The genus *Deraecoris* Kirschbaum of western America north of Mexico was revised. Approximately 10,000 specimens from the Nearctic Region were examined. Taxonomic characters used by previous authors were reevaluated. In addition to the male parameres, the male vesica and the female posterior wall of the bursa copulatrix and sclerotized rings were used extensively in distinguishing species. Even though the species of this genus are predaceous, known host plants were used to assess the distribution of the species. Six species-groups are recognized based on comparative, quantitative and cladistic analysis of morphological and ecological characteristics. Forty-four species and one subspecies are known to occur in western North America.

Five new species, *Deraeocoris fraserensis*, *D. cochise*, *D. gilensis*, *D. knightonius*, and *D. schuhii* are described. *D. incertus* variety *picipes* Knight is given species status. The following synonymies are
proposed: D. rufusculus Knight = D. incertus Knight, D. pilosus Knight = D. fulvescens (Reuter), D. californicus Knight = D. cerachates Uhler, D. incertus variety carneolus Knight = D. picipes Knight. The remaining varieties named by H. H. Knight are recognized only as color forms of their respective nominal species. Until more specimens are secured and its range assessed accurately, D. barberi hesperus is retained as a subspecies of D. barberi, even though it shows some differences in the shape of the posterior wall of the bursa copulatrix.

The male and female genitalia were found to be useful taxonomic characters for the genus. Intraspecific variation of the characters appeared to be significantly smaller when mature specimens are compared.

Most species breed on one or several host plant species within a given type of habitat. The incertus and barberi groups breed exclusively on conifers. The remaining groups live on dicotyledonous shrubs or trees. Many species are known to feed on aphids, chermids, psocids and coccids. Several species, including D. brevis and D. nebulosus, are of importance in the control of some orchard pests.
A Revision of the Genus *Deraeocoris* Kirschbaum (Heteroptera:Miridae) from Western America North of Mexico

by

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A REVISION OF THE GENUS DERAEOCORIS KIRSCHBAUM
(HETEROPTERA: MIRIDAE) FROM WESTERN
AMERICA NORTH OF MEXICO

INTRODUCTION

The family Miridae, the largest of the order Heteroptera, is composed mainly of plant-associated species. The majority of the mirid species are phytophagous. However, some groups are known to be chiefly predacious on other arthropods or to have a mixed diet. The family Miridae has attracted many workers, not only because of its size and diversity, but also because many mirid species were serious pests of cultivated plants. Despite the large volume of work done on mirids, basic taxonomic studies at the species level and even at the higher category level are still needed for most groups.

The subfamily Deraeocorinae (recognized by Schuh, 1976, as a tribe of the Mirinae but here retained as a subfamily) is comprised of six tribes: Deraeocorini, Clivinemini, Hyaliodini, Saturniomirini, Termatophylini, and Surinamellini. As pointed out by Schuh (1976), there is no consensus at present on the limits of the Deraeocorinae. Comprehensive studies on the definition of the subfamily and on the relationships between its higher taxa are lacking and are needed.

The tribe Deraeocorini includes approximately 260 species contained within 25 genera and distributed throughout the major faunal provinces of the world (Carvalho, 1957). The genus Deraeocoris
contains approximately 200 species distributed in most part of the world. This genus is represented by approximately 60 species in the Nearctic Region, 50 of which have been recorded from western North America. Many species of Deraeocoris have been reported in the literature to have predatory habits. However, at this time, these reports do not permit a general conclusion on the habits of the tribe or the subfamily as a whole.

The species of the genus Deraeocoris breed on shrubs and trees. All but the members of the former genus Camptobrochis overwinter in the egg stage. The eggs are inserted in living plant tissue. The number of generations per year varies, depending on the species. For example, D. brevis (Uhler), the most common species in the western Nearctic Region, has at least four generations per year, according to McMullen and Jong (1967). However, most species have one or two generations per year. Nymphs and adults of many species are known to prey upon small insects such as aphids, chermids, psocids, psyllids, and upon small nymphs or larvae of other insects. Most species are associated with one or several host plant species within a given type of habitat or with several related host plant species, while a few species are known to breed on a large number and often unrelated plant species. D. brevis has been reported to feed occasionally on plant parts, without appreciable damage (McMullen and Jong, 1967). The writer has observed this species and several others feeding partially on plant material.

The choice of this problem has been motivated by the writer's interest in predacious Hemiptera and by a previous study on the genus
Deraeocoris and Deraeocapsus of Oregon. Despite the work of H. H. Knight (1921, 1927, 1941 and 1968), the genus Deraeocoris of North America is still in need of a taxonomic revision. The main goals of this research are to revise the genus Deraeocoris of western America north of Mexico on the basis of the male and female genital structure, and other taxonomic characters as well, and to gather and put distributional, biological, ecological and bibliographical information into usable form for future research.
The genus *Deraeocoris* was created by Kirschbaum in 1855 as a subgenus of *Capsus*. Stål (1865) was the first to use *Deraeocoris* as a generic name. At the same time, Douglas and Scott (1865) also used *Deraeocoris* as a genus name but all the taxa they included in it are now placed in different genera of the subfamily Mirinae. However, due to the absence of a comprehensive study of this cosmopolitan genus, depending on the region, the species of the present genus *Deraeocoris* were assigned to different genera. These names are listed in the synonomical bibliography. The genus was not clearly defined until Distant (1904) fixed *Cimex olivaceus* Fabricius, 1776, as the type-species of the genus *Deraeocoris*. At the same time, Distant (1904) fixed *Lygaeus punctulatus* Fallén, 1806, as the type species of the genus *Camptobrochis Fieber* (1858). The North American species of *Deraeocoris* were assigned to the following genera: *Callicapsus* Reuter (1876), *Euarmous* Reuter (1876), *Mycterocoris uhler* and *Camptobrochis Fieber*. Poppius (1912), after studying the African Miridae, placed *Camptobrochis* as a synonym of *Deraeocoris*. Although many authorities recognized that these two groups were distinct, no action was taken to restore *Camptobrochis* as a separate genus. However, Van Duzee (1916), in his Catalogue of the North American Hemiptera (1917), assigned all of the American species of the genus into *Camptobrochys* and limited the use of *Deraeocoris* to *D. ruber* (Linn.), *D. fraternus* Van Duzee and *D. ingens* Van Duzee. The last two species were placed in a different genus by Knight (1921); the first was introduced into North America from Western Europe. Knight's
monograph of the species of the genus *Deraecoris* (1921) was the most important and most comprehensive work on the species of the genus of North America. He adopted the synonymy established by Poppius and used *Camptobrochis* as a subgenus of the large genus *Deraecoris*. In the above monograph, Knight described 38 new species of the genus from America, north of Mexico.

Since Knight's monograph, very little has been done on the genus *Deraecoris* of North America. Most of the work done on this genus was of a taxonomic nature. The North American species of the genus have been described by Uhler (1872, 1887, 1894, 1904), Reuter (1876, 1907), Van Duzee (1914, 1916, 1917, 1920), MacAtee (1919), Knight (1921, 1927), Bliven (1956), Akingbohungbe (1972) and Kelton (1980).

Species of *Deraecoris* were usually included in local or regional surveys of Hemiptera or Miridae such as: Van Duzee (1914, 1916, 1917), Knight (1923, 1941, 1968), Blatchley (1926), Froeschner (1949) and Scudder (1961).

The most important sources of references for the Deraecorinae of North America are Van Duzee's 'Catalogue of the Hemiptera of America North of Mexico' (1917), and Carvalho's 'Catalogue of the Miridae of the World' (1957 to 1960).

Most of the work done on the taxonomic characters and classification concerns the higher categories at the subfamily level, but they are essential in understanding the position of *Deraecoris* in the family Miridae. The pretarsal structures have been the characters most used in the classification of the Miridae. The following authors
have used these structures in the classification of the Miridae: Reuter (1905, 1910), Knight (1918, and subsequent work), Wagner (1955), Carvalho (1952) and Schuh (1974, 1976). The last author, in his 1974 paper, gave one of the most interesting discussions on the classification of the Miridae and their taxonomic characters. The genital structures are at least of equal importance to the pretarsal structures in the classification of the Miridae. However, although used extensively at the species and generic levels, their use for the higher classification in the Miridae has been limited compared to the pretarsal structures. The following works are important in understanding the genital structures of the Miridae and their terminology: Singh-Pruthi (1925), Knight (1923), Davis (1955), Dupuis (1955, 1956), Kullenberg (1947), Scudder (1959), Wagner and Weber (1964). Slater (1950) investigated the female genitalia, especially the posterior wall of the bursa copulatrix and the sclerotized rings as taxonomic characters in the Miridae. He included five species of Deraeocoris in his study. Kelton (1959) intensively studied the male genitalia of the Miridae and included six species of Deraeocoris. Schuh (1975) investigated the trichobothria of the Miridae as potential taxonomic characters, that could be used along with the parempodia. Akingbohungbe (1974) studied the dorsal abdominal glands of the nymphs of the Miridae and used them, together with pretarsal structures and other characters, to make a key to the subfamilies for fourth and fifth instar nymphs. Leston (1957, 1961) studied the cytotomy and the testis follicle number of the Miridae. He used these characters with the genital structure to draw a phylogeny of the

Biological studies of the species of Deraeocoris are not common. The eggs of terrestrial Hemiptera have been described by Southwood (1956). The structure and function of the egg shell of Deraeocoris ruber (Linnaeus) was studied by Hartley (1964). This species is European in origin but now found in the northeastern United States and Canada. Sanford (1964) described the eggs and the oviposition sites of a few predacious mirids, including D. fasciolus Knight. In his study of the biology of D. brevis (Uhler), Westigard (1973) mentioned that the eggs of this species were inserted in pear leaf petioles.

The nymphs of the North American species of the genus are poorly known. Knight (1921) described the fifth instar nymph of a few species taken with the adults. Wheeler et al. (1975) studied the biology of D. nebulosus (Uhler) and gave a description of the nymphal stages of this species.

The majority of the species of this cosmopolitan genus has been reported to be predacious on the eggs, larvae or adults of other species of insects. However, despite the large number of reports on the predacious habit of the species of Deraeocoris, studies on the food requirements or feeding strategies of these species are still uncommon. The predacious habit of some North American species of the genus and their prey has been reported by Knight (1921), Blatchley (1926), Knowlton (1935, 1946), Gilliat (1937), MacPhee and Sanford
Wheeler et al. (1975) and MacLellan (1977).

