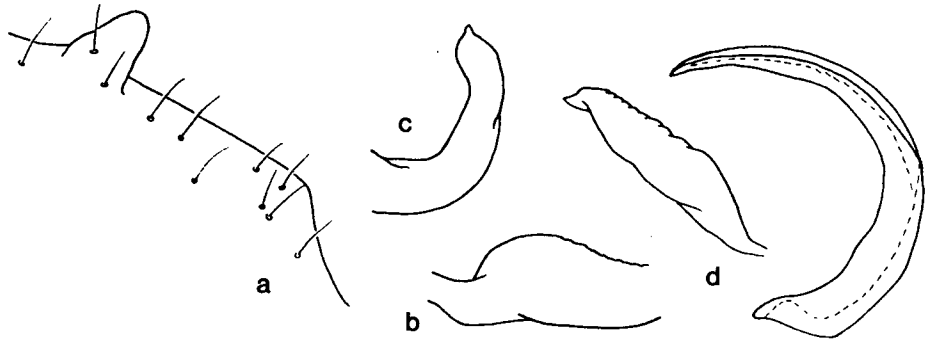


17 sonorensis

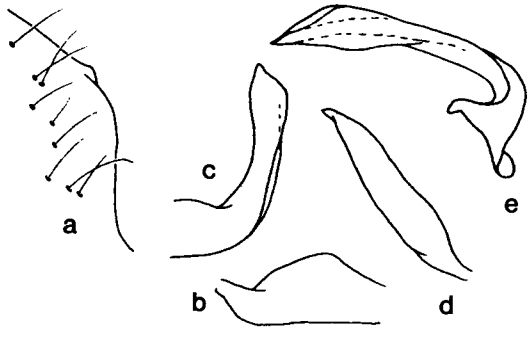
Figures 18-24. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

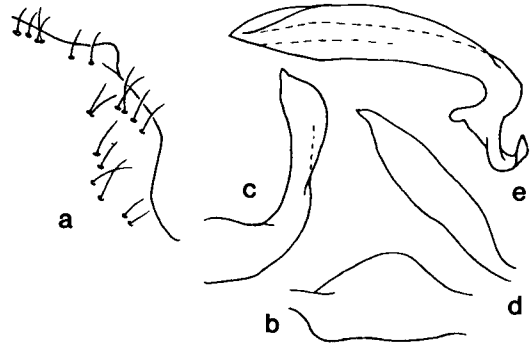
18. P. apache (1)
19. P. geniculatus (2)
20. P. consors (2)
21. P. nicholi (2)
22. P. beameri (2)
23. P. maricopae (2)
24. P. baboquivarii (2)



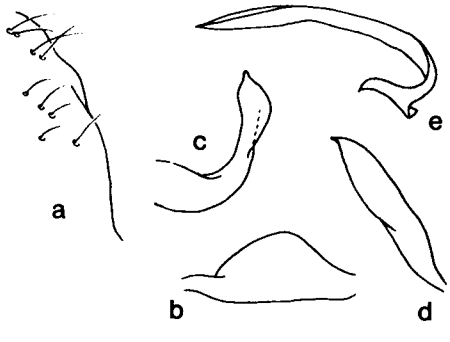
18 apache



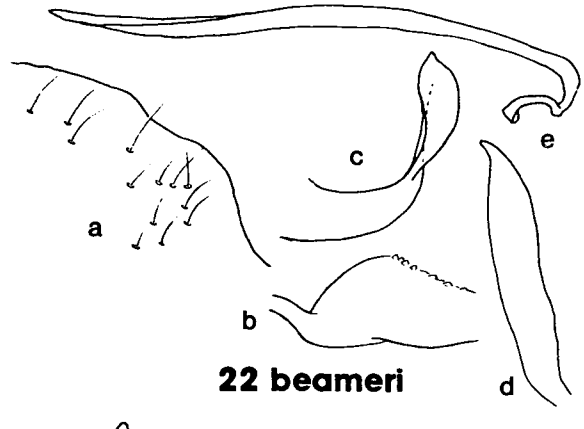
19 geniculatus



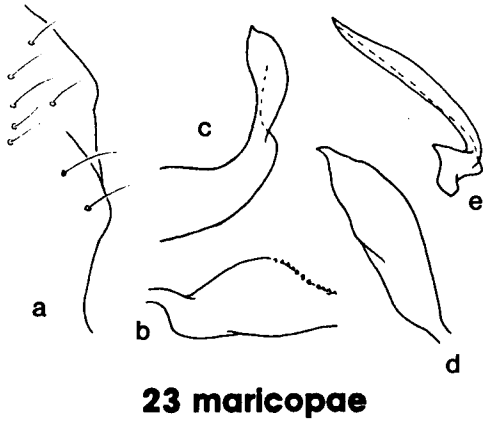
20 consors



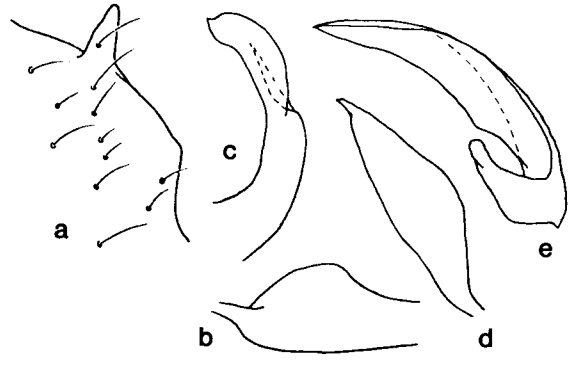
21 nicholi



22 beameri



23 maricopae

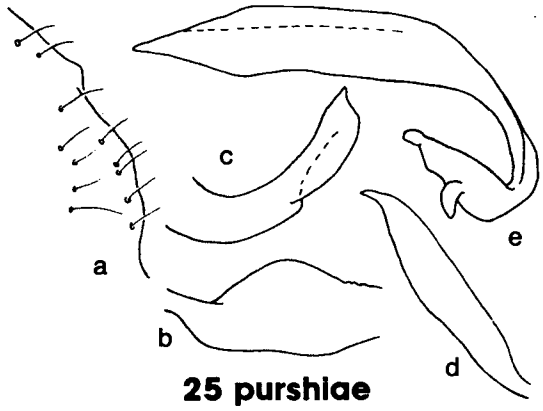


24 baboquivarii

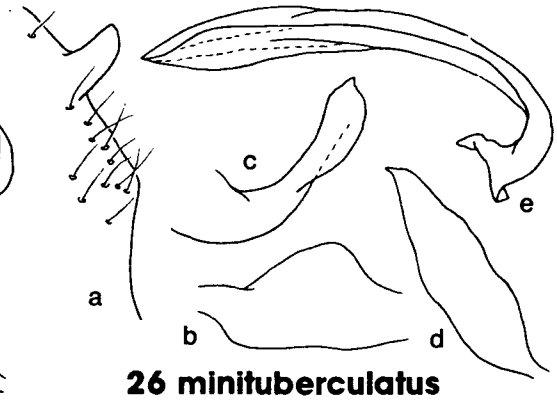
Figures 25-31. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

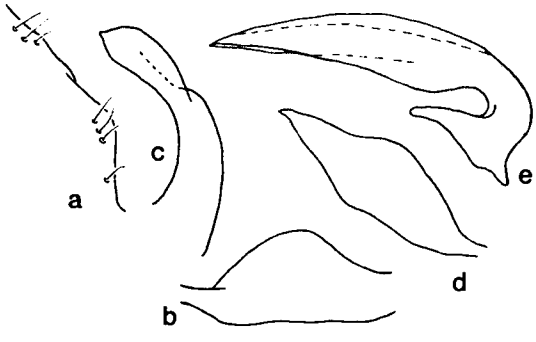
25. P. purshiae (2)
26. P. minituberculatus (2)
27. P. sublineatus (2)
28. P. rostratus (2)
29. P. deserticola (2)
30. P. arizonensis (2)
31. P. ejuncidus (2)



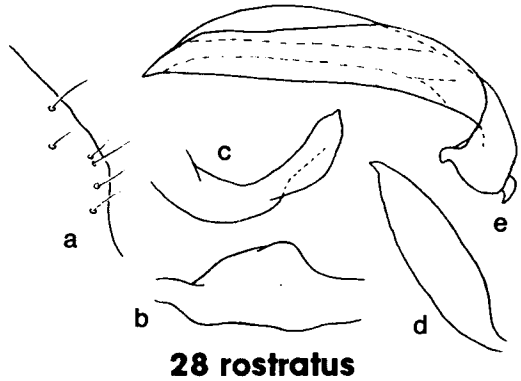
25 purshiae



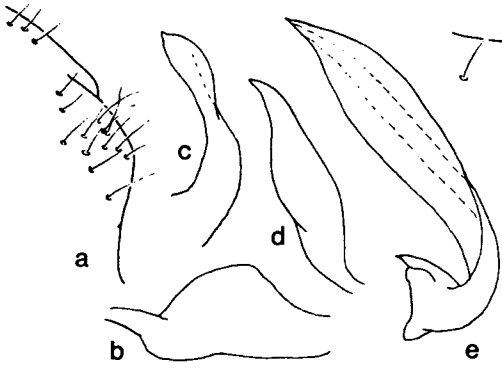
26 minituberculatus



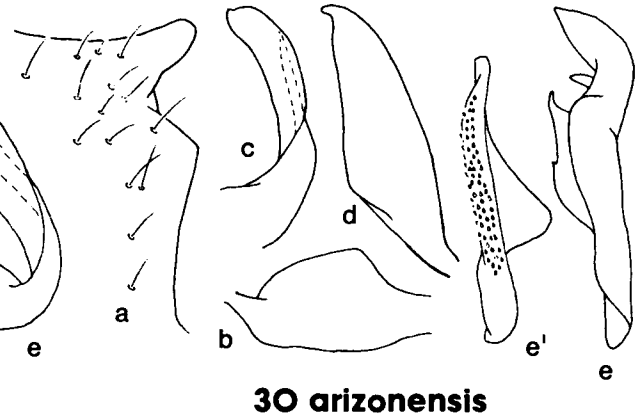
27 sublineatus



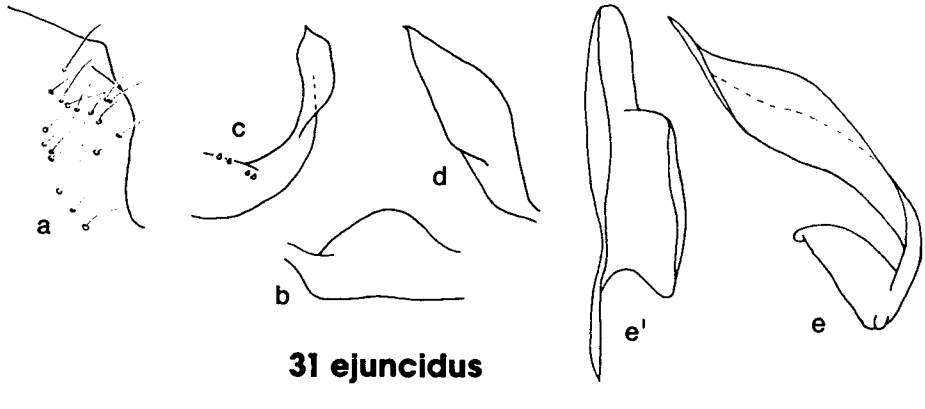
28 rostratus



29 deserticola



30 arizonensis

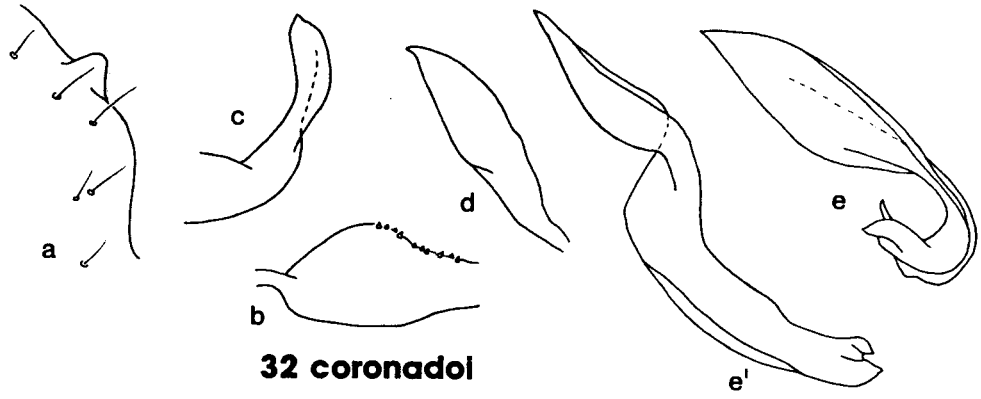


31 ejuncidus

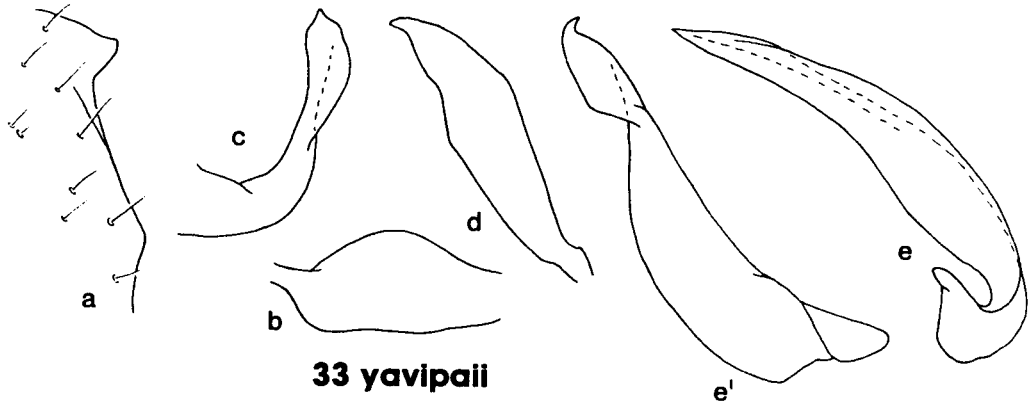
Figures 32-37. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

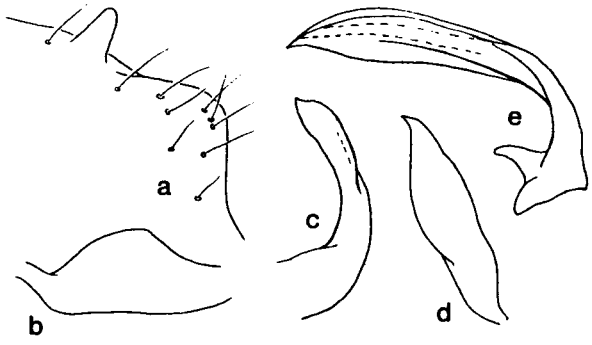
32. P. coronadoi (2)
33. P. yavapaii (2)
34. P. strigosus (2)
35. P. pintoi (2)
36. P. yuma (2)
37. P. difformis (2)



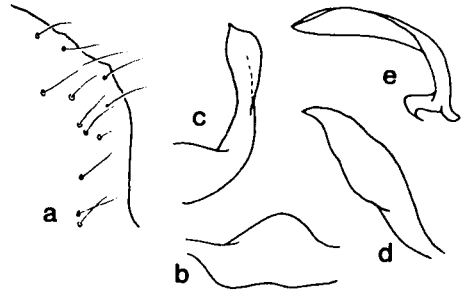
32 coronadoi



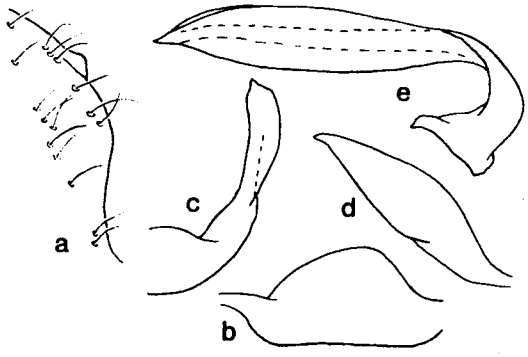
33 yavipaii



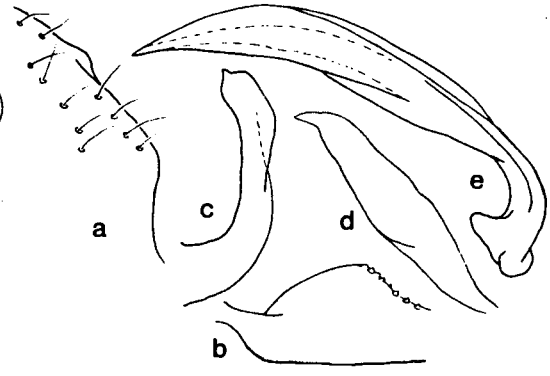
34 strigosus



35 pintoi



36 yuma

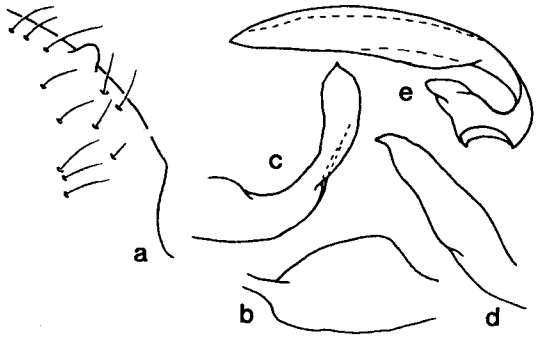


37 difformis

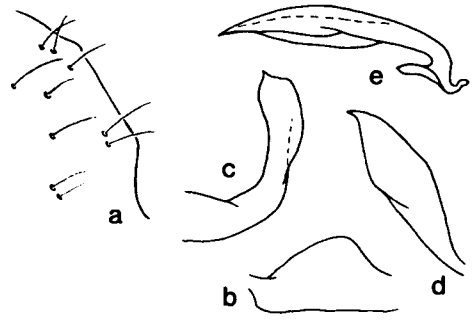
Figures 38-46. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