Host plant association for several species of the genus has been
reported by Knight (1921, 1923, 1927, 1968), Blatchley (1926).
MATERIALS AND METHODS

Approximately 10,000 specimens of Deraeocoris have been examined during this study. Specimens of other genera of the tribe Deraeocorini were also examined. In addition to the collection of the Oregon State University Systematic Entomology Laboratory, specimens were borrowed from most major collections in the United States and Canada. A listing of the collections, curators and abbreviations is included in the Acknowledgments.

Many places in Oregon were visited by the writer from 1976 to 1979 in order to obtain additional specimens and to gather information on the distribution, host plants and the biology of Deraeocoris. Collection efforts were concentrated on known host to secure live specimens for observation.

The type specimens of the majority of the species were examined during a visit to the U.S. National Museum in Washington, D.C. in 1979. Most of the H. H. Knight collection and many of the specimens he examined for his monograph of the genus (1921) are also contained in the U.S. National Museum. Other type specimens were kindly loaned by Dr. P. H. Arnaud, Jr. of the California Academy of Sciences. Many of the paratypes or specimens identified by H. H. Knight were also present in several collections.

After identification of all the specimens examined, label data were recorded for each specimen and arranged by species, states or provinces, counties and localities. Label data were recorded as accurately as possible since most species of western North America
are known only from very few specimens. These label data may be valuable for future study of the genus. The area covered in this revision include the following states or province: Alaska, British Columbia, Washington, Oregon, Idaho, Montana, Wyoming, California, Nevada, Utah, Colorado, Arizona and New Mexico. It is noted that many extralimital specimens also were examined during this study.

For each species, male and female genitalia of specimens from different parts of its range were examined. The number of specimens dissected varied according to their availability. Only dried specimens were used for the study of the genitalia. The specimen was first dipped into hot water for five minutes in order to be removed from the point. This allowed the specimens to be relaxed and avoided unnecessary damage. To remove the abdomen, a little pressure was applied on each side of the attachment of the abdomen to the thorax. Once the abdomen was removed, the specimen was remounted on the point. The abdomen was dipped in hot water to enhance the action of potassium hydroxide. After five minutes, it was placed into approximately ten percent potassium hydroxide for a period of five to fifteen minutes, depending on the species. Then the abdomen was transferred into a small dissection dish and dissected in potassium hydroxide under the microscope. For the male, the dorsal plate was removed first and by means of two pairs of fine forceps, the phallotheca and the parameres were freed from the genital capsule and placed into distilled water. Usually the vesica inflated after ten to fifteen minutes. If it did not, the phallotheca and the claspers were placed into a small vial
containing a small amount of glycerine for 24 hours. After that period, the vesica was transferred into distilled water and eventually inflation took place. In a few cases, it was necessary to direct the endosoma out of the phallotheca because the membranous lobes of the vesica were refrained from inflating by the sclerotized structure of the phallotheca. The female abdomen was treated in the same way as mentioned above. The dorsal plate was removed first. Then the abdomen was replaced in hot potassium hydroxide to get rid of the membranous and fatty materials. When the sclerotized rings were clearly exposed, the abdomen was dipped in a very dilute acetic acid solution to neutralize potassium hydroxide and washed thoroughly in distilled water. The female genitalia was dissected in glycerine. The method used for dissecting the female genitalia was as follows: the abdominal sclerites were removed first. The next step was to free the first rami from the second valvifers. This was done by breaking the ramal plates with a pair of forceps. Then the rami were pulled alternately and forward, while with another pair of forceps the valvifers and the second valvulae were held firmly. At the end of this operation, the sclerotized rings, the anterior parts of the bursa copulatrix and the first valvulae were separated from the posterior wall of the bursa copulatrix which remained attached to the second rami and the second rami and the second valvulae. For illustration purposes, the posterior wall of the bursa copulatrix was removed by inserting a fine and sharp needle along the inner margin of the second rami and the anterior edges of the ovipositor. After dissection and study, the
parts were placed in a microvial containing glycerine and attached to the pin holding the specimen.

Description or redescription of each species was made taking into account the size and color variations. A range is given for each measurement when there was appreciable variation. All the measurements were taken with a microscope using an eyepiece micrometer. The drawings were made at the same scale unless otherwise indicated. All the measurements are given in millimeters. The total lengths of the insects were measured using 15x magnification while the other structures were measured or examined using 45x and 90x magnifications.

In addition to the description, distribution and information on host plant are provided for each species, whenever available. Discussion of color or structure polymorphism is also included.

METHODS OF CLASSIFICATION

The species delimitations have been decided on the basis of comparative studies of morphological and distributional differences and similarities. Male and female genital structures were used in preference to any other morphological characters to distinguish between closely related species.

The species-groups were defined by comparative study of the available characters and by quantitative assessment, using a UPGMA (unweighted pair-group method using arithmetic averages) clustering method. This method is outlined by Sneath and Sokal (1973). For each species, 20 characters were selected. Morphological, ecological
and distributional characters were included. A list of the characters and of their states is included in the Appendix. For a few species, character states were estimated or taken from previous descriptions. Computation of the dissimilarity matrix and clustering was performed with a program called CLUSTER, written by Dr. J. A. Keniston of the Oregon State University Marine Science Center. The Canberra metric option was the measure of dissimilarity used in this analysis because it is a property solely of the species being compared and is not affected by the range of the entire characters.

The cladistic analysis of the species-group was performed using the WAGNER 78 maximum parsimony program of Dr. J. S. Farris, Department of Biological Science, State University of New York, Stony Brook. References and discussion of this method are found in Schuh and Polhemus (1980). The aim of this program is to produce the most parsimonious tree or cladogram with the minimum number of character changes. Among other information, it gives the character changes leading to each stem (terminal taxon or hypothetical ancestor), the synapomorphies (shared derived characters) and the length (in steps) of each stem. Only characters showing the least amount of variability were selected for each species-group. A list of the characters and the cladogram of relationships between the species-groups are included in the Appendix. It is stressed that the only implied relationships in the cladogram are between species-groups on the basis of synapomorphies or shared derived characters.

All the computations were performed on the CDC Cyber computer of
Dissimilarity and distance matrices are deposited on file at the Systematic Entomology Laboratory, Department of Entomology, Oregon State University.

**BIOLOGY**

The biology, ecology and behavior of the majority of the North American species of *Deraeocoris* has not yet been studied in detail, with the exception of a few species.

The majority of the species of *Deraeocoris* overwinter in the egg stage. Collection records show that most of these species have only one generation per year. However, some species may have two generations per year because the adults are collected from late May to early October. The number of generations per year may vary from one area to another. For example, *D. fasciolus* has been reported by McMullen and Jong (1967) to have two generations per year in British Columbia pear orchards. It has only one generation per year on *Corylus* sp. in Oregon.

The species of the subgenus *Camptobrochis* are known to overwinter in the adult stage both in the Palearctic and Nearctic Regions. Males and females hibernate in crevices and under loose bark of their host plant or on plants such as conifers which are not the usual host plants for these species. *D. brevis*, for example, is abundant on shrubs or small plants such as *Artemesia* spp. during the summer but is found on conifers early in the season and late in the fall. Westigard (1973)
reported that the overwintering adults of *D. brevis* were found under loose bark of ponderosa pine and black oak near a pear orchard. However, this species was abundant in the pear orchard during the summer and early fall. It is not known whether the adults mate in the fall before hibernating or in the spring before oviposition. Females of *D. brevis* and *D. validus* taken during the winter in January did not contain developed eggs.

The eggs are inserted in living plant tissue, leaving the upper part of the collar exposed. According to Sanford (1967), the eggs of *D. fasciolius* are inserted in crevasses, where the bark is incurved at the twig axils. The eggs of *D. brevis* are inserted in twigs and also in leaf petioles (Westigard, 1973). The eggs are laid in August and September for the majority of the species. Species living in desert-like habitats oviposit in June and July. The first generation of the species of *Camptobrochis*, which overwinter as adults, lay their eggs in the spring. Eggs of the second generation are laid in late summer for the overwintering generation.

The species of *Deraeocoris*, like most mirids, have five nymphal instars. The time required for the nymphal development depends upon species, ecological factors such as prey availability, temperature and geographical region. In *D. brevis*, the development time from first instar to adult was approximately 25 days (Westigard, 1973). Wheeler, et al. (1976) found a development time of 19.8 days for *D. nebulosus*. The writer found a duration of 20 to 30 days for the nymphal instars of *D. fulgidus*, *D. fusifrons*, and *D. rubroclarus* taken from the field,
usually reached the adult stage in a period of six to twelve days when supplied with fresh leaves and aphids in petri dishes.

The adults of most species require a period of about one week or more before their genital structures are mature after moulting from the fifth instar. The longevity of the adults is not known with certainty. It could be estimated that the overwintering adults of the species of the Camptobrochis live at least six months. Collection records show that the adults of species living in forest habitats are collected from June to September, while those living in dry and desert habitats are collected from April to early July.

Both nymphs and adults of Deraeocoris are predacious. Aphids, psyllids, chermids and psocids are among their most common prey. Many species are likely to feed on more than one prey species, since the majority of Deraeocoris are known to breed on different host plants. It is found that different host plant species have different species of aphids and that closely related host plant species do not necessarily have closely related species of aphids. Specificity with regard to host plant varies depending on the species of Deraeocoris. D. brevis has been recorded from more than 30 host plant species; often unrelated taxonomically. Some species, like D. incertus, are found only on conifers of the genus Abies, Pseudotsuga and Pinus. D. fulgidus is found only on species of plants occurring in the sage brush floristic association. D. diveni is found only on Pinus contorta Dougl. It appears that the degree of specificity with regard to the host plants is a good measure of prey preferences. Wheeler et al. (1975) listed
the known prey species of *D. nebulosus*.

Cannibalism has been also observed in some species in the western United States. At this time, it could not be assessed whether this cannibalistic behavior is common in the genus. The nymphs are vulnerable when molting from one instar to another. They remain motionless for a period of one to two hours, during which time they could be attacked by other nymphs and adults. Cannibalism has been observed in the field for *D. brevis*, *D. bakeri*, *D. fulgidus* and *D. piceicola*. It is noted, however, that on these occasions the prey populations were abundant. When several nymphs are confined together in the same petri dish, usually they will prey on each other, even if they are given adequate supply of aphids. It is not known if cannibalism plays a role in the scarcity of most species of *Deraeocoris* and if it does, to what degree.

Partial phytophagy has been reported by McMullen and Jong (1967) for *D. brevis*. The writer has confirmed this fact for the same species and several others. Fourth instar nymphs of *D. fulgidus*, *D. fasciolus*, and *D. piceicola* have been reared to the adult stage, supplied only with leaves of bitterbrush, filbert and spruce, their respective host plants. Adults and nymphs of *D. incertus* have been observed to feed occasionally on Douglas fir twigs even if they were confined with an abundant supply of aphids (*Cinara* sp.). In addition, this species has also been observed to feed on honey dew of the same aphid, on fir needles. *D. fusifrons* has also been observed to feed on oak leaves. At present, no valid explanation of this partial feeding can be put forward without a thorough investigation of the feeding tendencies and
strategies of the entire subfamily Deraeocorinae. Partial phytophagy could be interpreted as host plant recognition for species in which hatching of the eggs must be timed with the host plant and prey population. It may also reflect a certain physiological requirement.

In most species of the genus Deraeocoris, the wing to body ratio is greater in males than in females. However, the females of the genus are never brachypterous; the wing to body ratio in females is equal to or greater than one. The writer has also found more chemoreceptors of the 'sensilla basiconica' type on the second antennal segment of the males than on the females. It appears then that the males are dispersing more than the females. Collection records indicate the males of many species mature before the females. The roles of the scent gland in Deraescoris are not yet known. It could be assumed that it has a purely defensive function in the nymphs and it may be sexual or defensive or both in the adults.

This chapter illustrates the need for further research on the ecology and behavior of the genus Deraeocoris and of the subfamily Deraeocorinae.
DISCUSSION OF TAXONOMIC CHARACTERS

The characters considered in this study are those thought to be most essential for distinguishing the species-groups and the species of *Deraeocoris* of western North America.

**Total length of insect.** The total length is measured from the base of the rostrum to the tip of the membrane with the insect turned on the side. Length varies within the species but often the range can be useful for distinguishing some species.

**Head.** Length, width across the eyes and width of vertex are measured. These characters vary less than any other measurements. The width of vertex is a good character when compared with the length of the first antennal segment or with the width across the eyes. It is sometimes useful for distinguishing species and also species-group. The relative length of the rostrum, with reference to the position of the tip when it is parallel to the underside of the body is often a good indication of specific difference. In most species, the tip reaches upon the middle coxae; in others it reaches the hind coxae or surpasses it. The carina of the vertex is either well-defined or obsolete, depending on the species or sometimes upon the species-groups. The front may be nearly flat, moderately or strongly convex, depending on the species.

**Antennae.** Each segment is measured. The length of the first antennal segment varies less than that of other segments. The second segment is useful for distinguishing species; it varies in shape, vestiture and coloration; its length shows variation within species but the range is still a good character at the species and species-group level.
The length of the third segment is often a good diagnostic character for species and species-group.

**Thorax.** Length, anterior width and posterior width of the pronotum are measured. The length, taken from anterior margin of collar to posterior margin of pronotal disk is often useful when compared with the length of the second antennal segment. In some species, the length of the second antennal segment is shorter than the length of the pronotum, while in many others it is longer. The pronotal disk is flat or convex depending upon the species. The lateral margins may be nearly straight or concave and feebly to strongly carinate. The punctation of the pronotal disk is usually a good diagnostic character for species; the punctation may be dense, sparse, fine, coarse, deep or shallow. The calli vary in shape and coloration between species; they constitute one of the best diagnostic characters at the species level in Deraeocoris. The scutellum varies from flat to strongly convex and from punctate to impunctate; the presence or absence of punctation is an important diagnostic character at the group level. The hairiness of the pronotal collar and the color sometimes is good for distinguishing species. The underside of the thorax shows a great similarity between the species of Deraeocoris of western North America.

**Hemelytra.** The greatest width across the hemelytra is given as the greatest width of the insect; when compared with the total length, the width across the hemelytra is a diagnostic character for the species-groups. The density of punctures and length of the cuneus are sometimes useful for distinguishing species. The embolar margins may be straight
or arcuate. The color of the membrane in some groups is used as distinguishing character.

Legs. Banding patterns of femora and tibiae are often useful for distinguishing species. This character, like any other based on coloration, shows variability, but when the range of variation has been assessed, it is sometimes a good diagnostic character for individual species. The types and length of the setae on tibiae and femora are also good diagnostic characters at the species and species-group levels. The presence or absence of a basal tooth on the claw is, along with the punctation of the scutellum, one of the most useful diagnostic characters for the species-groups. It is noted here that in one-third of the North American species, the claws are not toothed at the base. This condition is known to occur only in some nearctic species of the genus.

Parameres of the males. Both left and right parameres are drawn for the male. The sensory lobe of the left clasper is very useful for distinguishing species while the apical processes of both are used for distinguishing between species-groups. The parameres show very little intraspecific variation. However, only the parameres of mature adults should be used for comparison. The terms 'genital clasper' or 'clasper' are often used for paramere.

Vesica. Known also as endosoma, aedeagus or phallus, this structure has many useful characters that could be used at different levels, ranging from the species to the subfamily level. The sclerotized plates around the secondary gonopore are found only in the Deraeocorinae; their shapes are used to diagnose groups or species. The shape and
number of the sclerotized spicules are very good for distinguishing between groups and species. The number and shape of the membranous lobes are useful species-group characters; they should only be used for comparison between closely related species when full inflation is achieved.

**Posterior wall of bursa copulatrix.** The posterior wall of *Deraeocorinae* consists of a simple plate with a pair of sclerotized lobes connected mesally by a narrow or a broad bridge. The sclerites are referred to by Slater (1950) as the 'A' structure and as the 'interramal sclerite' by Davis (1955); the dorsal and ventral margins of the posterior wall are membranous. The shape and the size of the 'A' structure are good diagnostic characters at the species level.

**Sclerotized rings.** The rings and the structures supporting them are useful for group and species diagnoses. Four structures are compared: the rings, the connecting sclerites (connecting the rings to the rami), the dorsal labiate plate (connecting both rings) and the sclerotized ring glands (semi-membranous lobes beneath and in front of the rings).

**Coloration.** Intraspecific variation or color polymorphism is common for the majority of the species studied. The range of color variation is given for each character. Coloration of the dorsum or of a given structure is a good preliminary diagnostic character for species when the range of variation is known.

**Setae and pubescence.** The presence, absence, type and length of setae on the dorsum or other parts of the body are good taxonomic
characters for both species and species-group levels. In this study, setae are called pubescent when they are short and inconspicuous; a structure is pilose when it is covered with long flexible setae (often slightly bent at tips and equal to or greater than longest setae on second antennal segment in length); finally, a structure is called setose when it is covered with stiff and erect setae. A spinose seta is a thickly sclerotized seta, i.e., those found on the anterior surface of the tibiae in the species of the brevis group and of the incertus group.

Nymphs. The nymphs of Deraeocoris are very similar in structure. Their sizes vary depending on the species. Two main groups can be recognized: the nymphs of the brevis group are covered with thick, black setae, often enlarged toward the tips; these setae are also present in the incertus but they are tapering toward the tips. The nymphs of the species of the remaining groups are covered with simple, long setae.
CLASSIFICATION

The subfamily Deraeocorinae is represented by four tribes in North America. Termatophylini, Clivinemini, Hyalodini and Deraeocorini. The Deraeocorinae are recognized mainly by their pretarsal structure. The claws are toothed or thickened at the base. The pulvilli are absent and the parempodia setiform. The posterior wall of the bursa copulatrix consists of a simple A structure and sometimes a structure similar to the B structure. The sclerotized rings are well-developed, often twisted or looped. The vesica shows great diversity. The gonopore opens in an area surrounded by sclerotized, often serrate plates and does not form a ring-like structure as in the Mirinae. According to Kelton (1959), the type of gonopore found in the Mirinae may have evolved from that of the Deraeocorinae. Slater (1950) pointed out that the posterior wall of the Capsinae (now Mirini) may have arisen possibly from that of the Deraeocorinae. However, the sclerotized rings of the Deraeocorinae are more complex than those of the Mirinae and show a closer relationship to the Orthotylini. The classification of the Deraeocorinae presents many problems. In this study, I retained the Deraeocorinae as a subfamily although it is recognized as a tribe of the Mirinae by Schuh (1976). Both subfamilies are related on the basis of the vesica. The posterior wall, the absence of pulvilli and the setiform parempodia are plesiomorphic in the Deraeocorinae. In addition, I consider the presence or absence of the pulvilli correlated to the presence or absence of a basal tooth on the claw. In Schuh's classification (1976), based on the above characters, I would derive the Mirinae from the Deraeocorinae. Finally, as pointed out by the same author...
(1976), in-depth studies of the Mirinae and the Deraeocorinae, with extensive out-group comparisons to further test their monophyletic nature, are very much needed.

Four tribes are represented in North America. Keys to these tribes and the included genera are found in Carvalho (1955), Knight (1941, 1968), Blatchley (1926) and in Slater and Baranowski (1978). The following list shows the tribes and the genera found in North America:

- Termatophylini: **Hesperophylum, Conocephalocoris**
- Hyaliodini: **Hyaliodes**
- Clivinemini: **Clivinema, Largidea, Bothynotus**
- Deraeocorini: **Deraecoris, Deraeocapsus, Eurychilopterella, Eustictus, Klopicoris, Strobilocapsus, Diplozona**

At present, very little is known about the phylogenetic relationships between these tribes.

The genus **Deraecoris** is the largest of the Deraeocorinae because it contains more than three-fourths of the species of this subfamily. The following discussion applies only to the species of western North America and to some extent of the Nearctic Region. Many extralimital species were also examined during this study.

**Deraecoris** and **Camptobrochis** were synonymized by Poppius in 1921. However, there are many important differences between these two taxa. The species of **Camptobrochis** (now considered a subgenus) overwinter in the adult stage while those of **Deraecoris** overwinter in the egg stage. The types of parameres, vesica and sclerotized rings found in these two taxa are very different. This dissimilarity is evident in the phenogram
shown in the Appendix. A comprehensive study of the species of the
world, in the light of characters such as the male and female genitalia,
is needed to decide the limits of Deraeocoris and whether Camptobrochis
is part of this genus. In this study, the subgenus Camptobrochis is
represented by the species of the brevis group.