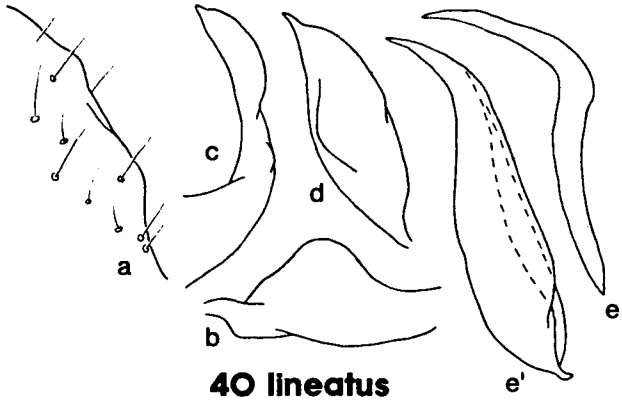
38. P. borregoi (2)
39. P. catalinae (2)
40. P. lineatus (2)
41. P. torridus (2)
42. P. albidopictus (2)
43. P. pulchricollis (2)
44. P. candidus (2)
45. P. squamosus (2)
46. P. albidosquamus (2)



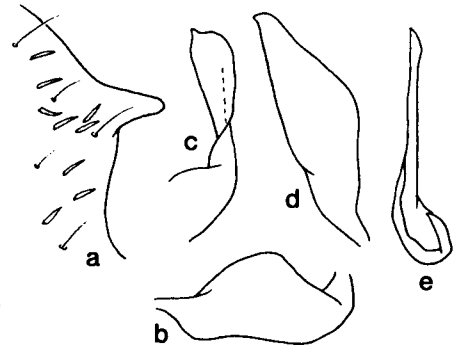
38 borregoi



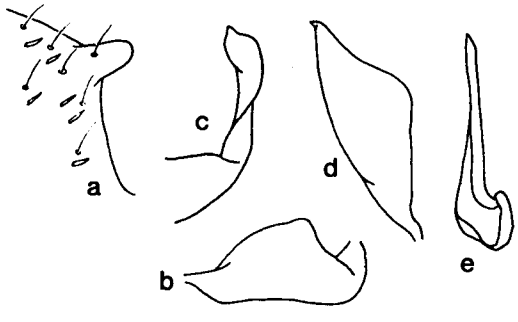
39 catalinae



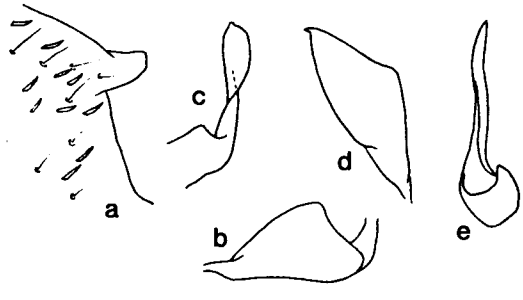
40 lineatus



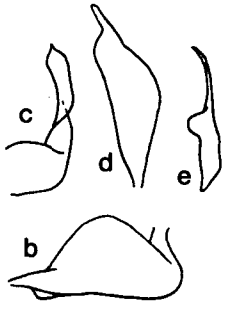
41 torridus



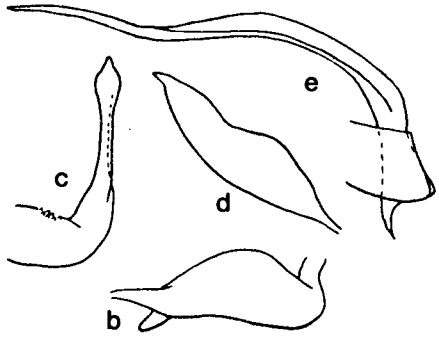
42 albidopictus



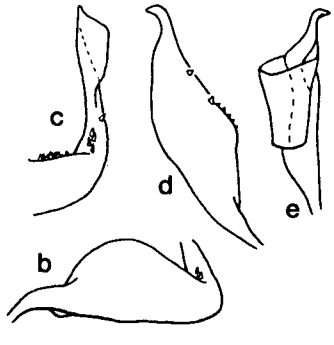
43 pulchricollis



44 candidus



45 squamosus

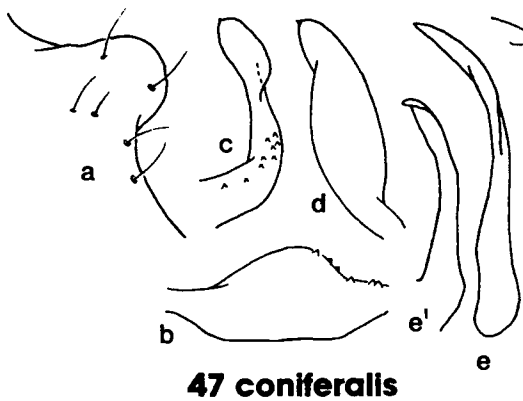


46 albidosquamus

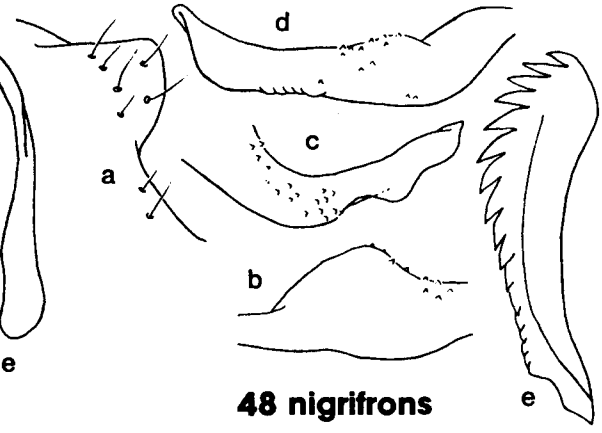
Figures 47-54. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

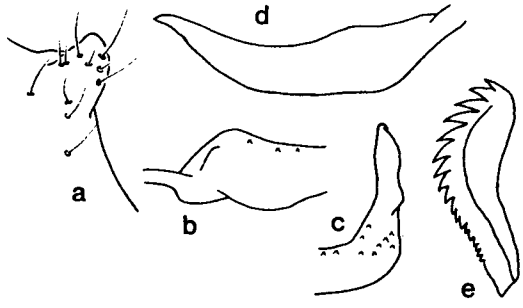
47. P. coniferalis (1)
48. P. nigrifrons (1)
49. P. nobilis (1)
50. P. tricinctipes (1)
51. P. alpinus (1)
52. P. yollabollae (1)
53. P. knowltoni (1)
54. P. usingeri (1)



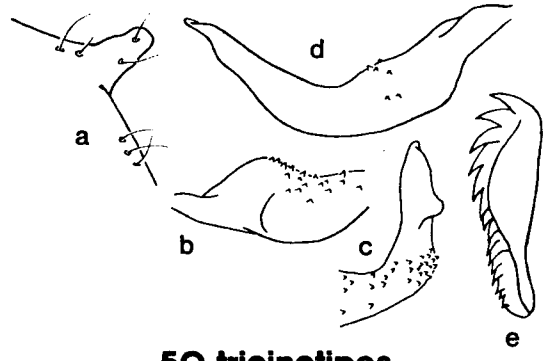
47 coniferalis



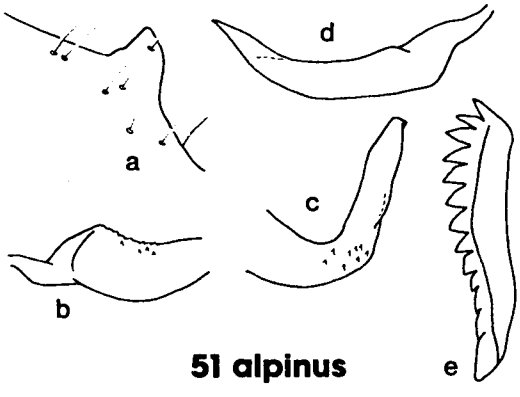
48 nigrifrons



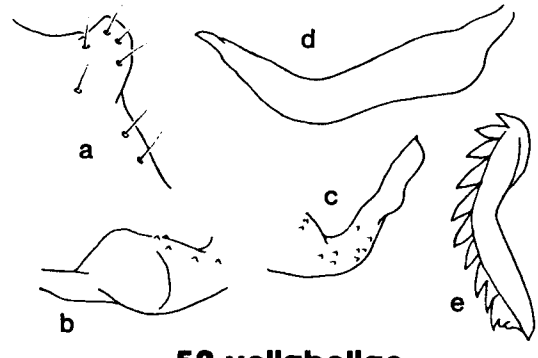
49 nobilis



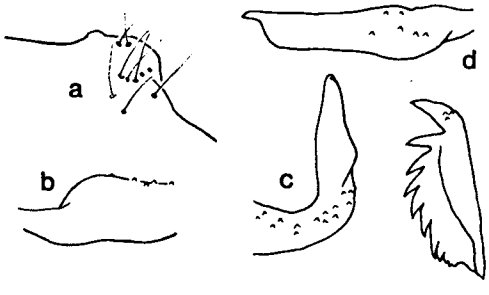
50 tricinctipes



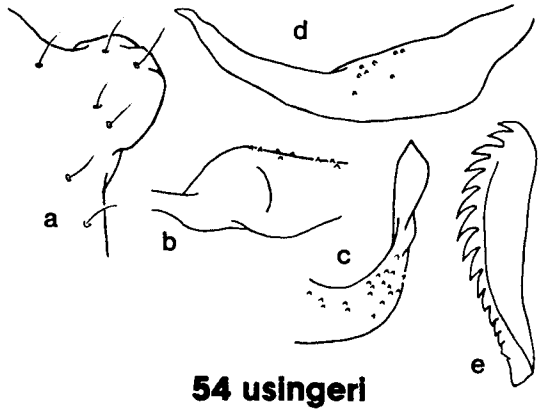
51 alpinus



52 yollabollae



53 knowltoni

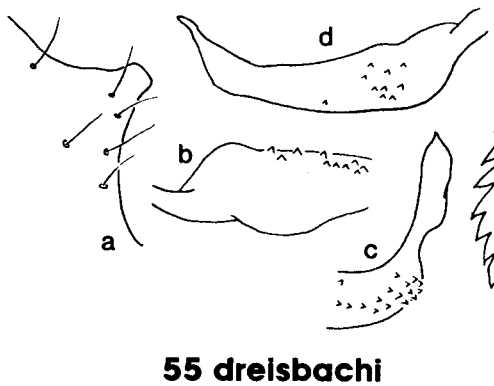


54 usingeri

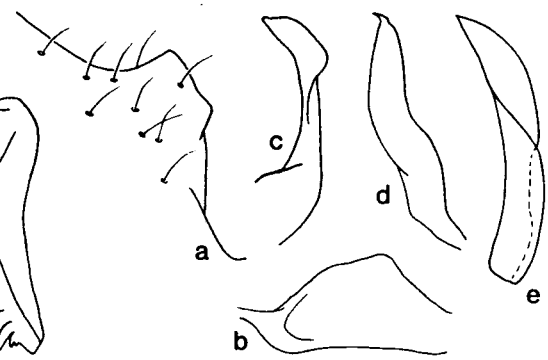
Figures 55-62. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

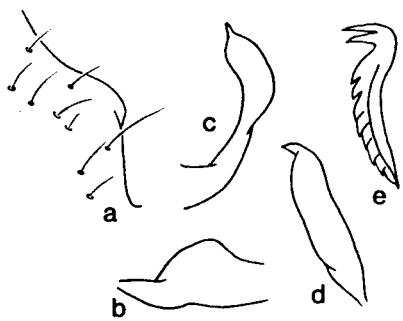
55. P. dreisbachi (1)
56. P. carnosulus (2)
57. P. hispidus (2)
58. P. albicuneatus (2)
59. P. listi (2)
60. P. longihirtus (1)
61. P. electilis (2)
62. P. conspicuus (1)



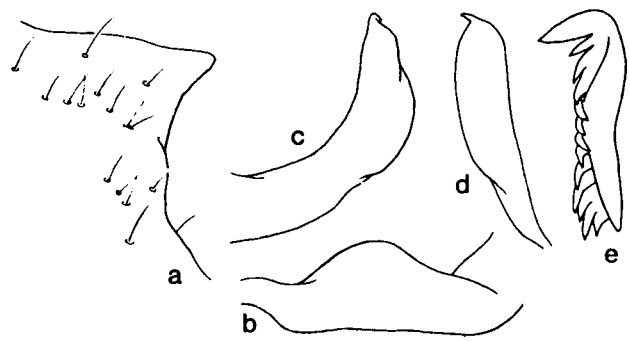
55 dreisbachi



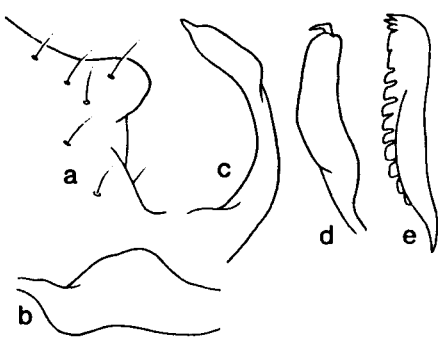
56 carnosulus



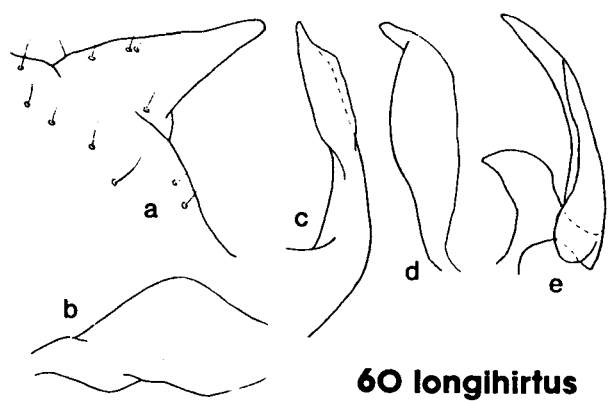
57 hispidus



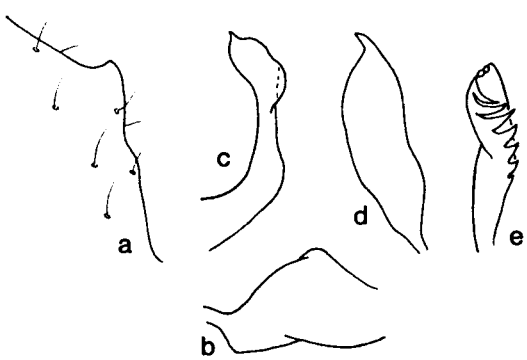
58 albicuneatus



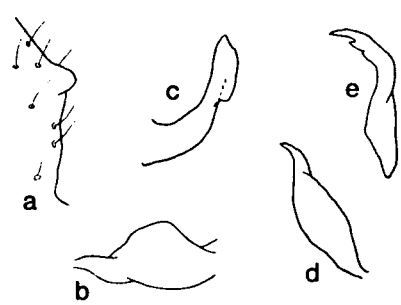
59 listi



60 longihirtus



61 electilis

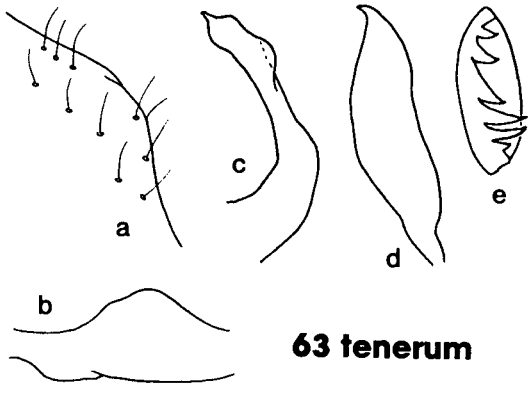


62 conspicuus

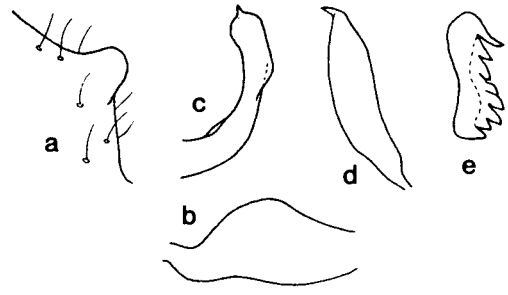
Figures 63-70. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. *cunealis* group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