The brevis group is represented by nine species. The species of
this group are easily distinguished by the toothed claws and the punc-
tate scutellum. The genitalia show a close relationship between the
species. Most species are known to overwinter in the adult stage. The
majority of the species live on herbaceous plants or shrubs. Many
characters of this group are interpreted as plesiomorphic in this study
but as mentioned above, there is the possibility that the subgenus
Camptobrochis, as typified by Deraeocoris punctulatus Fallén (a palearc-
tic species), and the species of brevis group studied herein, ought to
be removed from the genus Deraeocoris.

The incertus group contains only three species. They are closely
related to the species of the brevis group, except for the absence of a
basal tooth on the claw and the claspers which are more related to the
other groups. All three species are breeding on conifers and are ex-
clusive to the western Nearctic Region. They overwinter in the egg
stage.

The fasciolus group is represented by six species in western North
America. These species are recognized by the absence of punctures on
the scutellum and by the genitalia. The posterior wall of D. fasciolus
has a distinctive shape not found in any of the species studied but all of
the species of this group resemble *D. fasciolus* in general appearance. All species of this group live on broad-leaved trees, mainly oaks.

The *schwarzi* group contains four species. They are easily recognized by the posterior wall of the bursa copulatrix and the rounded and convex body shape. They occur in the Intermountain Sagebrush and American Desert Provinces.

The *fenestratus* group is closely related to the *fasciolus* group except for the presence of hairs on the dorsum and the absence of spinose setae along the anterior surface of the tibiae. Ten species are included in this group. Seven are widely distributed in California and neighboring states and three in the Colorado Plateau.

The *barberi* group is the largest species-group of the genus in western North America. This group is exclusively nearctic. Thirteen species are recognized in this study. Like the *incertus* group, all species live on conifers. The claws are not toothed basally and the scutellum is not punctate. Two subgroups are recognized in this group based on the presence or absence of setae on the dorsum.

*D. triannulipes* was included in the *fenestratus* group by the clustering method but a close examination of this species puts it definitely in the *fasciolus* group because of the genital structures and the absence of setae on the dorsum.

The relationships between the species-groups are summarized in the cladogram shown in the Appendix.
The genus *Deraeocoris* is cosmopolitan. According to Carvalho's *Catalogue of the Miridae of the World* (1957), it is distributed in all the major biotic provinces of the world. However, no comparative and comprehensive study of the species of this widely distributed genus has been undertaken to date. A comprehensive collection is needed in order to assess the relationships existing between the species of the different biotic provinces of the world. The palearctic and the Nearctic species of the genus are better known than those of the remaining regions.

In North America, 66 species are now recognized and of these, only one is known to occur in two zoogeographic regions. *D. ruber* is widely distributed in the Palearctic Region but occurs also in eastern Canada and northeastern United States. Only five of the 44 species of western North America are known to occur on the east side of the Rocky Mountains, beyond the Great Plains. Although western North America represents only a third of the land surface of North America, it contains approximately two-thirds of the Nearctic species of the genus. This reflects the tremendous geographic and ecological diversity of western North America.

The *brevis* group is represented by nine species in western North America. Of these, *D. histrio* and *D. nebulosus* are common to both sides of the Rocky Mountains. Three species of this group, including *D. bakeri*, *D. brevis* and *D. nigrifrons*, are distributed primarily in the Intermountain Sagebrush Province and also in the Colorado Plateau. All three species are found mainly on *Artemesia* and *Chrysothamnus*. *D. brevis* is
widely distributed in western North America and is found on a wide range of host plants and habitats. *D. luridipes* is restricted to the southern California Coastal Sage Scrub community. *D. validus*, *D. tinctus* and *D. fraserensis* are found on vegetation along streams, lakes and wet meadows. *D. validus* is common along the streams of the Columbia River system; *D. tinctus* is at present known only from vegetation along the Colorado River and *D. fraserensis* is found along the Fraser River. *D. histrio* and *D. nebulosus* are common east of the Rocky Mountains but they occur rather locally in the West.

The *incertus* group is found only on conifers. *D. incertus* is common in the Cascade Mountains, the Sierra Nevada and the Rocky Mountains, on Abies, Pseudotsuga and Picea. *D. atriventris* and *D. picipes* are confined to the most southern part of the Rocky Mountains; they breed mostly on pine. This group is unique to western North America. It has no related species in any other zoogeographic regions.

The *fasciolus* group is represented on either side of the Rocky Mountains. *D. fasciolus* is distributed across North America, north of the 40° latitude. *D. quercicola*, *D. fulvus*, *D. triannulipes* and *D. cochise* are found in the southern Rocky Mountains on oaks. *D. shastan* is found on oaks in the mountains of northern California and the Sierra Nevada Mountains.

The *schwarzii* group is represented by four species. It has no related species east of the Rocky Mountains. *D. schwarzii* and *D. fulgidus* are widely distributed in the Intermountain Sagebrush Province. *D. bul-latus* lives on shrubs within the Desert Woodland Vegetation of southern California, Nevada, Arizona, Utah and Colorado. *D. convexulus* is the
only species of the genus known from the American Desert Province.

The barberi group has more species than the others. This group is unique to the Nearctic Region. All of the species of the barberi group breed on conifers. It is represented on either side of the Rocky Mountains. *D. barberi* is widely distributed in the Rocky Mountains, while its subspecies hesperus is found only in the Sierra Nevada and the Cascade Mountains. Two species, *D. albigulus* and *D. kennisotti*, have a northern boreal distribution. *D. rubroclarus* is found only in the Cascade Mountains and along the Coast Ranges, north of San Francisco. The remaining species of the group are distributed in the Rocky Mountains, the Cascades and the Sierra Nevada Mountains. The distribution of this group and of the incertus group suggests that they have related species in Mexico, in the Sierra Madre and the Mexican Plateau, but the Deraeocorinae of that region are still poorly known.

The fenestratus group is closely related to the fasciolus group but it is distributed mainly in California and the Colorado Plateau. There is only one species allied to this group: *D. sayi*, east of the Rocky Mountains. *D. balli*, *D. apache*, *D. comanche* and *D. gilensis* occur in the Colorado Plateau Province. *D. vanduzeei* is known from southern California and central Arizona. The remaining species of the group are distributed in California and Oregon.

Nine primary patterns of distributions are recognized in the genus Deraeocoris of western North America. The terminology used for these patterns is adapted from Bailey (1978) and Linsley (1958).

Northern or boreal. Species living on conifers, i.e., *Pinus*
banksiana Lamb. like D. kennicotti exhibit this distribution pattern. The northern part of the continent, however, has been collected very little. This pattern of distribution could explain the range of D. albigulus which at present is known from remote locations such as Pennsylvania and northern Idaho. The range of D. fasciolus is also northern but lies north of the 40th parallel (Map 1).

Pacific Forest Province. This pattern of distribution has been classed by Linsley (1958) as the Vancouveran Range, in the narrow sense. D. rubroclarus shows this distribution pattern (Map 2).

Sierran Forest Province. Several species of northern California exhibit this distribution pattern. The range may also be extended north in the Cascades for some species, i.e., D. barberi hesperus (Map 3).

California Chaparral Province. This distribution pattern is exhibited by many species of the fenestratus group (Map 4).

Intermountain Sage Brush Province. This is the primary range of several species of the brevis group and of the schwartzii group (Map 5).

Desert Province. D. bullatus is so far the only species known to occur consistently in this range (Map 6).

Colorado Plateau Province. Many species of the barberi group and of the fenestratus group are confined to this province and surrounding regions (Map 7).

Mexican Highland Province. D. picipes and D. cochise occur in southeastern Arizona and Southwestern New Mexico. These species with little doubt are probably part of the Mexican fauna (Map 8).

Vancouveran (in the broadest sense, Linsley, 1958). This range
covers the northern and southern parts of the Rocky Mountains, the Cascades, the Sierra Nevada Mountains, and the Coast Ranges. This pattern of distribution is common for many species of the barberi and the incertus groups. It is noted that all of these species live on conifers (Map 9).

Host-plant association is not yet definitely established for many species and that is also true for their range. Many species often have a broader range than the primary ranges described above. At this time it is not yet possible to make a more elaborate comparison of the distribution and the biogeography of all the species of western North America because most species are known from relatively small numbers and because of the great complexity of the region. This awaits further investigation.
GENUS DERAEOCORIS KIRSCHBAUM

Euarmosus Reuter, 1876, Ofv. Svenska Vet.-Ak. Föhr. 32(9):76.
Shana Kirkaldy, 1902, Ent. 35:315.
Plexaris Kirkaldy, 1902, Ent. 35:282.

Type species: Cimex olivaceus Fabricius, 1776 (fixed by Distant, 1904, Faun. Brit. Ind., Rhynch. 2:466).

The following diagnosis is based on the features of the species of the genus Deraeocoris known to occur in the nearctic region, and thus may not encompass all the characteristics of the world species of the genus:

Size 3.5 - 7.5. Body suboval or more or less elongate, dorsum punctate, head always and scutellum in most species, impunctate, hairy or nearly glabrous, shining; coloration yellowish, brownish, reddish brown, brownish or black, never green or greenish; female usually more...
robust and more ovate than male. Head triangular, broader than long; front moderately convex, smooth, glabrous but sometimes hairy; carina separated from collum by a distinct groove; posterior margin of eyes usually on the same line as posterior margin of head; tylus protruding and well distinguished from anterior part of front; juga, lora, bucculae, gula and genae well-defined; collum often exposed. Rostrum reaching upon middle coxae but in a few it reaches or surpasses hind coxae. Antennae inserted above anterior margin of eyes, beset with erect long hairs or fine pubescent hairs or both; segment I always extending beyond tip of tylus, segment II nearly cylindrical or slightly thickened at the tip in male, slender on basal half and thicker (in-crassate) toward apex in females; sensilla basiconica present on segment II; segment II and III nearly cylindrical. Pronotum trapezoidal, moderately convex, broader at base than long; pronotal collar forming narrow and complete ring, covered with short, fuzzy, pale pubescence, rarely with few, long, erect hairs; lateral margins of pronotum nearly straight, sometimes slightly concave, marginate or immarginate; calli flat or moderately convex, smooth, impunctate, often confluent, sometimes with two punctures between or one on each callus; scutellum punctate or impunctate, slightly to strongly convex. Hemelytra usually surpassing tip of abdomen except in female of very few species; male of most species more elongate than female; cuneus strongly deflected, fracture deep; membrane with two areoiles, the smaller one very much reduced. Legs moderately long; femora distinctly hairy or pubescent; tibiae beset with long, erect hairs and shorter pubescence; sometimes
with two rows of spines on hind pair; tibial comb present at apex of front tibiae, formed by a row of fine, soft hairs on ventral side and usually with one pair of spines at each end; on middle and hind tibiae, tibial comb replaced by a row of spines; first tarsal segment shorter than second; claws deeply cleft at base or without a distinct notch, pulvilli absent, parempodia setiform. Genitalia, male: left clasper with distinct sensory lobe, in some species it is not well-produced; right clasper much smaller than left and of variable shape; vesica with one or more membranous lobes and one or more sclerotized spiculi, secondary gonopore not sclerotized--female: posterior wall of bursa copulatrix consisting of a simple A structure, sometimes B structure present; sclerotized rings well-developed, of variable shape and size.

Key to the Groups of Species of the Genus Deraeocoris of Western North America

1. Scutellum distinctly punctate .......................... 2
   Scutellum not punctate (or only shallowly rugose-punctate as in D. piceicola Knight) .......................... 3
2. Claws deeply cleft near base. ............... brevis Group, p. 36
   Claws not cleft near base ................ incertus Group, p. 65
3. Claws not cleft or only with a slight indication .barberi Group, p. 139
   Claws deeply cleft. ................................. 4
4. Dorsum heavily pubescent or pilose; at least with several long setae, as long or longer than those on the second antennal segment, on lateral margins and anterior angles of pronotum (except in D. knightonius, where the pubescence of dorsum is often
not conspicuous; this species is distributed in California and Oregon) .................. fenestratus Group, p.109

Dorsum only sparsely and shortly pubescent or glabrous; pubescence on lateral margins and anterior angles of pronotum shorter than longest setae on second antennal segment. ........ 5

5. Body ovate, strongly convex, width equal to or greater than one-half the body length. ............... schwarzii Group, p. 95

Body elongate, no strongly convex, width smaller than the body length ............... fasciolus Group, p. 78

The brevis Group

Diagnosis: small size, less than 5 mm in length; dorsum glabrous or only with short and sparse pubescence; vertex carinate; scutellum punctate; lateral margin of pronotum straight, more or less carinate; hind tibiae with a distinct row of spinose setae; claws deeply cleft at base; left clasper with short and rounded sensory lobe and unbarbed apical process; vesica with two or more membranous lobes and one flattened, spiraled, sclerotized process; posterior wall of bursa copulatrix with a simple A structure; sclerotized rings of various shapes.

This group is named after Deraeocoris brevis Uhler because this is the most common species of the western Nearctic Region. All species of the brevis group are included in the former genus Camptobrochis Fieber, which was placed as a synonym of Deraeocoris by Poppius (1912). Most species of the subgenus Camptobrochis are known to overwinter in the adult stage and to have one or more generations per year. In western
North America the species of the *brevis* group appear to be adapted to
dry climatic conditions and are generally found in sage brush or sage
scrub-types of vegetation, with the exception of *D. validus* which is
usually found on vegetation along streams or lakes and wet meadows.
*D. brevis* although found on a wide range of host-plats, is more common
on *Artemesia*, during the summer months. The species of the subgenus
*Camptobrochis* are thought to have a predatory habit. Four species of
the *brevis* group are known to be predacious with certainty.

Key to the Species of the *brevis* Group

1. Dorsum red, with two large black spots on pronotum; corium
   and clavus also spotted with black. Mainly eastern in dis-
   tribution but found in Sacramento Valley, California, and
   in Idaho .................................. *histrio* (Reuter), p. 50
   Dorsum not red and black as above. ......................... 2

2. Head width equal to or greater than length of second
   antennal segment ........................................... 6
   Head width shorter than length of second antennal segment. ...

3. Membrane nearly clear, with two small fuscous spots
   on apical half. Mostly eastern in distribution, but
   found in Arizona, Utah, California, Colorado, New Mexico
   and Wyoming. .................................. *nebulosus* (Uhler), p. 54
   Membrane not marked as above, either hyaline or infus-
   cated on apical half ..................................... 4

4. Membrane hyaline or nearly so, pronotum and hemelytra uniformly
   black. Found in all western states on sage brush. Breeds
most commonly on species of *Chrysothamnus*. ... *bakeri* Knight, p. 39

Membrane with apical half infuscated, otherwise dorsum not uniformly black. ... 5

5. Median line of pronotum, at least posterior half, pale; head black, often two spots near eye margin on vertex and carina of vertex pale. Known from Wyoming, Utah, Idaho and Colorado. Breeds on *Chrysothamnus* and *Artemesia*. ...

... *nigrifrons* Knight, p. 58

Median line of pronotum not indicated with pale; head as above, in addition, sometimes median line of front, pale. Very common species in western North America, breeds on a wide variety of host plants but most common on *Artemesia*. ...

... *brevis* Uhler, p. 49

6. Cuneus stained with reddish at least on basal half. ... 7

Cuneus not stained with reddish, basal half usually pale and apex brown or black. ... 8

7. Calli reddish; membrane hyaline. Known only from Colorado, probably breeding on vegetation along the Colorado River. ...

... *tinctus* Knight, p. 61

Calli brown or black; membrane clear, sometimes with a fumate cloud around apex; veins and bordering area darkly fumate. Known only from British Columbia, on vegetation along the Fraser River, probably breeds on alder. ...

... *fraserensis* n.sp., p. 39

8. Hind femora pale yellowish to brown with two black bands
near apices and a row of black spots on anterior surface; in dark-colored specimens femora may be entirely black.


Hind femora uniformly yellowish-orange, slightly reddish on apical half but without any black marking. Known only from southern California (Kern, Los Angeles, Orange and San Diego counties). Collected on *Sambucus* sp. and *Haplopappus venetus* (HBK). *Deraeocoris luridipes* Knight, p. 54

**Deraeocoris bakeri** Knight


**Diagnosis:** very similar to the black form of *D. brevis* but smaller in size; dorsum entirely black, except carina of vertex and pronotal collar white; membrane hyaline; genital claspers and posterior wall of bursa copulatrix distinct.

**Male.** Length: 3.52 - 4.10. Head length 0.48, vertex 0.40, width 0.88, usually black, sometimes pale markings on median line of frons on vertex at margins of eyes; carina of vertex white; collum black;
rostrum reaching upon middle coxae. Antennae segment I, length 0.32, segment II, 0.80-0.86, nearly cylindrical but slightly thicker toward apex; segment III, 0.32-0.40; segment IV 0.32-0.40; all segments black covered with pale pubescence and longer hairs, often reaching 0.10. Pronotum length 0.96-1.12, anterior angles 0.80-0.86, width at base 1.52-1.60, black, shiny and glabrous, sometimes short pubescence, visible on margins, lateral margins carinate; xyphus and propleura pale on inner margins; calli moderately convex, black and polished; scutellum punctate, black except at angles, slenderly pale. Hemelytra maximum width 1.60-1.68, black and glabrous; cuneus black, punctate; membrane hyaline, veins and areoles brownish. Legs femora piceous sometimes paler at apex; tibiae piceous, banded with pale at middle and apex, row of distinct spines on anterior face; claws deeply cleft, piceous. Venter, dark brown to black, pale pubescent. Genitalia parameres as in Figure 1, vesica with three membranous sacs and one flattened, spiraled, sclerotized process (Fig. 41).

Female. Length: 3.60 - 4.30. Very similar to male but more robust. Maximum width 1.76-1.84. Segment II of antennae, 0.80-0.96, more slender on basal half, thicker toward apex. Sclerotized rings as in Figure 77. Posterior wall as in Figure 119.

Fourth instar nymph. Length 2.40 - 3.04; maximum width 1.12 - 1.44; dorsum clothed with black spinose and clubbed setae with distinct notch at their apices. Head width 0.74 - 0.88, white, brownish along margin of eyes. Segment I of antennae, 0.32; segment II, 0.64 - 0.80; segment III, 0.32; segment IV, 0.40; antennal segments with simple
erect setae. Rostrum reaching anterior margins of hind coxae. Pronotum white, brownish on the sides. Wing pads, white, brownish on the sides, reaching second abdominal segment. Abdominal scent gland opening bordered by reddish-black spot. Abdomen, white, marked with red between segments and on spiracular plates. Anal tube black, white at middle. Legs pale, femora and tibiae marked with red, covered with simple setae, pair of black spinose setae present near apex of hind femur on dorsal face.

Fifth instar nymph. (female) Very similar to the fourth instar in appearance but larger in size and more ovate. Length, 386; maximum width, 1.68. Head width 0.88. Antennal segment I, 0.32; segment II, 0.88; segment III, 0.40; segment IV, 0.4. Wing pads reaching middle of fourth abdominal segment.


Distribution. This species is found only west of the Rocky Mountains. It has been recorded from all western states, except from Wyoming and British Columbia.

Biology. D. bakeri is restricted to sage brush floristic association and to dry habitats. It is found mostly on Chrysothamnus nauseasus (Pall.) Britton and C. viscidiflorus (Hook.) Nutt., although it can
also be found on Artemesia, Purshia, Juniperus, Ceanothus and Chamaebatiaria. The writer has seen nymphs and adults of this species feeding on Dactynotus sp. (Aphididae) and on nymphs of Chlamydatum sp. (Miri- 
dae). The adults of D. bakeri are collected from May to October. The 
fact that adults of this species have been collected in April in 
Klamath Co., Oregon, could suggest that the species overwinters as 
adults.

Deraeocoris brevis (Uhler)

Sci. (4)7:266.
Deraeocoris (Camptobrochis) brevis Knight, 1921, Rept. Minn. St. Ent.
Ser., Vol. ix(3):81
Deraeocoris (Camptobrochis) brevis var. piceatus Knight, 1921. Rept.
Minn. St. Ent. 18:90, 105; McMullen and Jong, 1967. Canad. Ent.
p. 61.