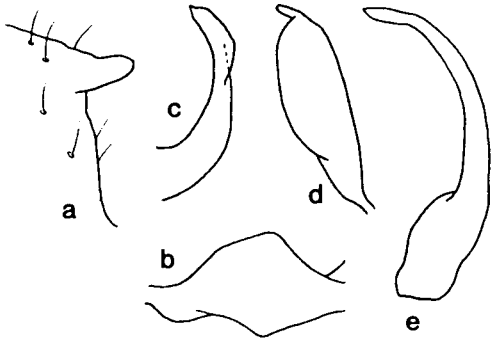
63. *P. tenerum* (2)
64. *P. breviatus* (2)
65. *P. desertinus* (1)
66. *P. reticulatus* (1)
67. *P. aridus* (1)
68. *P. bakeri* (2)
69. *P. formosus* (2)
70. *P. ingens* (1)



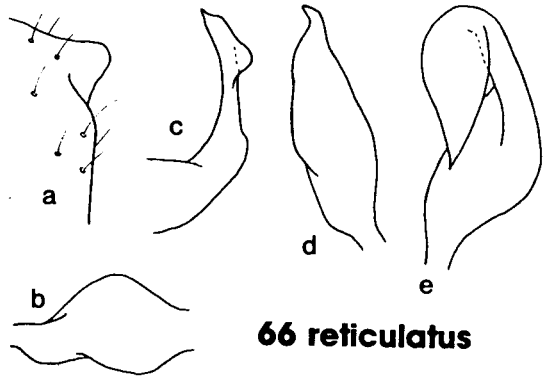
63 tenerum



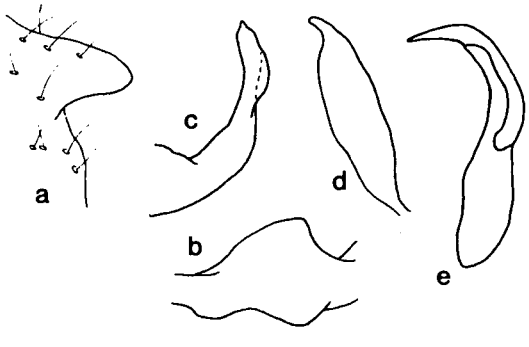
64 breviatus



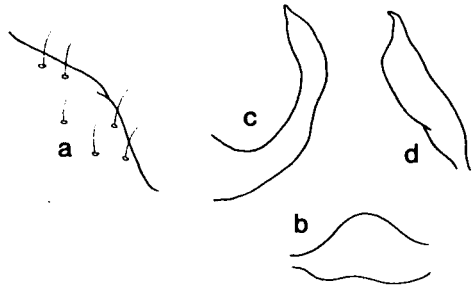
65 desertinus



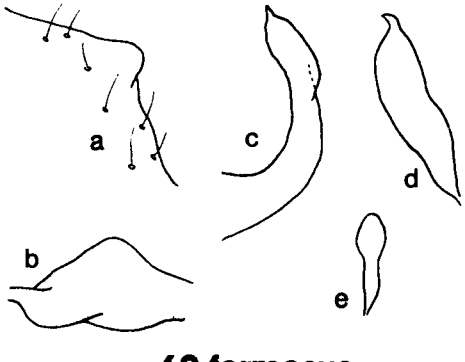
66 reticulatus



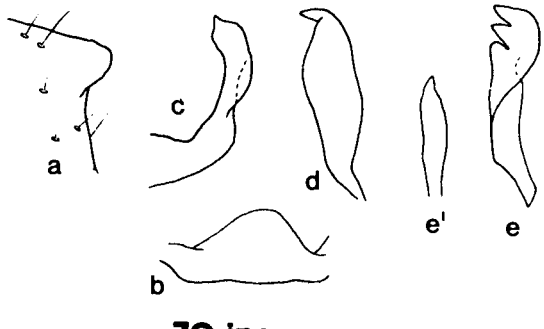
67 aridus



68 bakeri



69 formosus

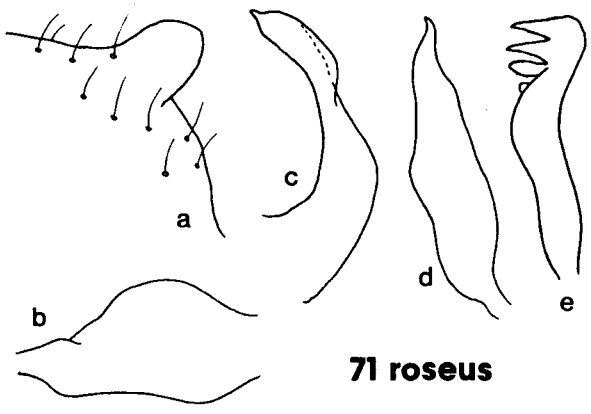


70 ingens

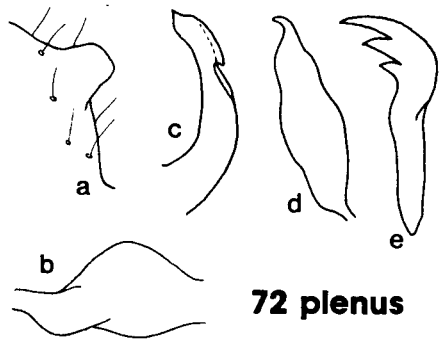
Figures 71-78. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

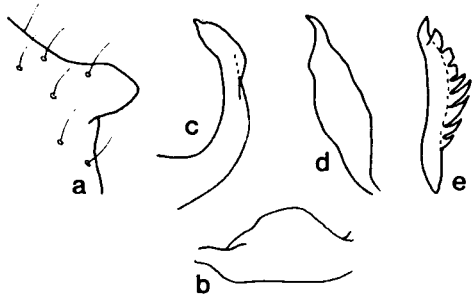
71. P. roseus (2)
72. P. plenus (1)
73. P. solanoi (1)
74. P. hirtus (1)
75. P. stitti (1)
76. P. megatuberis (1)
77. P. quadriannulipes (1)
78. P. hirsuticus (1)



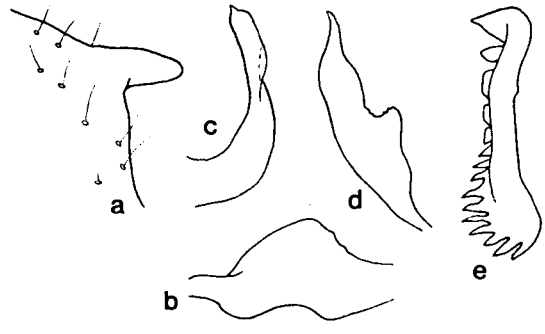
71 roseus



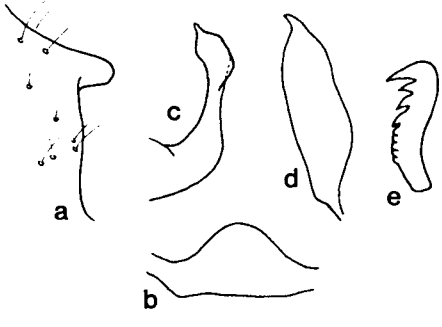
72 plenus



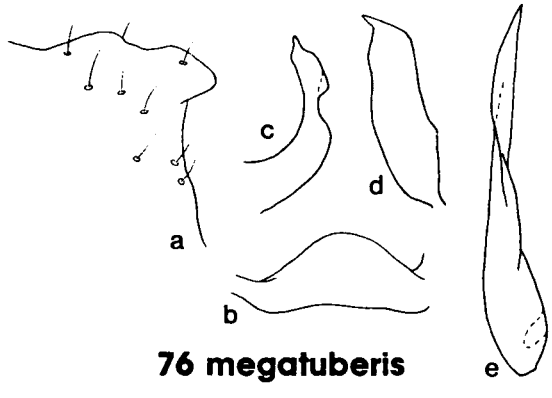
73 solanoi



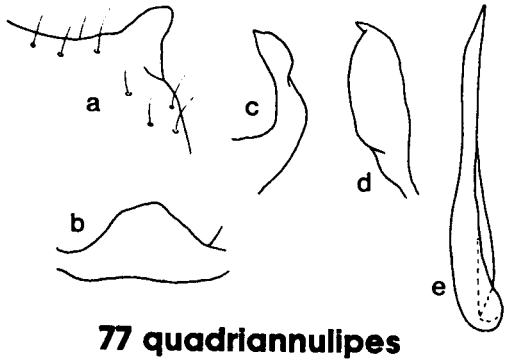
74 hirtus



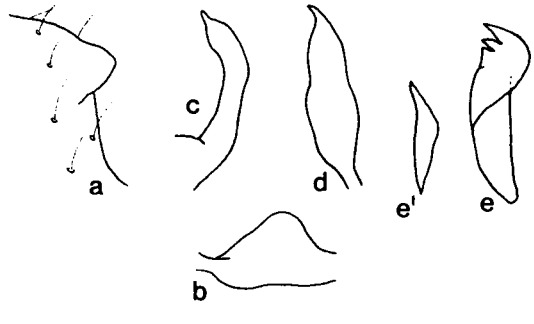
75 stitti



76 megatuberis



77 quadriannulipes

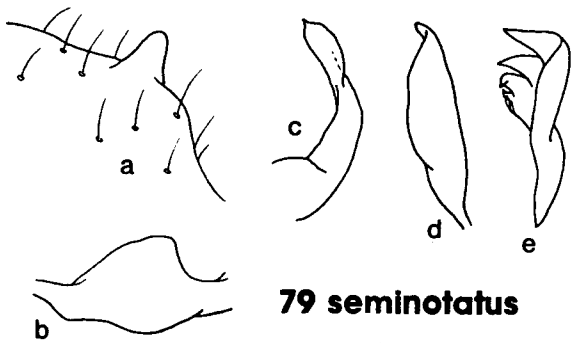


78 hirsuticus

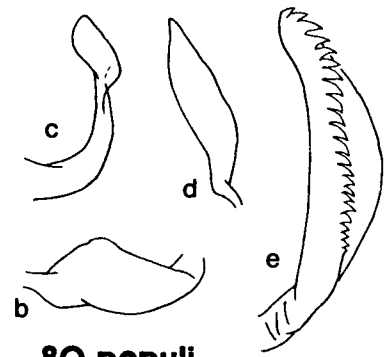
Figures 79-86. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

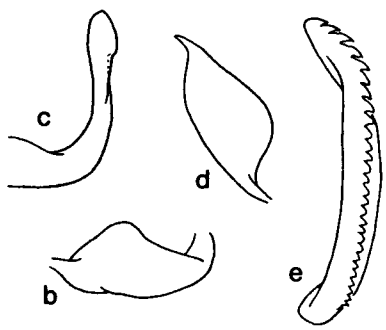
79. P. seminotatus (1)
80. P. populi (1)
81. P. tiliae (1)
82. P. dimidiatus (1)
83. P. navajo (2)
84. P. interspersus (2)
85. P. kiowa (2)
86. P. viridescens (2)



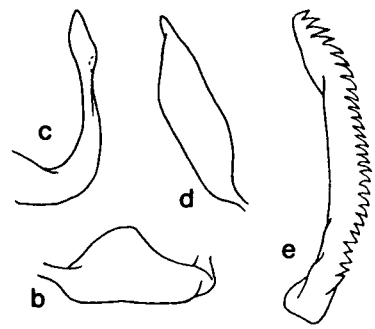
79 seminotatus



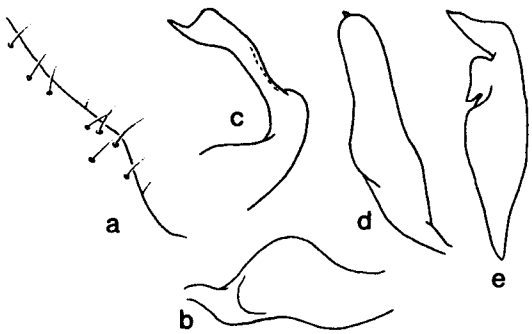
80 populi



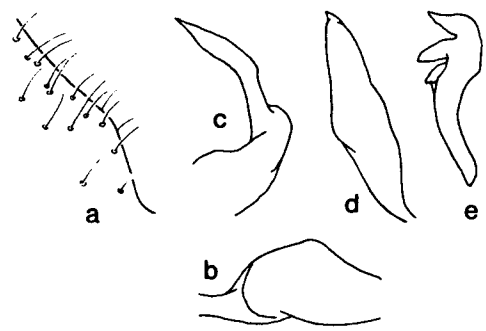
81 tiliae



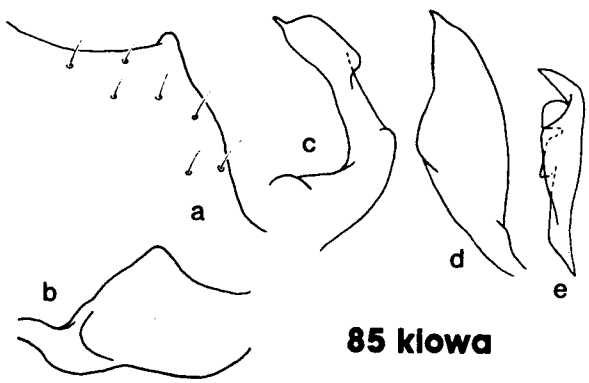
82 dimidiatus



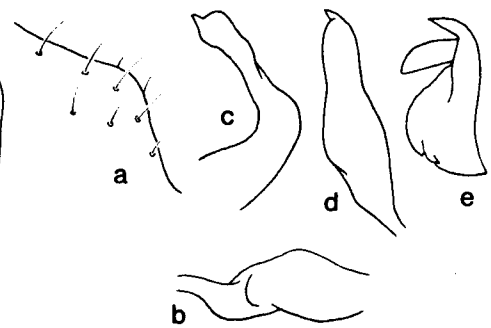
83 navajo



84 interspersus



85 kiowa

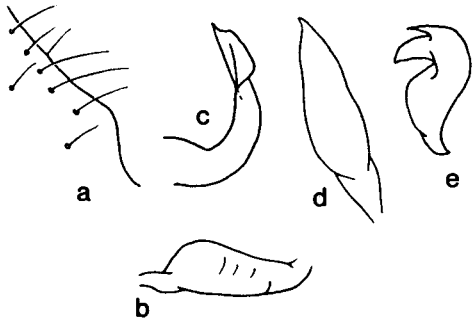


86 viridescens

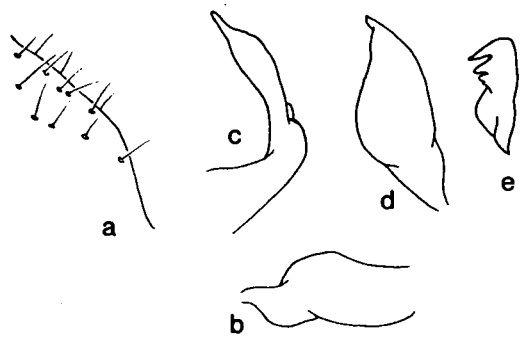
Figures 87-94. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

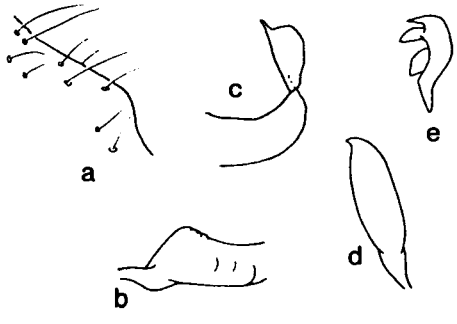
87. P. stellatus (2)
88. P. angusticollis (2)
89. P. alpestris (2)
90. P. pulchellus (2)
91. P. rubroornatus (2)
92. P. gracillatus (1)
93. P. laevis (1)
94. P. rolfsi (1)



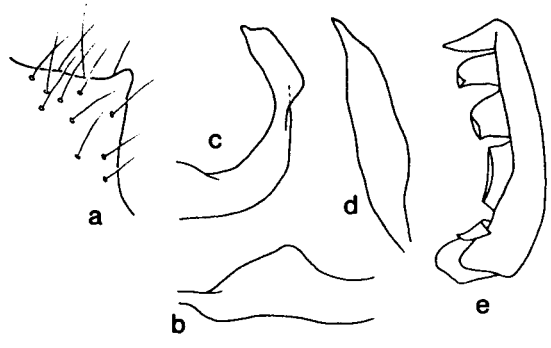
87 stellatus



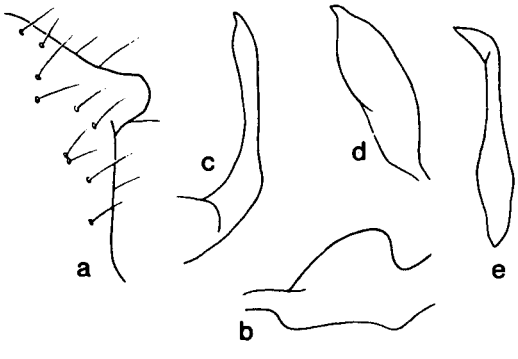
88 angusticollis



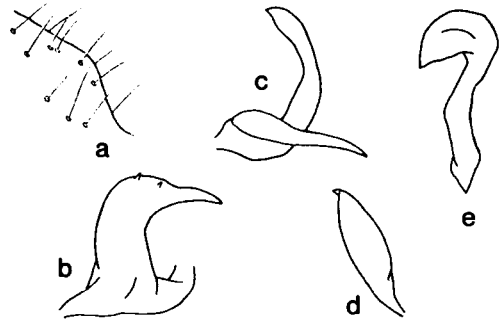
89 alpestris



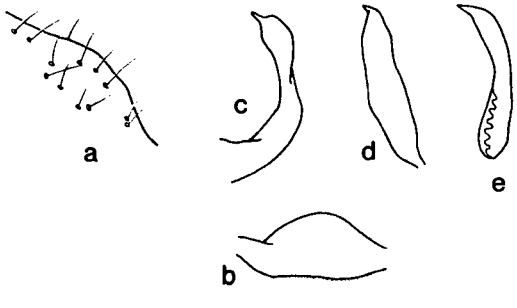
90 pulchellus



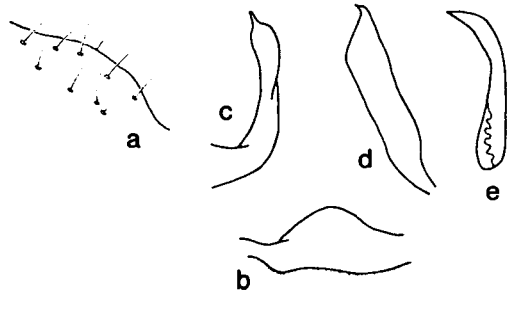
91 rubroornatus



92 gracillatus



93 laevis

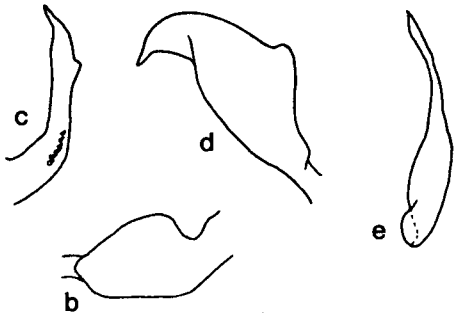


94 rolfsi

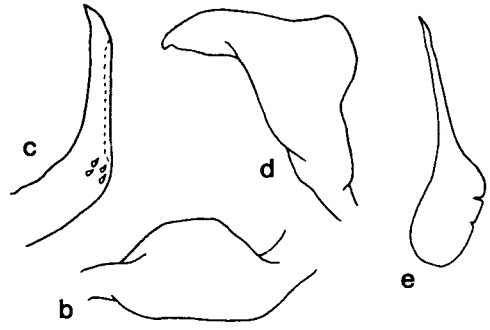
Figures 95-102. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

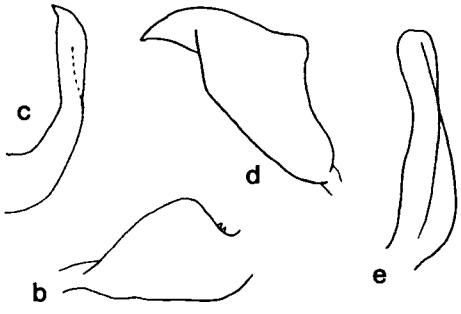
95. P. politus (1)
96. P. umbrosus (2)
97. P. chihuahuanae (2)
98. P. simulatus (2)
99. P. palmeri (1)
100. P. schuhi (1)
101. P. corticola (1)
102. P. commissuralis (1)



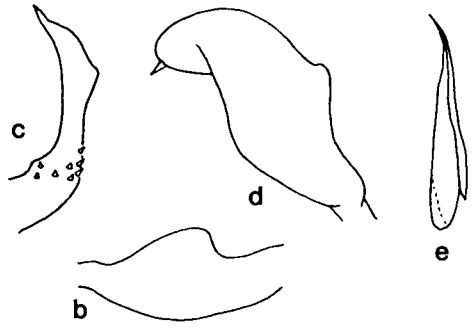
95 politus



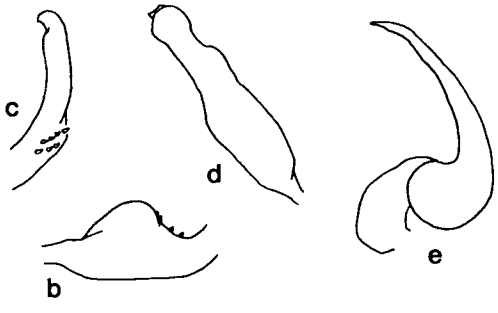
96 umbrosus



97 chihuahuanae

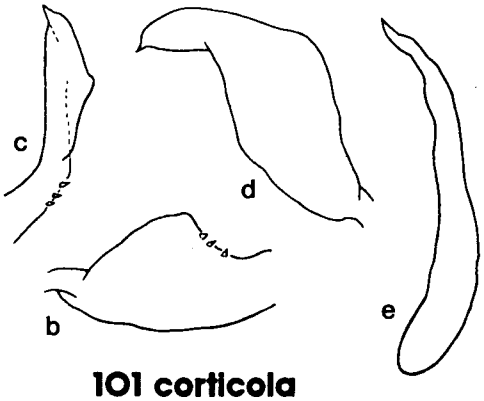


98 simulatus

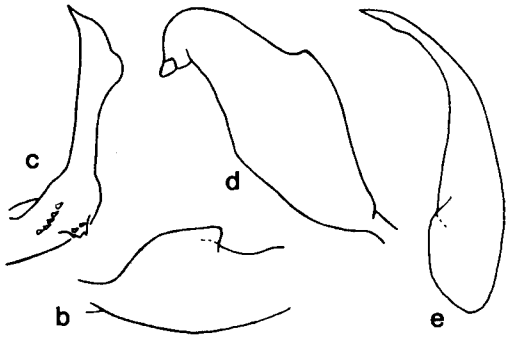


99 palmeri

100 schuhi



101 corticola

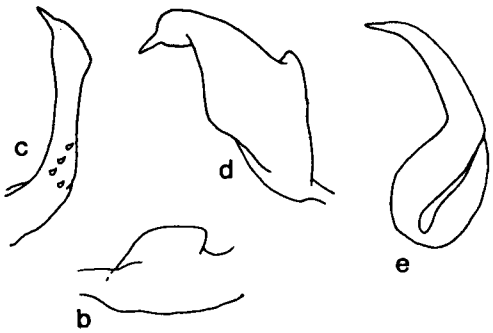


102 commissuralis

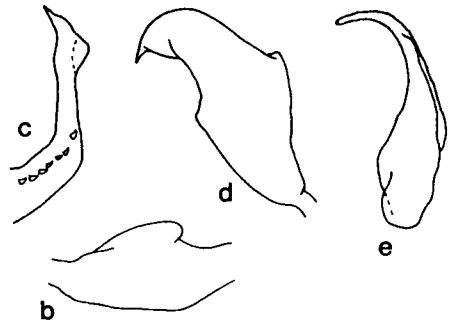
Figures 103-111. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

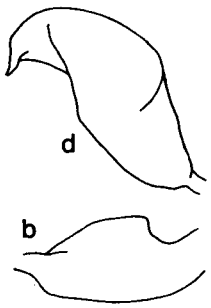
103. P. heidemanni (1)
104. P. fraterculus (western biotype) (1)
105. P. fraterculus (eastern biotype) (1)
106. P. piceicola (1)
107. P. mellarius (2)
108. P. comulus (2)
109. P. jucundus (2)
110. P. cochise (1)
111. P. auranti (1)



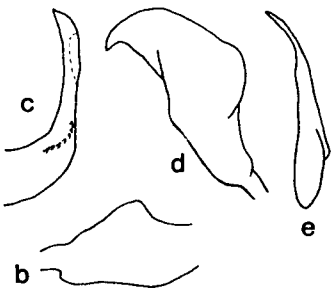
103 heidemanni



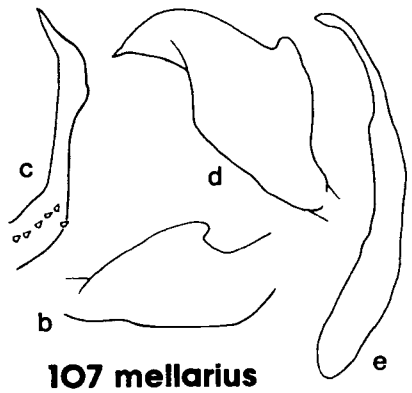
104 fraterculus (western)



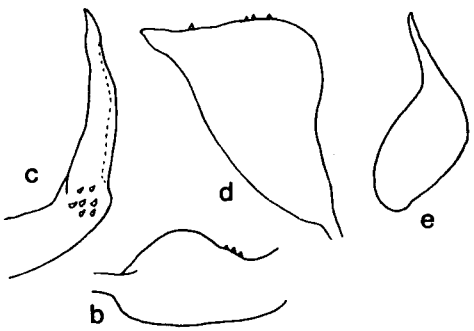
105 fraterculus (eastern)



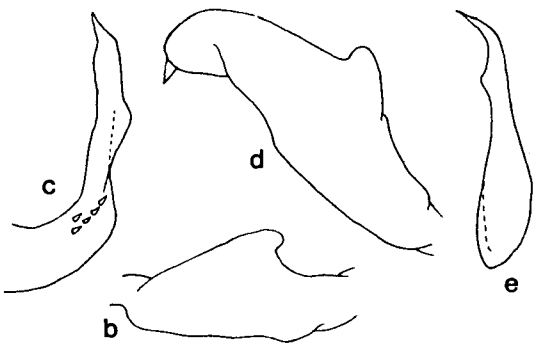
106 piceicola



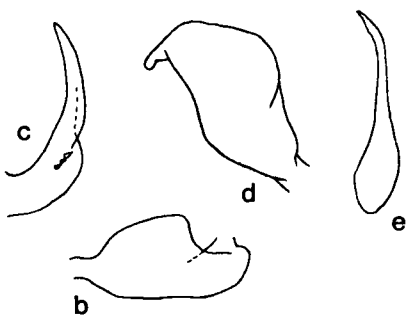
107 mellarius



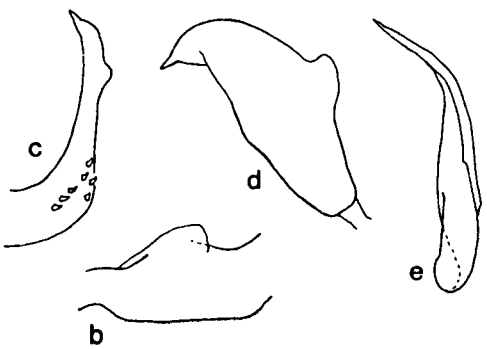
108 comulus



109 jucundus



110 cochise

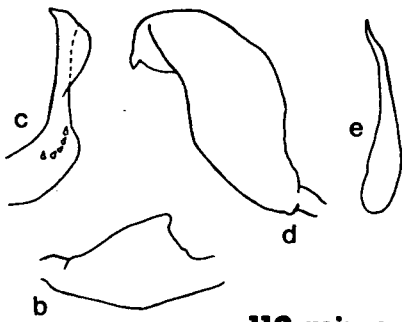


111 auranti

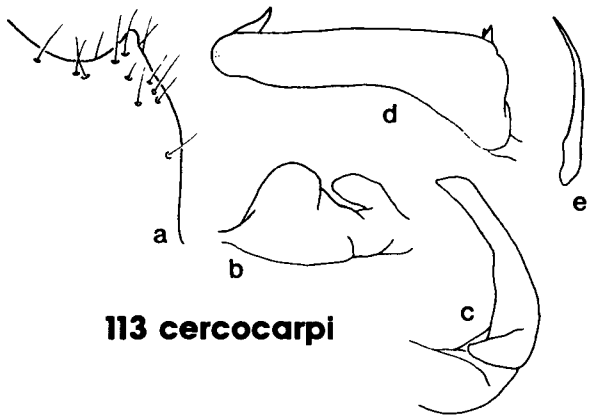
Figures 112-119. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

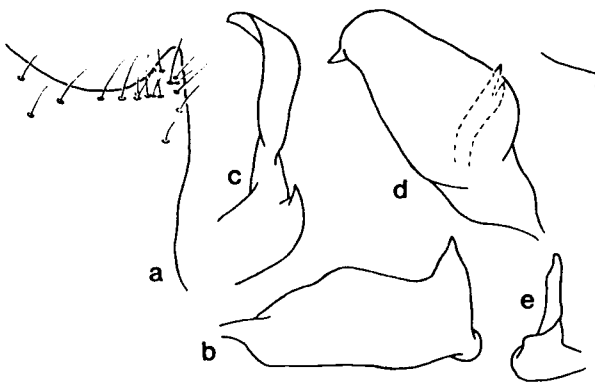
112. P. mirus (1)
113. P. cercocarpi (2)
114. P. dumicola (2)
115. P. tobrendae (2)
116. P. angustatus (2)
117. P. sagax (2)
118. P. lattini (2)
119. P. ceanothicus (2)



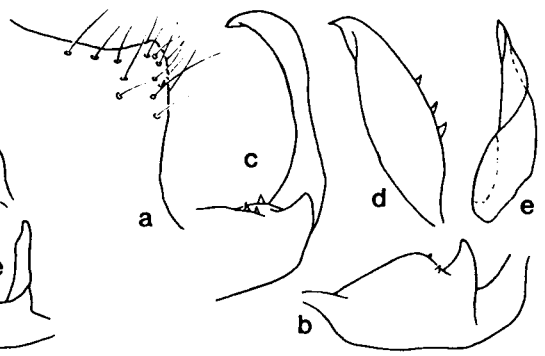
112 mirus



113 cercocarpi

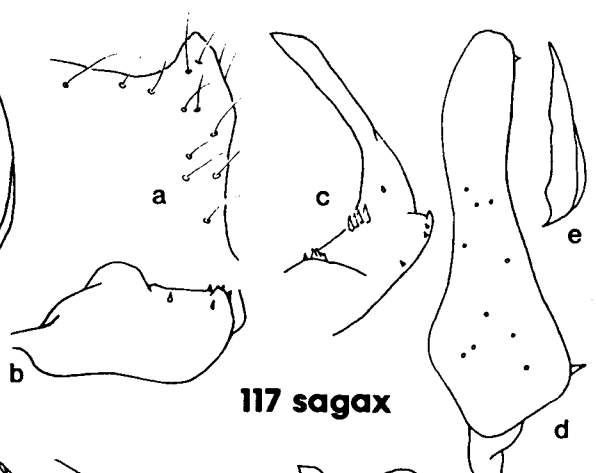


114 dumicola

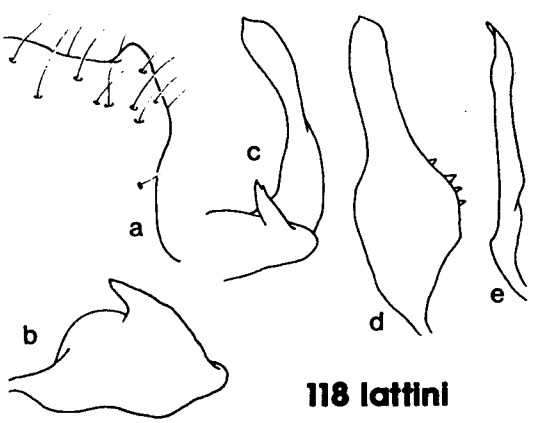


115 tobrendae

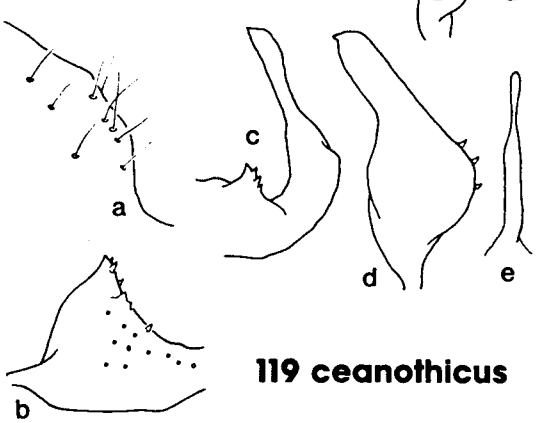
116 angustatus



117 sagax



118 lattini



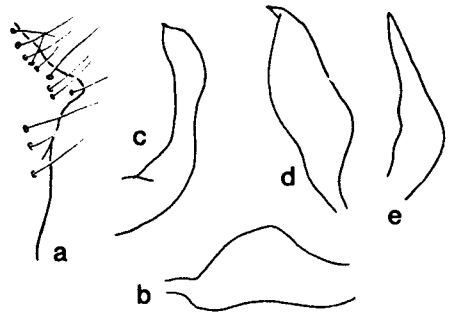
119 ceanothicus

Figures 120-127. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

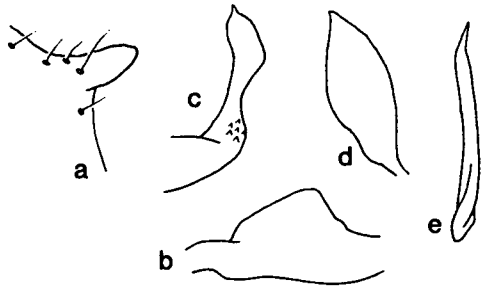
The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