Diagnosis: larger in size than D. bakeri; membrane infuscated at 
apex; dorsum piceous to black, variously marked with pale brown. Male 
and female genitalia distinctive for the species.
Male: Length 4.10 - 5.60. Head length 0.48 - 0.56, width 0.88 - 1.04, vertex 0.40 - 0.48, black, often with pale yellowish spots on median line of vertex, near eye margin and before antennal fossa; carina of vertex white; collum black; rostrum reaching middle of meso-coxae. Antennae segment I, length 0.32; segment II, 0.80 - 0.96, nearly cylindrical; segment III, 0.32 - 0.40; segment IV, 0.32 - 0.40; last two segments black to piceous, covered with short pubescence and with a few longer hairs. Pronotum length 0.80 - 1.04, anterior angles 0.80 - 0.96, width at base 1.74 - 1.84; punctate, black, often pale on each side, but median area always black; slightly convex; lateral margins marginate, narrowly white; posterior margin, narrowly white; pronotal collar yellowish; calli black, impunctate, slightly convex; scutellum punctate, piceous to black, narrowly at apex and basal angles. Hemelytra width 1.92 - 2.24, punctate, black to piceous, yellowish translucent at base of corium and embolium, in lighter colored specimens, basal half of corium, embolium, clavus and median area of corium invaded with pale brownish to yellowish; cuneus, longer than broad, punctate, black except basal area pale yellowish and translucent; membrane clear, apical half infuscated; veins and areoles fuscous. Legs piceous to black; femora pale reddish on apical third, with long fine pale setae; tibiae triannulate with pale, clothed with long setae and distinct row of spines on anterior face; claws, piceous, deeply notched at base. Genitalia parameres as in Figure 2. Vesica as in Figure 42, with four membranous lobes and one flattened and and spiraled sclerotized process.
Female: Length 4.32 - 4.96; maximum width 1.92 - 2.24. Similar to male but shorter and more ovate. Segment II of antennae, slender, becoming gradually thicker toward apex, pale yellowish at middle. Sclerotized rings as in Figure 78. Posterior wall as in Figure 120. Genitalia distinct from D. bakeri.

Fourth instar nymph. Very similar to nymphs of Deraeocoris bakeri but slightly larger in size. Length 2.88, maximum width 1.28, upper side of body covered with same type of setae found in D. bakeri and with simple dark setae. Head, pronotum and wing pads white, brownish on sides. Rostrum reaching hind coxae. Antennal segment I, 0.32, pale brownish; segment II, 0.80, nearly cylindrical, pale, brownish at apex; segment III, 0.32; segment IV, 0.32; all segments covered with pale fine hairs and longer dark setae. Wing pads reaching second abdominal segment. Dorsal abdominal scent gland opening bordered by dark reddish brown. Abdomen marked with red between segments and on spiracular plates. Anal tube black, white on median line. Legs pale; tibiae biannulated with red, clothes with pale setae, row of long dark setae on anterior face; femora marked with red near apices, covered with pale fine setae, pair of black spinose setae near apices of middle and hind femora; tarsi black at apices.

Fifth instar nymph (female). Very similar to the fourth instar in structure and coloration but larger in size and more ovate. Length 3.52; maximum width 1.68. Head width 0.88, vertex 0.48. Rostrum reaching posterior margin of middle coxae. Antennal segment I 0.32; segment II, 0.82; segment III, 0.40; segment IV, 0.40. Wing pads reaching posterior margin of fourth abdominal segment.
Holotype: female, Aug. 10, Las Vegas, New Mexico, Barber and Schwarz (USNM).

Material examined: Due to the excessive number of this species at hand, a list of the specimens examined is not given. The writer has examined most of the specimens listed by Knight (1921); in addition, more than 2500 specimens, from many entomological museums and personal collections, have been also examined. A complete list of the localities will be deposed at the Systematic Entomology Laboratory, Department of Entomology, Oregon State University.

Distribution: D. brevis is widely distributed to western North America; it has been recorded as far north as Mt. Yukon, Alaska and as far south as New Mexico and San Diego, California. This species is found in most ecoregions of western North America but mostly is common in sagebrush vegetation.

Biology: D. brevis, like D. bakeri, is primarily found on sagebrush vegetation. Its most common host-plant is Artemesia, but it has been collected from a wide range of tree and shrub species, including: Amelanchier alnifolia Nutt., Arbutus menziesii Pursh., Ceanothus velutinus Dougl., Salix sp., Pinus contorta Dougl., P. ponderosa Dougl., Abies sp., Castanopsis sp., Rubus sp., Ribes sp., Chamaebatiaria sp., Chrysothamnus sp., Anaphalis sp., etc. In addition, D. brevis is also found on orchard trees. It has been reported to feed on various small arthropods such as mites, aphids, psyllids, psocids, coccids, leafhopper nymphs and small lepidopterous larvae. It overwinters in the adult stage. According to McMullen and Jong (1967), D. brevis has at
least four generations per year in British Columbia orchards. Westigard (1973) and McMullen and John (1967) reported the importance of this species in the control of some orchard pests, especially the pear psylla.

_D. brevis_, like many species of _Deraeocoris_, shows variations in color. The variety _piceatus_ Knight is the most common color form of the species. The black color form, or _brevis sensu_ Uhler, is rather rare and found at various proportions according to localities. However, these color forms do not show any distinct geographical pattern. The varietal name _piceatus_ Knight is not recognized as of subspecific rank.

_Deraecoris fraserensis_ new species

_Diagnosis:_ similar in general aspect to _D. validus_ (Reuter) but _cuneus_ distinctly red; scutellum dark red; _calli_ not punctate as in _D. poecilus_ McAtee; differs from _D. ornatus_ Knight in having antennal segment II greater in length than pronotum; male and female genitalia distinctive but showing relationship to _D. validus_.

_Male._ Length 4.00. _Head_ length 0.56, width 0.88, vertex 0.40, dark brown to black, spots on middle of front, along eye margin, on median line and at each side of tylus pale white to yellow; carina of vertex slightly convex, white, trapezoidal shaped; rostrum reaching upon middle coxae. _Antennae_ segment I, 0.32, piceous, sparsely pubescent; segment II, 1.04, constricted at base, nearly cylindrical but very slightly thicker toward apex, piceous to black, short, dense pubescence, beset with several erect setae; segment III, 0.40; segment IV, 0.40; last two segments, paler, densely pubescent and with erect
setae. **Pronotum** length, 0.96; anterior angles, 0.80; width at base, 1.76; uniformly yellow to testaceous, slightly darker on each side of median line, punctures coarse and black, lateral margins of pronotum carinate; calli as in *D. validus*, separated by one deep puncture, piceous to black, latero-anterior angles invaded with pale; area before calli pale white, a few punctures may be present at antero-lateral angles of calli; scutellum reddish brown, lateral angles, apex and apical half of median line ivory-white, punctures black. **Hemelytra** width 1.92; yellowish testaceous, more or less translucent in one specimen, corium marked with brown at apex and middle; punctures black; cuneus red, darker at apex; membrane clear, apical half and areoles fumate. **Legs** red to piceous; femora with two pale bands near apex, a row of darker spots on their anterior face; tibiae triannulated with pale; basal segments of tarsi pale; claws, piceous, deeply cleft. **Genitalia** parameres as in Figure 3; vesica as in Figure 43; both vesica and parameres showing close relationship to *D. validus*.

**Female.** Similar to male but darker in color and larger in size. Length, 4.48; maximum width 2.24, second antennal segment, 0.96, black, slightly paler at middle, with short pubescence on apical third and with several erect setae, gradually thickening toward apex. Posterior wall of bursa copulatrix as in Figure 70; sclerotized rings as in Figure 121. The female genitalia show also a close relationship to *D. validus*.

**Holotype:** male, Wells, B.C., Wendell Park, 8-4-1949, G. J. Spencer (UBC). **Paratypes:** one topotypic male; one topotypic female;
one male and three females from Quesnel, B.C., 6-18-1949, G. J. Spencer (UBC).

**Etymology:** the species name, *fraserensis*, has been derived from the name of the type locality of the type series, the Fraser Plateau.

**Distribution:** at present, this species is only known from the above localities.

**Biology:** not known. One of the specimens from Quesnel bears the label 'on Alder.' *D. fraserensis* is structurally related to *D. validus*. Moreover, Quesnel and Wells, the types localities, are located respectively along the Fraser and the Willow Rivers. It is probable that *D. fraserensis* lives on vegetation bordering the Fraser River and its tributaries. It is noted that *D. validus* is mostly found on vegetation bordering streams and lakes, notably on *Salix* sp.

*Deraeocoris histrio* (Reuter)

*Callicapsus histrio* Reuter, 1876, Ofv. k. Vet. Akad. Fohr. 32(9):75;


Blatchley, 1926, Het. E. N. Am., p. 89.

*Deraeocoris (Camptobrochis) histrio* Knight, 1921, Rept. Minn. St. Ent.


**Diagnosis:** Dorsum red with black spots on pronotum on apical half of corium and on basal half of clavus; scutellum red, a small black spot on median line of base.

**Male.** Length 4.88. Head width, 0.96, vertex 0.40, length 0.48, black, spots near margins of eyes on vertex and carina pale yellow, rostrum reaching up on hind coxae; collum black. Antennae segment I, 0.40; segment II, 1.36, nearly cylindrical but slightly thicker on apical half, clothed with dense and short pubescence; segment III, 0.48; segment IV, 0.48; last two segments slender, about half the thickness of segment II, densely and shortly pubescent with a few exserted hairs. Pronotum length 1.04, anterior angles 0.80, width at base 1.92; moderately convex, red, except two large spots each side of median line and behind each callus black; punctures black; pronotal collar pale red; calli nearly flat, black, latero-anterior angles red, xyphus and pleura black, red near lateral margin of pronotum; scent gland opening black. Scutellum red spot at middle of basal line black. Hemelytra width 2.24, red, two rounded spots on apical half of coria and slenderly at base, basal two-thirds of clavus, black; cuneus red, black on apical third; membrane clear, apical half, areoles and veins
dark fuscous. Legs black; tibiae banded with pale; first two segments of tarsi pale. Venter black, covered with pale short hairs. Genitalia parameres as in Figure 4. Vesica as in Figure 44.

Female. Length 4.96. Maximum width 2.56. Very similar to male but more ovate and robust. Antennal segment II, 1.12, slender at base gradually thicker toward apex. Posterior wall of bursa copulatrix as in Figure 82; sclerotized rings as in Figure 124.

The writer has not seen any of the type specimens of this species but some of the specimens examined and determined by Knight (1921).


Distribution. This species is distributed in all states east of the Rockies. Its occurrence in the Sacramento area and in Idaho is not understood. It is probably the result of accidental introduction.

Biology. This species has been found by Blatchley (1926) to overwinter in the adult stage, beneath loose bark of Quercus velutina Lam. and Pinus divaricata (Ait.). The known host plant of this species is Polygonum muhlenbergii (Wats.) (Knight, 1924). The habitat of this species in California is unknown. The specimens listed from Idaho are probably overwintering adults.
Deraeocoris luridipes Knight

Deraeocoris luridipes Knight, 1921, Rept. Minn. St. Ent. 18:91, 110;
Deraeocoris (Camptobrochis) luridipes Knight, 1968, Brigham Young

**Diagnosis:** dorsum more or less uniformly yellowish brown translucent; membrane distinctly infuscated on apical half; femora uniformly lurid or pale yellow; posterior wall of female genitalia distinct from D. validus.

**Female.** Length 4.64. Head width 0.96, vertex 0.40, length 0.56, black, carina, spots near margins of eyes on median line of vertex on median line and each side of tylus pale yellow; rostrum reaching hind margin of middle coxae. Antennae segment I, 0.40; segment II, 1.20, slender, gradually thicker toward apex, segment III, 0.48; segment IV, 0.40; all segments piceous, last three segments pale pubescent with longer exserted hairs. Pronotum anterior angles 0.80, width at base 1.76, length 1.04; uniformly yellowish brown, punctures black; calli dark brown, invaded with pale red on antero-lateral angles, area before calli pale; xyphus marked with dark brown. Scutellum, dark brown, punctate, sides and median line white. Hemelytra width 2.16; uniformly yellowish brown and translucent; punctures black, cuneus slenderly black at apex; membrane, apical half infuscated, veins and areoles infuscated. Venter piceous, pale pubescent. Legs uniformly lurid; tibiae triannulated with pale. Genitalia distinct from that of D. validus; posterior wall as in Figure 84; sclerotized
rings as in Figure 123.


Distribution. At present, this species known only from southern California.

Biology. This species lives on elderberry (Sambucus sp.) and Haplopappus venetus (HBK). Its biology is unknown.

Deraeocoris nebulosus (Uhler)


Diagnosis: Small size, usually under 4.00 mm.; brown or testaceous; membrane clear with two small fuscous spots on apical half.

Male. Length 3.04 - 3.84. Head width 0.80 - 0.88, vertex 0.32 - 0.40, length 0.40 - 0.48; black and dark brown, spot near margins of eyes, on median line of vertex and tyulus, on each side of tyulus, ivory-white, carina white, indented at middle; collum dark brown or black; rostrum reaching middle coxae. Antennae segment I, 0.24, black with fine and short pubescence; segment II, 0.88 - 0.96, cylindrical, constricted at base and apex, uniformly dark brown, paler at middle in light-colored specimens, density clothed with short pubescence; segment III, 0.32; segment IV, 0.32; last two piceous to black, shortly pubescent with few exserted hairs. Pronotum anterior angles 0.64 - 0.80, length 0.72 - 0.80, width at base 1.44 - 1.60; with black and coarse punctures; pronotal disk testaceous to dark brown, pale white before calli, on median line, on each side, narrowly on hind and lateral margins; calli black, nearly flat; scutellum punctate, piceous to black, angles and apical half of median line ivory-white. Hemelytra maximum
width 1.60 - 1.76; testaceous translucent, more or less broadly marked with dark brown at middle, base and apex of corium, on apical half of clavus; in dark-colored specimens hemelytra black except at base of embolium; cuneus dark brown or black, basal half pale translucent; membrane clear, veins and areoles infuscated, two fuscous spots on apical half near lateral margins. Legs dark brown to black; femora pale at apices, finely pubescent; tibiae trianulated with pale; tarsi pale, apical half dark brown or black, claws deeply cleft, piceous. Venter black, shiny, with pale pubescence. Genitalia parameres as in Figure 45; vesica as in Figure 5 with only two apparent membranous lobes.

Female. Similar in structure and coloration to male. Length 3.68 - 4.00; maximum width 1.92 - 2.08. Segment II of antennae 0.80 - 0.96, basal half slender, thicker toward apex, pale yellow, black at base and apex. Sclerotized rings as in Figure 6, closely related to D. brevis and D. nigrifrons; posterior wall as in Figure 5.

Type specimens of this species have not been located at present; they were not among Uhler's type material at the U.S. National Museum.


The above specimens were found to be identical to some of the specimens examined by Knight (1921), most of which are in the Cornell University collection and the U.S. National Museum.

Distribution. *D. nebulosus* occurs predominantly east of the Rocky Mountains. It has been recorded from eastern Canada and from most eastern and central states. At present, the above specimens constitute the only known records of this species in western North America.

Biology. Wheeler et al. (1975) studied the biology and nymphal stages of *D. nebulosus*. In addition, they summarized the known prey and hot-plants. It appears that *D. nebulosus* is similar to *D. brevis* in that it feeds on a wide range of prey species and that it is ubiquitous. Many records show that this species overwinters in the adult stage.

*Deraeocoris nigrifrons* Knight


Diagnosis: very similar to *D. brevis* but front usually black.
except spots on vertex near margin of eyes black; basal half of median line of pronotum usually pale (never so in \textit{brevis}); female genitalia and parameres distinctive for the species.

\textbf{Male.} Length 3.68 - 4.00. Head length 0.48, width 0.96, vertex 0.40, black except two spots each side of vertex near eye margins and carina white to yellow; rostrum reaching upon middle coxae. Antennae segment I, 0.32; segment II, 0.88, nearly cylindrical but thicker toward apex, black to piceous, pale pubescent and with few erect hairs; segment III, 0.32; segment IV, 0.40; last two segments, pale pubescent and beset with few erect hairs. Pronotum length 0.88, anterior angles 0.96, width at base 1.60, testaceous to pale yellow, large spots behind calli and each side of median line, piceous to black; scutellum, as in \textit{brevis}, black, lateral margins ivory-white. Hemelytra maximum width 1.76; testaceous to pale translucent yellow, apical half of corium, base and apex of clavus piceous; in dark-colored specimens, hemelytra piceous except small triangle at base of corium, pale and translucent; cuneus pale translucent, apical half piceous to black; membrane clear, apical half, veins and bordering areas infuscated. Legs piceous; femora marked with two pale white bands near apex; tibiae biannulated with pale white; tarsi pale near base. Venter black, shining, and pale pubescent. Genitalia parameres as in Figure 6, closely related to \textit{D. brevis}; vesica as in \textit{D. nebulosus}, Figure 45.

\textbf{Female.} Length 3.84 - 4.48, very similar but slightly larger than male. Antennal segment II, 0.96, opical half slender but thicker toward apex; piceous, usually pale yellow at middle. Posterior
wall of bursa copulatrix as in Figure 83, distinctive for the species; sclerotized rings as in Figure 125, somewhat related to *D. brevis*.

**Holotype:** male, August 3, Axel, Colorado, H. H. Knight (USNM). **Allotype:** August 24, Donner Lake, Placer Co., California, W. M. Gifford (USNM).


**Material illustrated:** male, Aspen, Colorado, 8000', 7-24 to 27-1919 (AMNH); female, Emery, Utah, 8-16-1929, R. H. Beamer (UK).

**Distribution:** At present, this species is only known from California, Colorado, Idaho, Utah and Wyoming at an elevation of 7-8000 feet.

**Biology:** very little is known about the biology of *D. nigrifrons*. Specimen records show that it lives on sage brush vegetation. It has
been collected on Chrysothamnus and Artemesia. It has certainly the same habits as D. bakeri which also lives on sage brush vegetation and at fairly high elevation. However, unlike D. bakeri and D. brevis, this species apparently has a restricted distribution.

Deraeocoris tinctus Knight


**Diagnosis:** dorsum pale yellowish brown, stained with red; cuneus red; membrane clear; antennal segment II equal in length to pronotum, or slightly larger.

**Male:** Length 4.00. Head length 0.48, width 0.88, vertex 0.40; white to pale yellow, marked with reddish brown or brown, on each side and at base of tylus, on each side of median line of front, transversally on vertex on each side of median line right before carina; genae, juga and bucculae, dark brown; rostrum reaching upon middle coxae. Antennae segment I, 0.32, pale brown; segment II, 1.04; nearly cylindrical, constricted at base and apex, densely pale pubescent, dark brown, paler at middle; segments III and IV missing on the para-type specimen described here. Pronotum length, 0.96; anterior angles, 0.80; width at base 1.60; uniformly pale yellowish brown, stained with red, finely punctate, moderately convex; lateral margin indistinctly carinate; calli only slightly convex, reddish brown bordered with black, two deep punctures between calli; scutellum reddish brown, lateral margin and apical half of median line white, punctate.
Hemelytra width 1.76, pale testaceous, translucent; corium marked with red near apex; cuneus pale translucent stained with red, punctures translucent; membrane clear, veins darker. Legs pale yellow; femora red on apical one third; tibiae banded with three red annuli, knees piceous; tarsi blackish at apex; hairs and pubescence on legs as in nebulosus. Venter red, ninth segment dark brown, finely pubescent. Genitalia not illustrated.

Material examined: male, holotype, Grand Junction, Colorado, 7-28-1900; male and female paratypes, topotypic (USNM), the above description is based on one topotypic male paratype (TAM).

Distribution: this species is known only from the type series. It is noted, however, that such a localized distribution is frequently found for many species of the genus Deraeocoris.

Biology: very little is known about this species. A close examination of the specimens reveals, however, that it is closer to D. validus than to D. nebulosus and D. cuneatus, as supposed by Knight, 1921. It is likely to be found on vegetation bordering the Colorado and Gunnison Rivers around Grand Junction, Colorado.

Deraeocoris validus (Reuter)


**Diagnosis:** very similar to *D. brevis* but median line of pronotum always pale, area in front of calli usually white, less than apical half of cuneus is black; genitalia distinctive for the species.