120. P. aurora (2)
121. P. cuneotinctus (2)
122. P. vanduzeei (2)
123. P. adenostomae (2)
124. P. occidentalis (2)
125. P. acaciae (2)
126. P. miniatus (2)
127. P. ventralis (2)

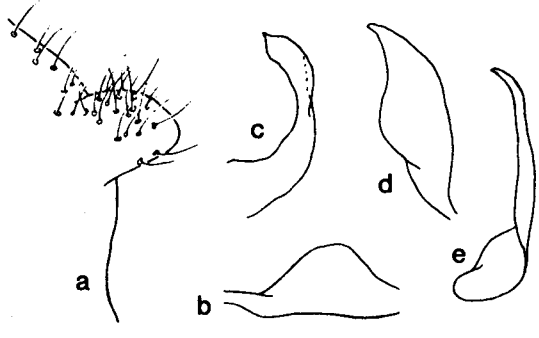
120 aurora



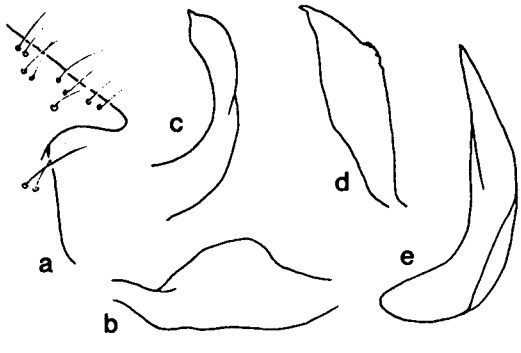
121 cuneotinctus



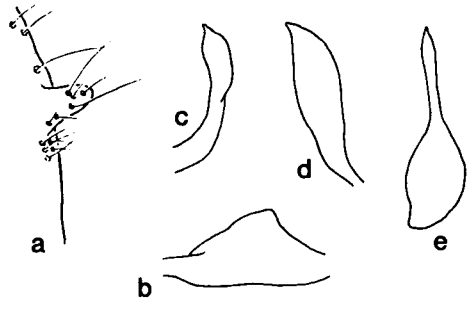
122 vanduzeei



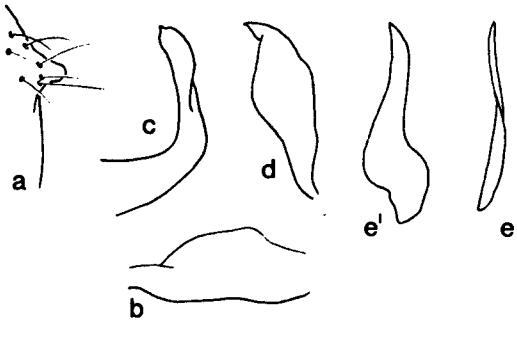
123 adenostomae



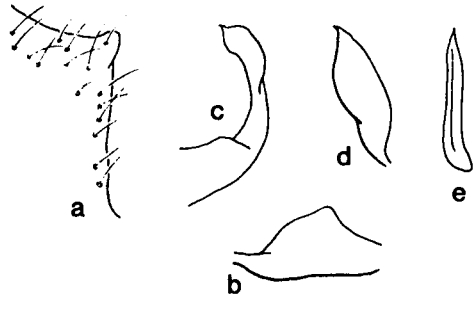
124 occidentalis



125 acaciae



126 miniatus

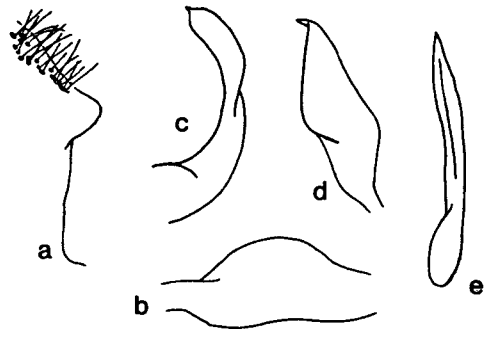


127 ventralis

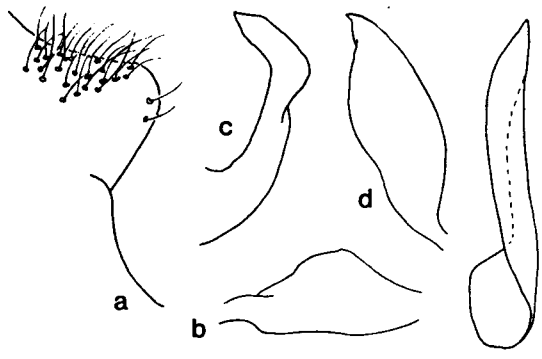
Figures 128-135. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

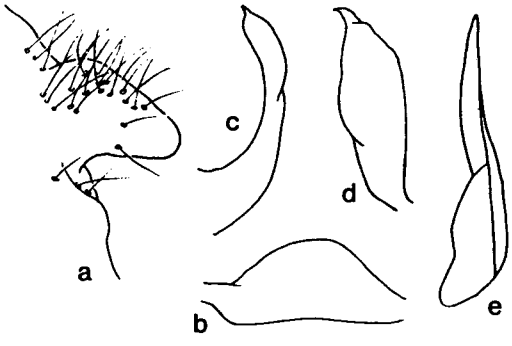
128. P. tricinctus (2)
129. P. nigrisquamus (2)
130. P. adustus (2)
131. P. monophyllae (2)
132. P. juniperanus (2)
133. P. breviusculus (2)
134. P. brevicornis (2)
135. P. albifrons (2)



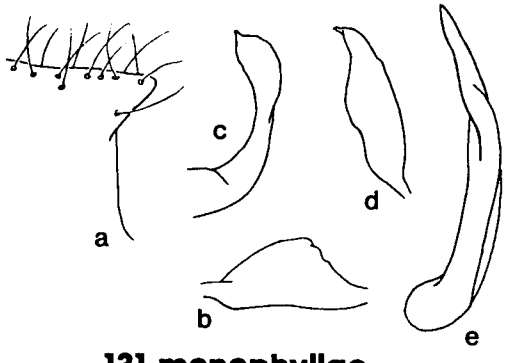
128 tricinctus



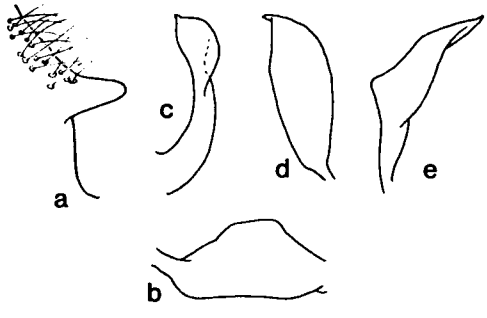
129 nigrisquamus



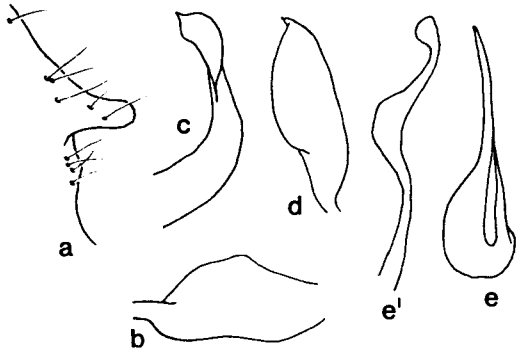
130 adustus



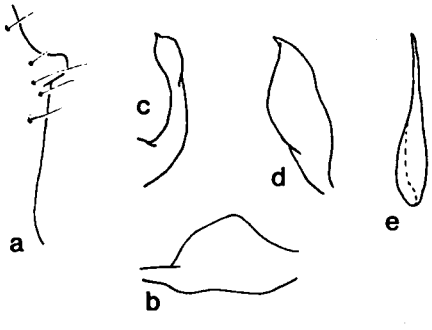
131 monophyllae



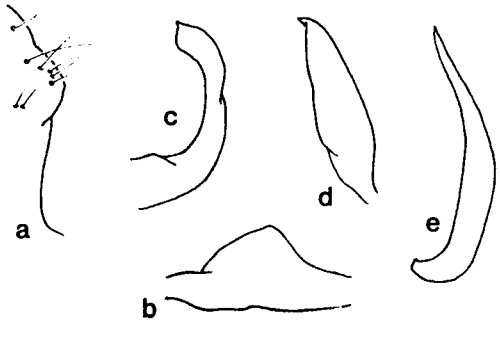
132 juniperanus



133 breviusculus



134 brevicornis

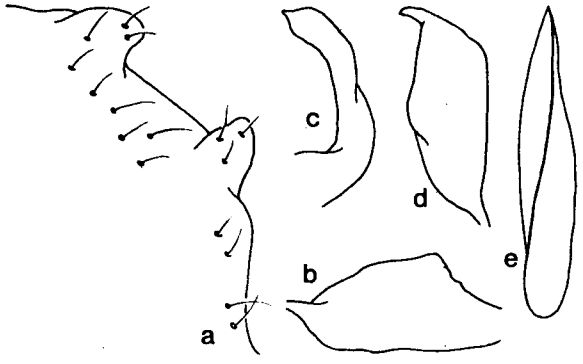


135 albifrons

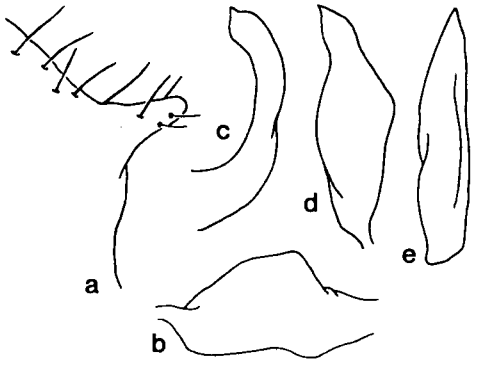
Figures 136-143. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

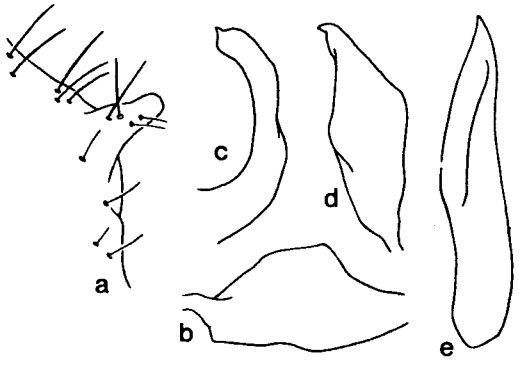
136. P. bituberis (2)
137. P. relativus (2)
138. P. californicus (2)
139. P. ramosus (2)
140. P. juliae (2)
141. P. empirensis (2)
142. P. calli (2)
143. P. conspurcatus (2)



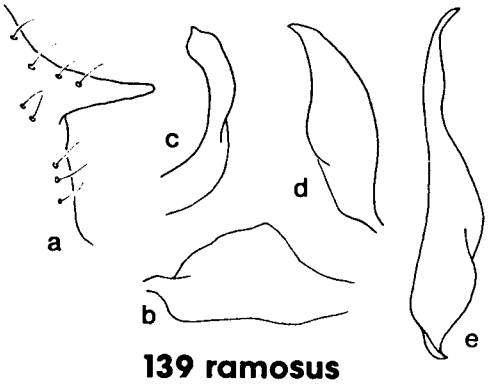
136 bituberis



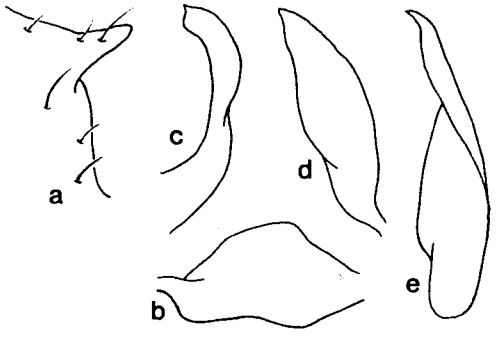
137 relativus



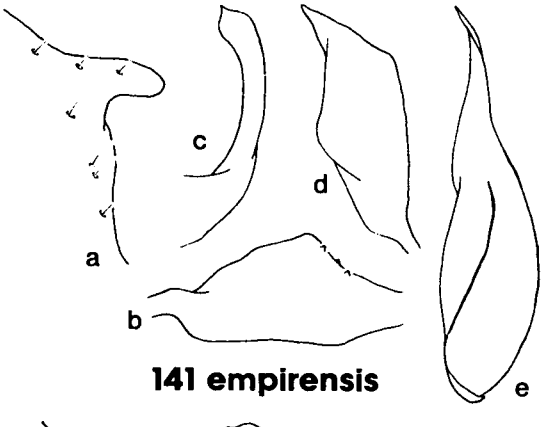
138 californicus



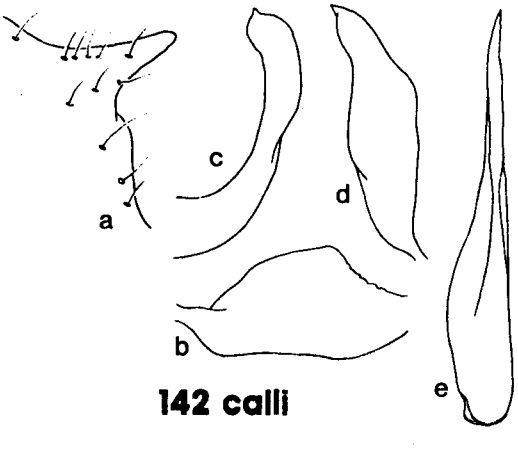
139 ramosus



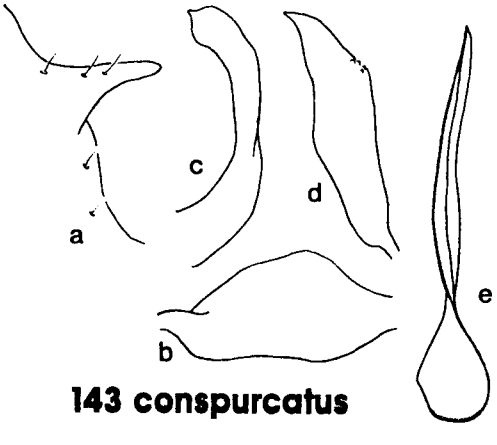
140 juliae



141 empirensis



142 calli

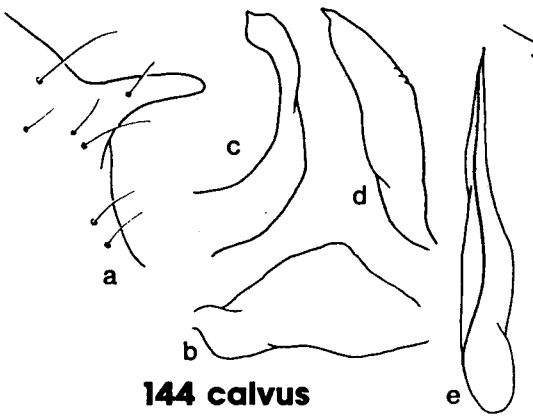


143 conspurcatus

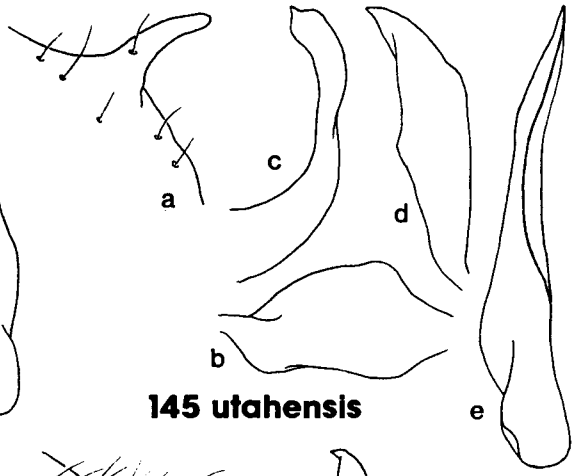
Figures 144-151. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

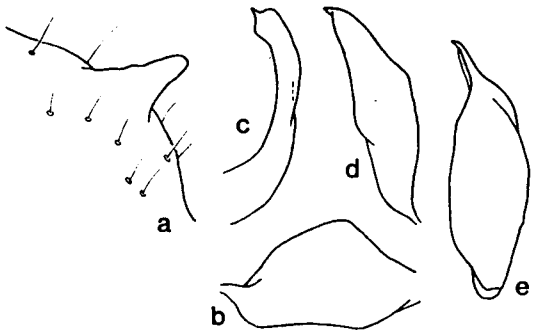
144. P. calvus (2)
145. P. utahensis (2)
146. P. ketinelbi (2)
147. P. becki (1)
148. P. canescens (2)
149. P. decurvatus (1)
150. P. histriculus (2)
151. P. maritimus (2)



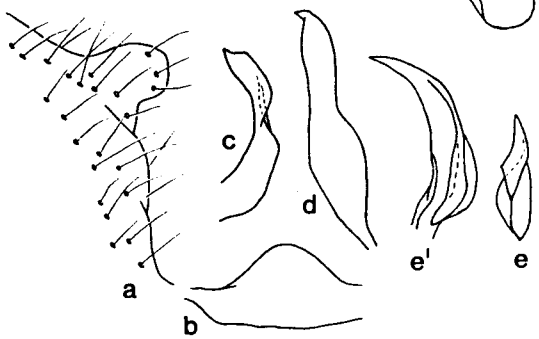
144 calvus



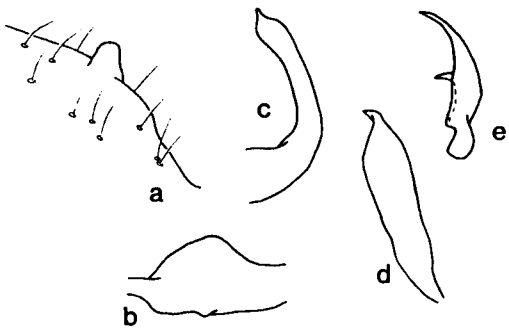
145 utahensis



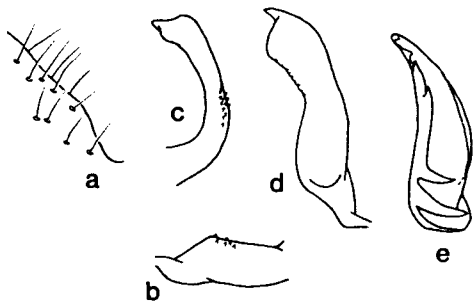
146 ketinelbi



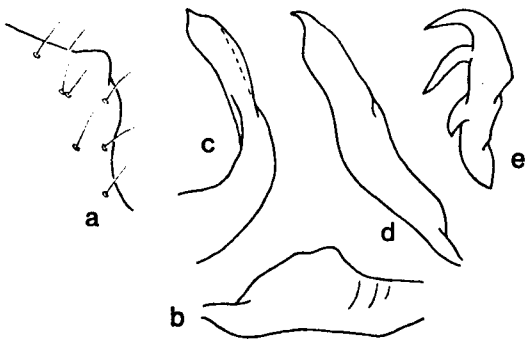
147 becki



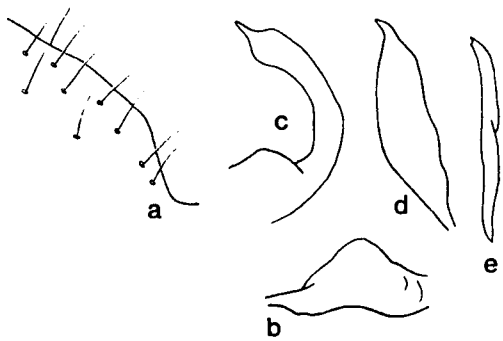
148 canescens



149 decurvatus



150 histriculus

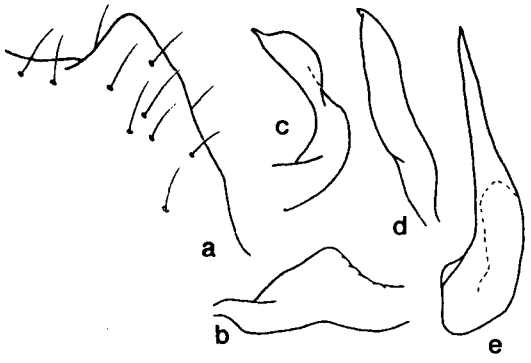


151 maritimus

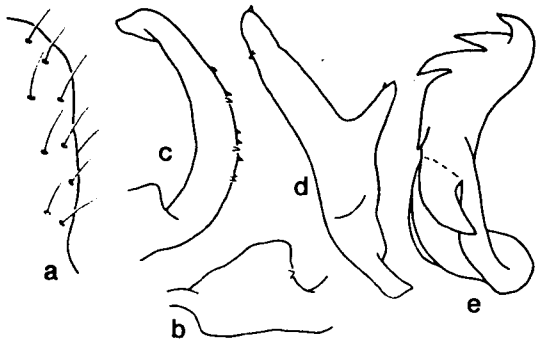
Figures 152-159. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

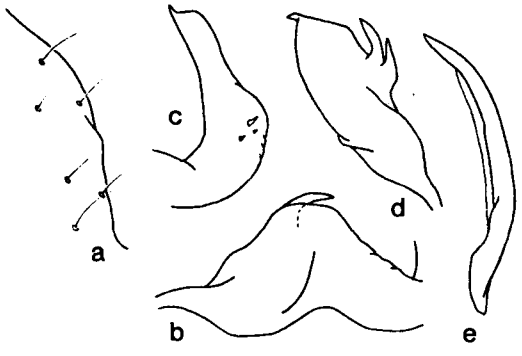
152. P. mesillae (2)
153. P. neglectus (1)
154. P. omani (2)
155. P. radiatae (2)
156. P. roseotinctus (1)
157. P. shoshoni (2)
158. P. varipes (1)
159. P. varius (2)



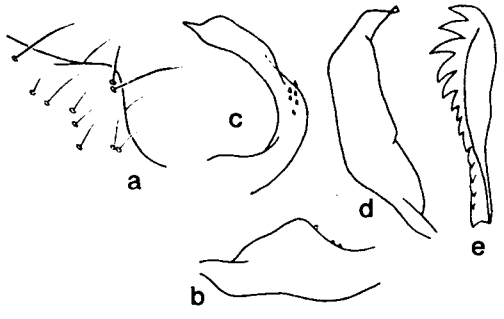
152 mesillae



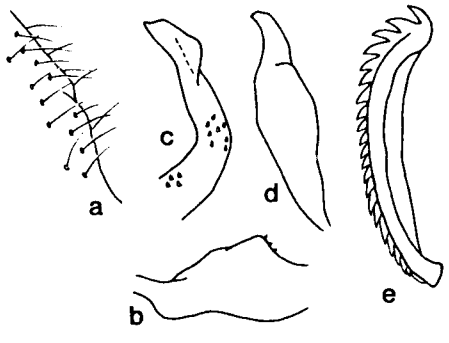
153 neglectus



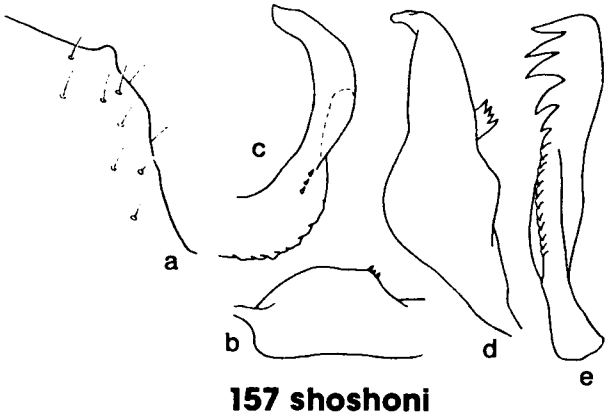
154 omani



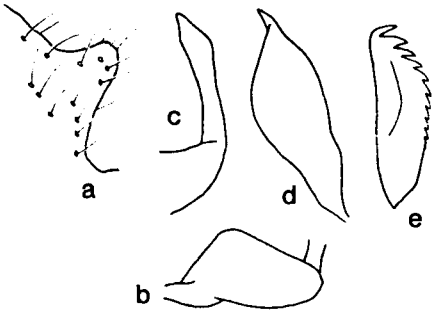
155 radiatae



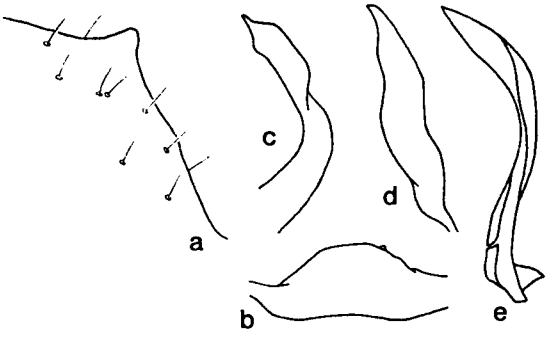
156 roseotinctus



157 shoshoni



158 varipes

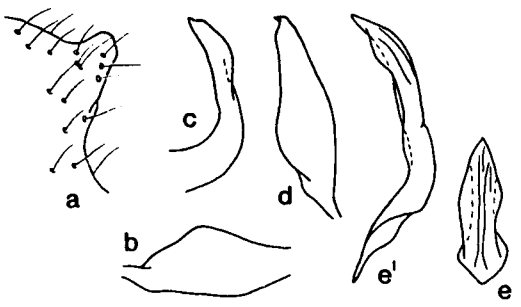


159 varius

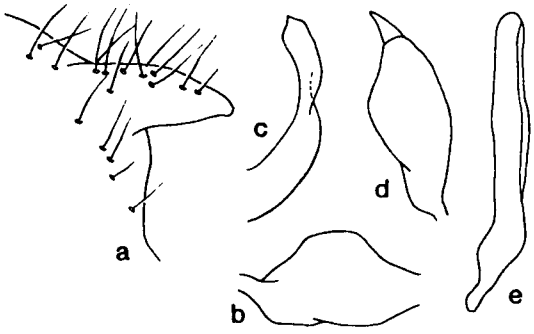
Figures 160-161. Male genital structures: (a) lateral view of left margin of genital aperture showing tubercle above base of clasper; (b) lateral view of arm of left clasper; (c) dorsal view of shaft of left clasper; (d) right clasper, lateral view unless otherwise stated; (e) sclerotized process of vesica, or right sclerotized process for species with two or more processes; (e') left sclerotized process. In species with more than two sclerotized processes (e.g. cunealis group), e and e' denote right and left sclerotized processes respectively, and the remaining processes are shown in the order they appear between e and e' (vesica viewed with gonopore facing observer).

The #1 behind a species name indicates that the genitalic illustrations for that species are scaled to 55X the actual size; the #2 behind a species name denotes figures scaled to 82X the actual size.

160. P. vau (1)
161. P. vinaceus (2)



160 vau



161 vinaceus

LITERATURE CITED

Bailey, R.G. 1978. Description of the ecoregions of the United States. USDA, Forest Service, Intermountain Region, Ogden, Utah. 77 p.

Blatchley, W.S. 1926. Heteroptera or true bugs of Eastern North America. Nature Publishing Company, Indianapolis. 1116 p.

Bliven, B.P. 1954. New Hemiptera from Redwood (Miridae, Cicadellidae). Bulletin of the Brooklyn Entomological Society 49:109-119.

Bliven, B.P. 1956. New Hemiptera from the western states with illustrations of previously described species and new synonymy in the Psyllidae. Private Publication, Eureka, California. 27 p.

Bliven, B.P. 1959. New Pyrrhocoridae and Miridae from the western United States (Hemiptera). The Occidental Entomologist 1(3):25-33.

Bliven, B.P. 1966. New Miridae from western North America. The Occidental Entomologist 1(9):115-122.

Boheman, C.H. 1852. Nya svenska Hemiptera. Ofversigt af Kongliga Svenska Vetenskaps - Akademiens Förhandlinger 9:49-60, 65-80.

Butler, E.A. 1923. A biology of the British Hemiptera - Heteroptera. H.F. and G. Witherby, London. 682 p.

Carvalho, J.C.M. 1952. On the major classification of the Miridae (Hemiptera) with keys to subfamilies and tribes and a catalogue of the world genera. Annales da Academia Brasileira de Ciencias 24:31-110.

Carvalho, J.C.M. 1955. Keys to the genera of Miridae of the world (Hemiptera). Boletim do Museu Paraense Emilio Goeldi 11(2):1-151.

Carvalho, J.C.M. 1959. A catalogue of the Miridae of the world. Part IV. Subfamily Mirinae. Arquivos do Museu Nacional, Rio de Janeiro, Brasil 48:1-384.

Carvalho, J.C.M. and P.S.F. Ferreira. 1969. Mirideos Neotropicais, CXI: Genero Phytocoris Fallén na fauna Chilena (Hemiptera). Annales da Academia Brasileira de Ciencias 41:601-623.

Carvalho, J.C.M. and A.V. Fontes. 1972. Mirideos Neotropicais, CXLIII: Descricao de dois novos generos (Hemiptera). Revista Brasileira de Biologia 32:335-341.

Carvalho, J.C.M. and I.P. Gomes. 1969. Mirideos Neotropicais, CIX: Novas especies e ocorrencias para a Republica do Equador (Hemiptera). Annales da Academia Brasileira de Ciencias 41:421-433.

Carvalho, J.C.M. and I.P. Gomes. 1970. Mirideos Neotropicais, CXIV: Algumas especies de Phytocoris Fallén da Argentina, Brasil, Colombia e Paraguai (Hemiptera). Revista Brasileira de Biologia 30:115-136.

Clayton, R.A. 1982. A phylogenetic analysis of Lygocoris Reuter (Heteroptera: Miridae) with notes on life histories and zoogeography. Masters thesis. University of Conneticut, Storrs. 69 p.

Collyer, E. 1953. Biology of some predatory insects and mites associated with the fruit tree red spider mite (Metatetranychus ulmi (Koch)) in south-eastern England. III. Further predators of the mite. Journal of Horticultural Science 28:98-113.

Cooper, G.M. 1981. The Miridae (Hemiptera: Heteroptera) associated with noble fir, Abies procera Rehd. Masters thesis. Oregon State University, Corvallis. 135 p.

Denton, R.E. 1979. Larch casebearer in western larch forests. USDA, Forest Service, Intermountain Forest and Range Experiment Station, General Technical Report INT-55. 62 p.

Distant, W.L. 1891. Rhynchota in Whymper's travels amongst the Great Andes of Ecuador. Appendix: 113. London.

Distant, W.L. 1893. Descriptions of new genera and new species of Neotropical Rhynchota. Transactions of the Entomological Society of London 1:83-96.

Douglas, J.W. and J. Scott. 1869. British Hemiptera: additions and corrections. The Entomologist's Monthly Magazine 5:259-268.

Downes, W. 1924. New records of Hemiptera from British Columbia. Proceedings of the Entomological Society of British Columbia 21:27-33.

Downes, W. 1957. Notes on some Hemiptera which have been introduced into British Columbia. Proceedings of the Entomological Society of British Columbia 54:11-13.

Fabricius, J.C. 1776. Genera insectorum eorumque characteres naturales secundum numerum, figuram situm et proportionem omnium partium oris adjecta mantissa specierum nuper detectarum. Chilonii. 310 p.

Fabricius, J.C. 1803. Systema Rhyngotorum secundum ordines, genera, species adiectis synonymis, locis, observationibus, descriptionibus. Brunsvigae Apud Carolum Reichard. 314 p.

Fallén, C.F. 1814. Specimen novam Hemiptera disponendi methodum exhibens. Lundae. 26 p. (Dissertation).

Fallén, C.F. 1828/29. Hemiptera Sueciae. Cimicides eorumque familiae affines. Lundae. 188 p.

Farris, J.S. 1970. Methods for computing Wagner trees. Systematic Zoology 19:83-92.

Froeschner, R.C. 1949. Contributions to a synopsis of the Hemiptera of Missouri. Part IV. Hebridae, Mesoveliidae, Cimicidae, Anthocoridae, Cryptostemmatidae, Isometopidae, Miridae. American Midland Naturalist 42:123-188.

Gillette, C.P. and C.F. Baker. 1895. A preliminary list of the Hemiptera of Colorado. Colorado Agricultural Experimental Station, Technical Series, Bulletin 31, 1:1-137.

Henry, T.J. 1974. Two new pine-inhabiting Phytocoris from Pennsylvania (Hemiptera: Miridae). Entomological News 85:187-191.

Henry, T.J. 1979. Descriptions and notes on five new species of Miridae from North America (Hemiptera). Melsheimer Entomological Series 27:1-10.

Henry, T.J. 1982. New synonymies and a new combination in the North American Miridae (Hemiptera). Proceedings of the Entomological Society of Washington 84:337-341.

Henry, T.J. and G.M. Stonedahl. 1983. Type designations and new synonymies for the Canadian and United States species of Phytocoris Fallén (Hemiptera: Miridae). Proceedings of the Entomological Society of Washington (in press).

Ives, W.G.H. 1967. Relations between invertebrate predators and prey associated with larch sawfly eggs and larvae on tamarack. Canadian Entomologist 99:607-622.

Johnston, H.G. 1930. Four new species of Miridae from Texas (Hemiptera). Bulletin of the Brooklyn Entomological Society 25:295-300.

Kelton, L.A. 1959. Male genitalia as taxonomic characters in the Miridae (Hemiptera). Canadian Entomologist, Supplement 11, 91:1-72.

Kelton, L.A. 1971. Review of Lygocoris species found in Canada and Alaska (Heteroptera: Miridae). Memoirs of the Entomological Society of Canada, No. 83. 87 p.

Kelton, L.A. 1979. Two new species of Phytocoris from western Canada (Heteroptera: Miridae). Canadian Entomologist 111:689-692.

Kelton, L.A. 1980. The Insects and Arachnids of Canada. Part 8. The plant bugs of the prairie provinces of Canada (Heteroptera: Miridae). Publication 1703. Agriculture Canada, Ottawa. 408 p.

Kirschbaum, C.L. 1855. Rhynchotographische Beiträge. Die Rhynchoten der Gegend von Wiesbaden. Vol. 1. Die Capsiden. Jahrbucher des Vereins fur Naturkunde im Herzogthum Nassau 10:161-348.

Kluge, A.G. and J.S. Farris. 1969. Quantitative phyletics and the evolution of Anurans. Systematic Zoology 18:1-32.

Knight, H.H. 1917. A revision of the genus Lygus as it occurs in America north of Mexico with biological data on the species from New York. Cornell University Agricultural Experiment Station Bulletin 391:555-645.

Knight, H.H. 1920. New and little-known species of Phytocoris from the eastern United States (Heteroptera: Miridae). Bulletin of the Brooklyn Entomological Society 15:49-66.

Knight, H.H. 1923. The Miridae (or Capsidae) of Connecticut. pp. 442-658, In W.L. Britton (ed.). Guide to the insects of Connecticut. Part IV. The Hemiptera or sucking insects of Connecticut. Bulletin of the Connecticut Geological and Natural History Survey 34:1-807.

Knight, H.H. 1925a. Descriptions of thirty new species and two new genera of North American Miridae (Hemiptera). Bulletin of the Brooklyn Entomological Society 20:33-58.

Knight, H.H. 1925b. A list of Miridae and Anthocoridae from Alberta, Canada (Hemiptera). Canadian Entomologist 57:181-182.

Knight, H.H. 1926. Descriptions of eleven new species of Phytocoris from eastern North America (Hemiptera: Miridae). Bulletin of the Brooklyn Entomological Society 21:158-168.

Knight, H.H. 1927a. Notes on the distribution and host plants of some North American Miridae (Hemiptera). Canadian Entomologist 59:34-44.

Knight, H.H. 1927b. On the Miridae in Blatchley's "Heteroptera of Eastern North America." Bulletin of the Brooklyn Entomological Society 22:98-105.

Knight, H.H. 1927c. Descriptions of twelve new species of Miridae from the District of Columbia and vicinity (Hemiptera). Proceedings of the Biological Society of Washington 40:9-18.

Knight, H.H. 1928. New species of Phytocoris from North America (Hemiptera: Miridae). Bulletin of the Brooklyn Entomological Society 23:28-46.

Knight, H.H. 1934. Phytocoris Fallén - Twelve new species from the western United States (Hemiptera: Miridae). Bulletin of the Brooklyn Entomological Society 29:1-16.

Knight, H.H. 1941. The plant bugs, or Miridae, of Illinois. Bulletin of the Illinois Natural History Survey 22:1-234.

Knight, H.H. 1961. Ten new species of Phytocoris from North America. Iowa State Journal of Science 35:473-484.

Knight, H.H. 1968. Taxonomic review: Miridae of the Nevada Test Site and the western United States. Brigham Young University Science Bulletin, Biological Series 9(3):1-282.

Knight, H.H. 1974. A key to the species of Phytocoris Fallén belonging to the Phytocoris junceus Kngt. group of species (Hemiptera: Miridae). Iowa State Journal of Research 49:123-135.

Kullenberg, B. 1944. Studien über die biologie der Capsiden. Zoologiska Bidrag från Uppsala 23:1-522.

LeRoux, E.J. 1960. Effects of "modified" and "commercial" spray programs on the fauna of apple orchards in Quebec. Annals de la Societe Entomologique du Quebec 6:87-121.

Leston, D. 1961. Observations on the mirid (Hem.) hosts of Braconidae (Hym.) in Britain. The Entomologist's Monthly Magazine 97:65-71.

Linnaeus, C. 1758. Systema Naturae. 10th ed. Vol. 1. Holmiae. 823 p.

Linnavuori, R. 1973. A collection of Heteroptera from Katanga, with remarks on some species from other parts of the Ethiopian Region. Annales Entomologici Fennici 39:70-94.

Linnavuori, R. 1974a. Studies on Africa Miridae (Heteroptera). Entomological Society of Nigeria, Occasional Publications, No. 12. 67 p.

Linnavuori, R. 1974b. Studies on Palearctic and African Heteroptera. Acta Entomologica Fennica 30:3-35.

Linnavuori, R. 1975. Hemiptera of the Sudan, with remarks on some species of the adjacent countries. 4. Miridae and Isometopidae. Annales Zoologici Fennici 12:1-118.

Loan, C.C. 1974. The North American species of Leiophron Nees, 1818 and Peristenus Foerster, 1862 (Hymenoptera: Braconidae: Euphorinae) including the description of 31 new species. Le Naturaliste Canadien 101:821-860.

Lundberg, J.G. 1972. Wagner networks and ancestors. Systematic Zoology 21:398-413.

Maldonado Capriles, J. 1969. The Miridae of Puerto Rico (Insecta, Hemiptera). University of Puerto Rico Agricultural Experiment Station. Technical Paper 45. 133 p.

Martin, J.L. 1966. The insect ecology of red pine plantations in central Ontario. IV. The crown fauna. Canadian Entomologist 98:10-27.

Munz, P.A. and D.D. Keck. 1973. A California flora and supplement. University of California Press, Berekley. 1681 p. + 224 p. suppl.

Parshley, H.M. 1921. A report on some Hemiptera from British Columbia. Proceedings of the Entomological Society of British Columbia 18:13-24.

Razafimahatratra, V.P. 1980. A revision of the genus Deraeocoris Kirschbaum (Heteroptera: Miridae) from western America north of Mexico. Ph.D. thesis. Oregon State University, Corvallis. 235 p.

Reuter, O.M. 1876. Capsinae ex America boreali in Museo Holmiensi asservatae, descriptae. Ofversigt af Kongliga Svenska Vetenskaps - Akademiens Förhandlingar 32(9):59-92.

Reuter, O.M. 1909. Bemerkungen über nearktische Capsiden nebst Beschreibung neuer Arten. Acta Societatis Scientarum Fennicae 36(2):1-86.

Reuter, O.M. 1912. Hemipterologische Miscellen. Ofversigt af Finska Vetenskaps - Societetens Förhandlingar 54A(7):1-76.

Schuh, R.T. and B.M. Massie. 1980. Bibliography of Miridae (Hemiptera) 1956-1980: Literature published since preparation of the "Catalogue of the Miridae of the World" by J.C.M. Carvalho. Unpublished bibliography. American Museum of Natural History, New York. 123 p.

Schuh, R.T. and J.T. Polhemus. 1980. Analysis of taxonomic congruence among morphological, ecological, and biogeographic data sets for the Leptopodomorpha (Hemiptera). Systematic Zoology 29:1-26.

Southwood, T.R.E. and D. Leston. 1959. Land and water bugs of the British Isles. F. Warne and Company, London and New York. 436 p.

Stål, C. 1868. Hemiptera Fabriciana. Ofversigt af Kongliga Svenska Vetenskaps - Akademiens Handlingar 7:1-148.

Stonedahl, G.M. 1983a. Two new conifer-inhabiting Phytocoris from western North America (Hemiptera: Miridae). Pan-Pacific Entomologist (in press).

Stonedahl, G.M. 1983b. New records for Palearctic Phytocoris in western North America (Hemiptera: Miridae). Proceedings of the Entomological Society of Washington (in press).

Tucker, E.S. 1907. Some results of desultory collecting of insects in Kansas and Colorado. List of Hemiptera - Heteroptera. Kansas University Sciences Bulletin 4:51-62.

Turnock, W.J. 1953. Some new predators of the larch sawfly. Canadian Department of Agricultural Science Service. Division of Forest Biology. Bi-monthly Progress Report 9(3):2.

Uhler, P.R. 1894. Observations upon the Heteropterous Hemiptera of Lower California, with descriptions of new species. Proceedings of the California Academy of Sciences, Series 2, 4:223-295.

Uhler, P.R. 1895. Callodemas n. gen. p. 33, In C.P. Gillette and C.F. Baker (eds.). A preliminary list of the Hemiptera of Colorado. Colorado Agricultural Experimental Station, Technical Series, Bulletin 31, 1:1-137.

Usinger, R.L. 1933. New distributional and host plant records of Heteroptera for California. I. Pan-Pacific Entomologist 9:171-172.

Van Duzee, E.P. 1903. Hemiptera of Beulah, New Mexico. Transactions of the American Entomological Society 29:107-113.

Van Duzee, E.P. 1908. List of Hemiptera taken by W.J. Palmer, near Lake Temagami, Ontario. Canadian Entomologist 40:109-116.

Van Duzee, E.P. 1910. Descriptions of some new and unfamiliar North American Hemiptera. Transactions of the American Entomological Society 36:73-88.

Van Duzee, E.P. 1912. Hemipterological gleanings. Bulletin of the Buffalo Society of Natural Sciences 10:477-512.

Van Duzee, E.P. 1914. A preliminary list of the Hemiptera of San Diego County, California. Transactions of the San Diego Society of Natural History 2:1-57.

Van Duzee, E.P. 1916. Checklist of the Hemiptera (excepting the Aphididae, Aleurodidae, and Coccidae) of America, north of Mexico. New York Entomological Society, New York. 111 p.

Van Duzee, E.P. 1917a. Catalogue of the Hemiptera of America north of Mexico excepting the Aphididae, Coccidae, and Aleurodidae. University of California Publications in Entomology 2:1-902.

Van Duzee, E.P. 1917b. Report upon a collection of Hemiptera made by Walter M. Giffard in 1916 and 1917, chiefly in California. Proceedings of the California Academy of Sciences, Series 4, 7:249-318.

Van Duzee, E.P. 1918. New species of Hemiptera, chiefly from California. Proceedings of the California Academy of Sciences, Series 4, 8:271-308.

Van Duzee, E.P. 1920. New hemipterous insects of the genera Aradus, Phytocoris, and Camptobrochys. Proceedings of the California Academy of Sciences, Series 4, 9:331-356.

Van Duzee, E.P. 1923. Expedition of the California Academy of Sciences to the Gulf of California in 1921. Proceedings of the California Academy of Sciences, Series 4, 12:123-200.

Van Duzee, E.P. 1925. Notes on a few Hemiptera from the San Bernardino Mountains, California. Bulletin of the Brooklyn Entomological Society 20:89-90.

Wagner, E. 1970/71. Die Miridae Hahn, 1831, des Mitelmeerraumes un der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 1. Entomologische Abhandlungen 37 Supplement. 484 p.

Wagner, E. and H.H. Weber. 1964. Hétéroptères Miridae. In Faune de France. Vol. 67. Fédération Francaise des Sociétés de Sciences Naturelles, Paris. 589 p.

Westwood, J.O. 1840. An introduction to the modern classification of insects. Vol. 2. Synopsis of the genera of British insects. London. 158 p.

Wheeler, A.G., Jr. and T.J. Henry. 1976. First record on the predaceous mirid Phytocoris tiliae (F.) from the United States. Entomological News 87:25-28.

Wheeler, A.G., Jr. and T.J. Henry. 1977. Miridae associated with Pennsylvania conifers. I. Species on arborvitae, false cypress, and juniper. Transactions of the American Entomological Society 103:623-656.

Wiley, E.O. 1981. Phylogenetics, the theory and practice of phylogenetic systematics. Wiley-Interscience, New York. 439 p.

Zetterstedt, J.W. 1828. Fauna insectorum Lapponica. Hammone. 563 p.

APPENDICES

APPENDIX A

CODING SYSTEM FOR SPECIES-GROUPS OF *PHYTOCORIS* AND PROPOSED OUTGROUP

CREO: *Creontiades* (outgroup)
AURO: *aurora*
CAND: *candidus*
COLL: *pulchricollis*
CONS: *conspurcatus*
CUNE: *cunealis*
FRAT: *fraterculus*
GRAC: *gracillatus*
HOPI: *hopi*
INTE: *interspersus*
JUNC: *junceus*
JUNI: *juniperanus*
LAEV: *laevis*
LASI: *lasiomerus*
LIST: *listi*
PLEA: *plenus* (subgroup A)
PLEB: *plenus* (subgroup B)
PLEC: *plenus* (subgroup C)
PLED: *plenus* (subgroup D)
PLEE: *plenus* (subgroup E)
PULC: *pulchellus*
ROSE: *roseipennis*
ROST: *rostratus*
STEL: *stellatus*
TILI: *tiliae*

APPENDIX B

MORPHOLOGICAL CHARACTERS FOR CLADISTIC ANALYSIS OF PHYTOCORIS SPECIES-GROUPS

The first # is the number of that character in the separate data set (set #1 or #2); the # in parentheses is the number of the same character in the summary data set (#3).

* indicates a homoplasious character.

** indicates additional homoplasious characters detected by analysis of the summary (#3) data set.

*** indicates a character that was homoplasious when analyzed separately, but non-homoplasious (synapomorphic) in the analysis of the summary data set.

All character states are absent (0) or present (1) unless otherwise indicated.

I. External Characters

** 1 (1) Head subquadrate, frons weakly to strongly convex (0); head short, elliptical, frons usually weakly convex (1): head elongate, frons abruptly deflexed apically (2).

* 2 (2) Eye shape: obovate (0); subspherical to elliptical (1).

3 (3) Eye length (males only): greater than vertex width (0); less than vertex width (1).

*** 4 (4) Tylus: weakly to moderately produced at base (0); strongly produced at base (1).

5 (5) Lorum with distinct tubercle on anterodorsal margin.

* 6 (6) Length of bristle-like setae on antennal segment I: mostly less than or equal to segment width (0); greater than segment width (1).

7 (7) Antennal segment I width dense brush of long, pale setae on ventral surface.

*8 (8) Posterior submargin of pronotal disk with weakly elevated bullae.

9 (9) Scutellum with round, dark spot each side before apex.

*10 (10) Dorsal surface with narrow to broad, flattened, dark setae.

11 (11) Hemelytra with long, erect, bristle-like setae.

12 (12) Apex of ostiolar peritreme: rounded (0); angulate to acute (1).

13 (13) Venter with dense mat of appressed, white, scale-like hairs.

14 (14) Abdomen with medial groove on sternites 2 thru 7.

15 (15) Length of tarsal segment I: less than length of tarsal segment II (0); equal to or greater than length of tarsal segment II (1).

II. Male genitalic characters

Genital tubercles:

*1 (16) Genital segment with tubercles above clasper bases.

2 (17) Base of left genital tubercle with series of stout, bristle-like, setae (figs. 128a-130a).

Left Clasper:

3 (18) Sensory lobe or upper surface of arm between sensory lobe and angle with an upright, knob-like or spine-like process (figs. 113b-120b).

4 (19) Sensory lobe produced as a flattened, sickle-shaped process (fig. 92b).

5 (20) Dorsal margin of sensory lobe carinate (fig. 102b).

6 (21) Outer surface of shaft with medial carina (fig. 53c).

Right Clasper:

*7 (22) Shape: elongate, or narrowly to broadly lanceolate (0); otherwise (1).

8 (23) Arm with one or more stout spines arising from inner dorsal surface (figs. 113d-120d).

*9 (24) Outer surface of arm and/or shaft with small tubercles or spines (figs. 15d & 48d).

10 (25) Inner surface of arm and/or shaft with distinct row of small spines.

Vesica:

**11 (26) Membranous lobe(s) greatly reduced, sclerotized process(es) absent (0); membranous lobe(s) moderately to greatly reduced, sclerotized process(es) well developed (1); membranous lobe(s) well developed, sclerotized process(es) well developed (2).

***12 (27) Primary membranous sack with sclerotized plate or blade medially above gonopore which is surrounded, or nearly so, by membrane (not a true sclerotized process).

13 (28) Primary membranous sack with spinulate knob above left margin of gonopore.

*14 (29) Basal and/or primary lobes of vesica with patch(es) of spinulae.

15 (30) Vesica with distinct sclerotized process(es) or row of heavy spines.

16 (31) Sclerotized Process (S.P.) Type 1: serrate, with strong medial ridge, serrations large and fewer than 20 in number (figs. 48e-55e).

17 (32) S.P. Type 2: serrate; bowl-shaped, margins strongly reflexed (figs. 63e & 64e).

18 (33) S.P. Type 3: as in Type 1 but with 20 or more small, tooth-like serrations (figs. 80e-82e).

*19 (34) S.P. Type 4: serrate, flattened, often somewhat club-shaped; not bowl-shaped and without strong medial ridge; tooth-like serrations large and fewer then 20 in number (figs. 72e, 83e, 87e).

20 (35) S.P. Type 5: non-serrate, flattened, elongate or lanceolate, sometimes gently twisted or with margins slightly reflexed (figs. 118e, 124e, 136e-146e).

*21 (36) S.P. Type 6: non-serrate, elongate with margins strongly reflexed, linear to strongly curved (figs. 10e-18e).

22 (37) S.P. Type 7: non-serrate, bulbous and closed basally, tapered distally (fig. 103e).

23 (38) S.P. Type 8: as in Type 7 but broadly opened basally (figs. 41e-43e).

24 (39) S.P. Type 9: non-serrate, lance-shaped, strongly curved basally, usually with 2-4 distinct ridges (figs. 19e-39e).

25 (40) S.P. Type 10: non-serrate, large elongate, flattened, often slightly twisted (figs. 1e-6e).

26 (41) S.P. Type 11: non-serrate, club-shaped (fig. 92e).

27 (42) S.P. Type 12: bulbous basally, with median furrow, inner basal margin with 5-6 blunt serrations (figs. 93e & 94e).

***28 (43) Membranous attachment to sclerotized process: less than basal 1/2 of process (0); more than basal 1/2 of process (1).

*29 (44) Basal process: indistinct or weakly sclerotized (0); well sclerotized, extending to level of gonopore or beyond (1).

III. Summary data set

All characters from data sets I & II were used in the summary set. Character numbers are in parentheses in sets I & II.

APPENDIX C

DATA MATRICES OF CODED CHARACTERS FOR THE CLADISTIC ANALYSIS OF *PHYTOCORIS* SPECIES-GROUPS

Columns are characters (numbered from left to right beginning with 1; character numbers correspond to those in Appendix B). Rows are OTU's (coding of species-groups according to Appendix A).

Data matrix 1. Coded external morphological characters (data set I).

Data matrix 2. Coded male genitalic characters (data set II).

Data matrix 3. Summary of all coded characters (data set III).

1

```
000000000000000 CRED
100001010100000 AURO
010000000000000 LASI
100001010100000 JUNI
100001000000000 STEL
100001001000000 INTE
000000000010000 LIST
211100010101111 COLL
211100110101111 CAND
010001000000000 CUNE
100001000000000 TILI
211100000000000 ROSE
100000010100000 FRAT
100000000000000 JUNC
100001010100000 CONS
211100010101000 ROST
010010000000000 LAEV
000000010000000 PULC
010000010000000 GRAC
000000000000000 PLEA
000000000000000 PLEB
000000000000000 PLEC
000000000000000 PLED
000000000000000 PLEE
211100010101000 HOPI
```

2

```
0000000000000000000000000000 CRED
1010001100210110000100000001 AURO
1000000000200010000000000001 LASI
1100000000210110000100000001 JUNI
0000000000200010001000000011 STEL
0000000000200110001000000011 INTE
1000000000200010001000000011 LIST
1000000000100010000001000001 COLL
0000000010100010000000000000 CAND
1000000010100010000000010001 CUNE
0000000000200010010000000011 TILI
1000000000200010000100000000 ROSE
0000101001210110000010000001 FRAT
1000011010201111000000000011 JUNC
1100000000210110000100000001 CONS
1000000000100110000000100000 ROST
0000000000200110000000000101 LAEV
1000000000200110000000000001 PULC
0001000000200110000000001001 GRAC
1000000000200110000000000001 PLEA
1000000000000000000000000000 PLEB
1000000000200010001000000011 PLEC
1000000000200010000000000011 PLED
1000000000200010100000000011 PLEE
1000000010200110000100000001 HOPI
```

3

```
0000000000000000000000000000000000000000000000 CRED
1000010101000001010001100210110000100000001 AURO
0100000000000001000000000200010000000000001 LASI
1000010101000001100000000210110000100000001 JUNI
1000010000000000000000000200010001000000011 STEL
1000010010000000000000000200110001000000011 INTE
0000000000100001000000000200010001000000011 LIST
2111000101011111000000000100010000001000001 COLL
2111001101011110000000010100010000000000000 CAND
0100010000000001000000010100010000000010001 CUNE
1000010000000000000000000200010010000000011 TILI
2111000000000001000000000200010000100000000 ROSE
1000000101000000000101001210110000010000001 FRAT
1000000000000000100001101020111100000000011 JUNC
1000010101000001100000000210110000100000001 CONS
2111000101010001000000000100110000000100000 ROST
0100100000000000000000000200110000000000101 LAEV
0000000100000000100000000200110000000000001 PULC
0100000100000000001000000200110000000001001 GRAC
0000000000000000100000000200110000000000001 PLEA
0000000000000000100000000000000000000000000 PLEB
0000000000000000100000000200010001000000011 PLEC
0000000000000000100000000200010000000000011 PLED
0000000000000000100000000200010100000000011 PLEE
2111000101010001000000010200110000100000001 HOPI
```

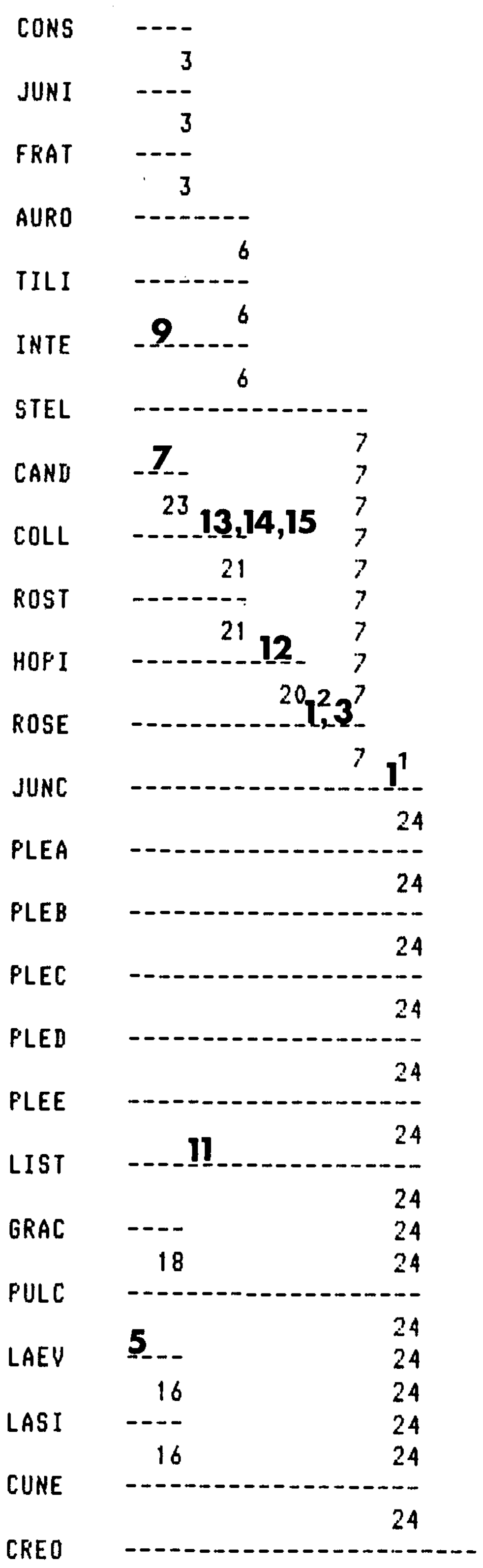
APPENDIX D

CLADOGRAMS OF THE RELATIONSHIPS BETWEEN THE SPECIES-GROUPS OF PHYTOCORIS BASED ON DATA SETS I THRU III

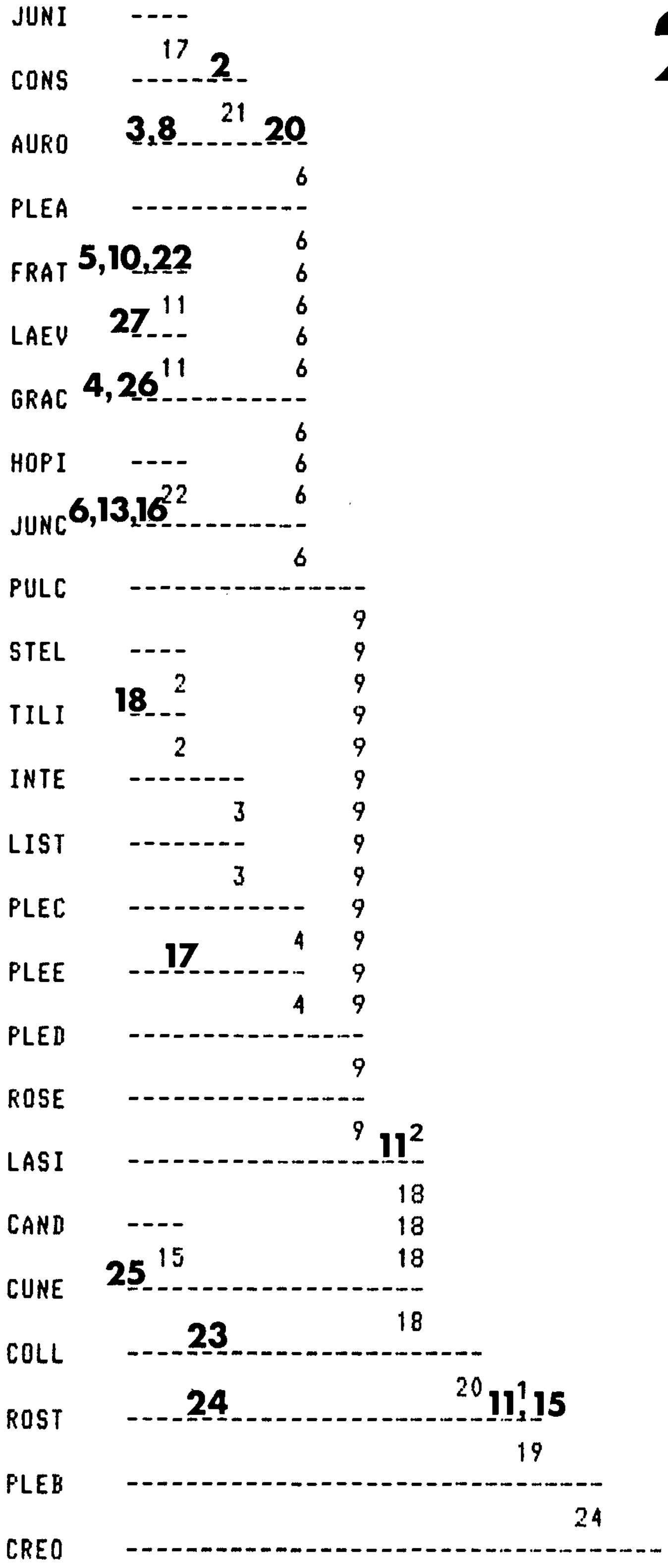
Bold numbers are correlated characters; light numbers are nodes.

Cladogram 1. Species-group assemblages of Phytocoris based on the external morphological characters (data set I).

1


CONS
3
JUNI
3
FRAT
3
AURO
6
TILI
6
9
INTE
6
STEL
7
7
CAND
7
23
13,14,15
7
COLL
7
21
7
ROST
7
21
12
7
HOPI
7
20
2
7
1,3
ROSE
7
1
1
JUNC
24
PLEA
24
PLEB
24
PLEC
24
PLED
24
PLEE
24
11
LIST
24
24
GRAC
24
18
24
PULC
24
5
LAEV
24
16
24
LASI
24
16
24
CUNE
24
CREO

Cladogram 2. Species-group assemblages of Phytocoris based on characters of the male genitalia (data set II).


JUNI
17
2
CONS
3,8
21
20
AURO
6
PLEA
6
5,10,22
FRAT
6
11
6
27
LAEV
6
11
6
4,26
GRAC
6
HOPI
6
22
6
6,13,16
JUNC
6
PULC
9
STEL
9
2
9
18
TILI
9
2
9
INTE
9
3
9
LIST
9
3
9
PLEC
9
4
9
17
PLEE
9
4
9
PLED
9
ROSE
9
11
2
LASI
18
CAND
18
15
18
25
CUNE
18
23
COLL
20
11,
1
15
24
ROST
19
PLEB
24
CREO

2

Cladogram 3. Species-group assemblages of Phytocoris based on all external and genitalic characters (summary data set III). Numbers are correlated characters.

3
Creontiades
plenus (subgp. B)
cunealis
lasiomerus
roseipennis
hopi
rostratus
pulchricollis
candidus
plenus (subgp. D)
plenus (subgp. E)
junceus
listi
plenus (subgp. C)
stellatus
tiliae
interspersus
plenus (subgp. A)
pulchellus
gracillatus
laevis
fraterculus
aurora
conspurcatus
juniperanus
30
40
3,4
12
39
13,14,15
43
38
7
32
21,28,
31
11
33
9
27
19,
41
5,
42
20,
25,
37
35
18,
23
17

APPENDIX E

LISTING OF GROUP(S) AND SPECIES ASSOCIATED WITH EACH COUPLET OF THE KEY TO THE SPECIES-GROUPS OF PHYTOCORIS

3 Pulchellus Group: rubroornatus

4 becki

4' Juniperanus Group: vanduzeei

6 vinaceus

6' Rostratus Group: nicholi

8 Pulchricollis Group: pulchricollis

8' Candidus Group: albidosquamus, squamosus

9 Juniperanus Group: tricinctus, ventralis

11 Pulchricollis Group: albidopictus

13 Hopi Group: cinereus, hopi, nigrolineatus

13' Rostratus Group: lineatus, strigosus

14 Hopi Group: apache, sonorensis

14' Rostratus Group: arizonensis, baboquivarii, beameri, coronadoi, deserticola, ejuncidus, maricopae, minituberculatus, purshiae, rostratus, sublineatus, yavapaii

16 Rostratus Group: strigosus

16' Juniperanus Group: acaciae, adenostomae, adustus, albifrons, brevicornis, breviusculus, juniperanus, monophyllae, nigrisquamus, occidentalis, tricinctus

18 Juniperanus Group: occidentalis

18' Fraterculus Group: auranti, cochise, jucundus, mirus

20 Rostratus Group: pintoi

21' Conspurcatus Group: ramosus

22 varius

22' Fraterculus Group: mellarius, politus

24 Rostratus Group: borregoi

25 Juniperanus Group: occidentalis

26 Aurora Group: cercocarpi, dumicola, tobrendae

26' Fraterculus Group: commissuralis, corticola, fraterculus, heidemanni, palmeri

28 Rostratus Group: strigosus

30 Junceus Group: coniferalis

31 mesillae

31' Conspurcatus Group: bituberis, californicus, calli, calvus, conspurcatus, empirensis, juliae, ketinelbi relativus, utahensis

32 Fraterculus Group: umbrosus

32' Rostratus Group: borregoi, catalinae, difformis, yuma

34 Juniperanus Group: occidentalis

35 Conspurcatus Group: juliae

35' Fraterculus Group: chihuahuanae, mellarius, simulatus

36 Aurora Group: angustatus, aurora, ceanothicus, cercocarpi, dumicola, lattini, sagax, tobrendae

36' Fraterculus Group: piceicola, schuhi

38 vau

39 Plenus Group: electilis

41 becki

41' Juniperanus Group: cuneotinctus, vanduzeei

42 Interspersus Group: viridescens

43 Pulchellus Group: pulchellus, rubroornatus

44 roseotinctus

45' Roseipennis Group: fuscipennis

46 Rostratus Group: consors, geniculatus

46' Plenus Group: hirsuticus

48 Pulchricollis Group: torridus

49 Plenus Group: tenerum

52 Listi Group: albicuneatus, hispidus, listi

53 Juniperanus Group: breviusculus, miniatus

53' Fraterculus Group: mellarius

54 radiatae

54' Stellatus Group: alpestris

56 Stellatus Group: stellatus

56' Fraterculus Group: comulus

57 Junceus Group: dreisbachi

57' shoshoni

59 Lasiomerus Group: lasiomerus, pallidicornis, rubropictus

60 Laevis Group: laevis, rolfsi

61 Interspersus Group: interspersus, kiowa, navajo, viridescens

63 canescens

64 varipes

66 maritimus

66' Plenus Group: stitti, tenerum

67' Fraterculus Group: jucundus, mellarius

68 Listi Group: carnosulus

68' Plenus Group: ingens, stitti

69 Candidus Group: candidus

70 Rostratus Group: strigosus

71 Roseipennis Group: fuscipennis, planituberis, roseipennis, validus

73 Plenus Group: ingens, seminotatus, stitti

73' Fraterculus Group: auranti, cochise, mirus

74 Junceus Group: nigrifrons

74' Cunealis Group: cunealis, fuscosignatus, hettenshawi, rubrimaculatus, rufoscriptus, sewardi

76 Tiliae Group: populi, tiliae

78 Listi Group: carnosulus

78' Junceus Group: alpinus, dreisbachi, knowltoni, nobilis, rainieri, tricinctipes, usingeri, yollabollae

79 omani

80 Stellatus Group: angusticollis

81 neglectus

81' decurvatus

83 Plenus Group: aridus, breviatus, desertinus, formosus, hirtus, ingens, megatuberis, plenus, quadriannulipes, reticulatus, roseus, solanoi

84 Plenus Group: conspicuus

86 Plenus Group: roseus

87 histriculus

87' Tiliae Group: dimidiatus, populi

88 Plenus Group: longihirtus

89 Plenus Group: bakeri

90 Fraterculus Group: jucundus

91 Gracillatus Group: gracillatus, tenuis

91' canescens

92 Junceus Group: nigrifrons

92' Gracillatus Group: gracillatus, tenuis

APPENDIX F

ABBREVIATIONS

Cmp. = Camp

Cmpgd. = Campground

Crk. = Creek

Co. = County

Cyn. = Canyon

For. = Forest

Ft. = Fort

Hwy. = Highway

Int. = Interstate

Is. = Island

Jct. = Junction

Lk. = Lake

Mdw. = Meadow

Mon. = Monument

Mt.(s.) = Mountain(s)

Nat. = National

nr. = near

Pk. = Park

R. = River

Rd. = Road

Rdg. = Ridge

Res. = Reservoir

Rgr. = Ranger

Rsrh. = Research

Rt. = route

Spg.(s.) = Spring(s)

Smt. = Summit

St. = State

Stn. = Station

INDEX TO SPECIES

(junior synonyms are indicated by an asterisk)