**Male.** Length 4.16 - 4.64. **Head** length 0.48 - 0.64; width 0.88 - 0.96, vertex 0.32 - 0.40; pale yellow; spots on front on each side of median line, transversally on vertex right before carina, at base and on each side of tylus median line, bucculae, lorae, brown to black; in dark-colored specimens, head black except median line of front and tylus and narrowly along eye margins pale; carina ivory-white, indented at middle; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.32 - 0.40, black, pale pubescent; segment II, 1.12, nearly cylindrical, constricted at base, pale pubescent and beset with several erect hairs; segment III, 0.40; segment IV, 0.32; last two segments slender, black, pale pubescent and beset with fine erect setae. **Pronotum** length 0.96 - 1.12; anterior angles 0.64 - 0.88; width at base 1.44 - 1.76; brownish testaceous, median line usually indicated with pale; lateral margins carinate, slightly sinuate; calli black, slightly convex, separated by two deep punctures at middle, antero-lateral angels often invaded with pale; in light-colored specimens the calli are pale, bordered by dark brown; area
before and between calli ivory-white, sometimes with a few punctures; scutellum, dark brown, lateral margins, apex and median line pale, coarsely punctate. Hemelytra width, 1.76 - 2.08; brownish testaceous translucent, often marked with piceous at middle and apex of corium; cuneus pale translucent, apical one third piceous or black; membrane clear, veins and apical half fumate; in light-colored specimens, the apical half of membrane is not distinctly fumate. Legs pale yellow; femora with row of piceous spots on anterior and dorsal surfaces, apical half broadly biannulate with piceous, tibiae triannulate with piceous, knee marked with piceous; tarsi pale, apical segment and claws piceous. Genitalia parameres as in Figure 7; vesi-ca as in Figure 46.

**Female.** Length 4.64 - 5.04. Maximum width 1.32 - 2.24. Antennal segment II, 0.96 - 1.04, slender at base and gradually thicker toward apex, dark brown or black, pale yellow at middle. Similar to the male in general aspect. Sclerotized rings as in Figure 84; posterior wall of bursa copulatrix as in Figure 126.

**Fifth instar nymph (male).** Very similar in structure and coloration to nymphs of *D. bakeri* and *D. brevis*; dorsum covered with simple long black setae and pale finer setae. Length 2.88; maximum width 1.72. Head length 0.64, width 0.88, vertex 0.48, area before carina slightly depressed, carina beset with a row of setae on its anterior margin. Rostrum reaching middle coxae. Antennal segments beset with erect long setae and shorter pubescent hairs; segment I, 0.32; segment II, 0.96, nearly cylindrical; segment III, 0.40; segment IV, 0.40. Wing pads reaching middle of fifth abdominal segment.
Dorsal abdominal scent gland openings bordered by black. Legs similar to that of adults. Tarsi two-segmented; claws cleft at base.

The type specimens of this species has not been seen by the writer.


Material illustrated: male and female, Corvallis, Oregon.

Distribution: this species occurs west of the Rocky Mountains from Alaska to California.

Biology: *D. validus* lives on vegetation bordering streams, rivers and lakes. It can be found also in marshes and in moist places. The writer has observed nymphs and adults of this species feeding on psocids and aphids. Species of the genus *Salix* are the most common host-plants. It overwinters in the adult stage and may have more than one generation a year.

This species shows great variation in size and color pattern, but the genital structures are fairly constant. It appears that *D. validus* is composed of several geographic races associated with the major river systems of western North America.

The incertus Group

Diagnosis: small to moderate size 4-7 mm.; dorsum nearly glabrous, usually with very short pubescence; eye of male large; dorsal width of an eye, in male, nearly equal to or greater than
width of vertex; scutellum distinctly punctate; hind tibiae with a distinct row of spinose setae on anterior face; claws not cleft at base; claspers different from those of the brevis group by having apical process truncate or beak-like; vesica with corkscrew-like spiculum as in the brevis group.

The species of this group are distributed in the Cascade and Sierra Nevada Mountains, the Coastal Ranges, in the San Bernardino and the San Jacinto Mountains and in the Rocky Mountains. Only the following species are recognized in this group: Deraeocoris atriventris Knight, D. incertus Knight and D. picipes Knight. D. diveni Knight and D. piceicola Knight, on the basis of the genital structures, do not belong to this group. D. diveni does not have a punctate scutellum and is more closely related to D. fulvescens than to D. incertus. Although D. piceicola often has a distinctly punctate scutellum and is more closely related to D. fulvescens than to D. incertus. Although D. piceicola often has a distinctly punctate scutellum, many other characters conform with the barberi group. The members of the incertus group are found on conifers exclusively, on species of the following genera: Abies, Picea, Pseudotsuga and Pinus. They are not known to overwinter in the adult stage like the species of the brevis group. D. incertus is known to feed on chermids.

Key to the Species of the incertus Group

1. Hind femora black, narrowly pale at apices; dorsal width of an eye not greater than vertex in male. Known only
from the mountains of southeastern Arizona. Breeds on
*Pinus ponderosa* var. *arizonica* and var. *scopulorum*

**Deraeocoris atriventris** Knight, p.68

Hind femora brown, red or piceous but not black; dorsal
width of an eye greater than vertex in male. ............ 2

2. Hind tibiae dark red or piceous usually with a single
pale annulation on apical half. Known from Arizona,
Colorado and New Mexico; collected on conifers, *Pinus*
ponderosa Dougl., *Picea* sp., and *Pseudotsuga menziesii*
var. *glauca* (Beissn.) Franco ............ *picipes* Knight, p.75

Hind tibiae brownish or black, with two pale annulations,
and often with an additional narrow annulation just be-
low the knee. Widely distributed in the Coast Ranges,
the Cascades, the Sierra Nevada and the Rocky Mountains.
Breeds on species of *Abies* and *Pseudotsuga*... *incertus* Knight, p.70

**Deraeocoris atriventris** Knight

*Deraeocoris atriventris* Knight, 1921, Rept. Minn. St. Ent. 18:11,

**Diagnosis:** smaller in size than *D. incertus* Knight; width of
vertex greater than dorsal width of an eye in male; femora, piceous
to black, only the apices pale; male and female genitalia distinctive
for the species.

**Male.** Length 4.32 - 4.7. **Head** width 0.96; vertex 0.38, length
0.56, black carina, spots near margin of eye on vertex, behind
antennal bases, on median line of front, on each side of tylus, pale to white; rostrum reaching upon hind coxae. Antennae segment I, 0.32; segment II, 1.60, nearly cylindrical, piceous, with short pubescence and a few exserted hairs; segment III, 0.32; segment IV, 0.32; last two segments black, shortly pubescent and with longer setae. Pronotum length 0.88, anterior angles 0.72, width at base 1.52, coarsely punctate, piceous to black, spots behind middle and postero-lateral angles of calli pale to white; calli shining black, limited on their posterior margins by deep and coarse punctures; scutellum, punctate, black, apical half of median line and basal angles narrowly pale. Hemelytra width 1.76, testaceous, translucent; apex of corium, spots at middle of corium and embolium black; cuneus black, basal margin pale; membrane clear, apical half, veins and areas bordering veins infuscated. Legs black or piceous; femora narrowly banded with pale at apex; tibiae biannulated with pale; tarsi and claws piceous. Venter black, shining, pale pubescent. Genitalia as in Figures 8 and 47, distinctive for the species.

Female. Length 4.88; maximum width 2.08; second antennal segment, length 1.44; dorsum uniformly grayish testaceous, punctures, calli, posterior angles of pronotum, apex of corium, and cuneus black. Posterior wall of bursa copulatrix as in Figure 86; sclerotized rings as in Figure 128; genitalia distinct from that of D. incertus.


Material examined: Arizona. Cochise Co.: Chiricahua Mts.,


Distribution: At present, D. atriventris is known only from mountains of southeastern Arizona.

Biology: The biology and habits of this species are unknown. The records show that it can be found at high elevation (around 9000 ft), and on Pinus ponderosa var. arizonica and var. scopulorum Engelm.

Deraecoris incertus Knight


Diagnosis: slightly larger in size than D. atriventris; in male, dorsal width of an eye equal or greater than vertex, femora biannulate with pale at apices.

Male. Length 4.48 - 5.12. Head length 0.64 - 0.72, width 0.96 - 1.04, vertex 0.32; markings of head similar to D. atriventris but pale spots on vertex, front and tyulus broader; carina ivory-white; rostrum reaching upon hind coxae. Antennae segment I length 0.40;
segment II, 1.44 - 1.68, nearly cylindrical; segment III, 0.48; segment IV, 0.40; all segments piceous to black, last three segments with short pubescence and beset at intervals with longer erect hairs. 

Pronotum length 0.96 - 1.12, anterior angles 0.64 - 0.80, width at base 1.60 - 1.76; disk coarsely punctate behind calli, dark brownish to black, spots behind middle lateral angles of calli and area in front of calli pale yellow to white, median line at least pale on apical half; margins of pronotum narrowly white; lateral margins nearly straight, carinate; calli, convex, black; in light-colored specimens, disk of pronotum yellow to testaceous, dark brown only at basal angles; short sparse pubescence can usually be seen on pronotum; scutellum, punctate, piceous or black, basal angles, apex and apical half of median line ivory-white. Hemelytra width 1.92 - 2.16; pale testaceous and translucent, apex and base of corium and clavus piceous to black, in dark-colored hemelytra piceous or black, except spots on basal half of corium and middle of clavus pale translucent; cuneus pale, apical half and punctures piceous or black, in dark-colored specimens cuneus entirely piceous or black, except narrowly at basal angles pale; membrane infuscated, spot behind vein and cuneus clear. Legs piceous or black; femora biannulate near apices, hind femora pale at middle with one row of dark spots; tibiae biannulate with pale, a distinct row of spinose setae on anterior face; tarsi piceous or black; claws slender, not toothed at base. Venter piceous or black, shining, with sparse and short pubescence. Genitalia parameres as in Figure 9; vesica as in Figure 48;
genitalia showing relationship with *D. atriventris* but different in many details.

**Female.** Length 4.32 - 5.44; maximum width 2.16 - 2.72; antennal segment II length 1.28 - 1.60, slender at base gradually thickening toward apex, piceous, pale at middle, with short pubescence and erect setae. Similar to male but more robust and dorsum more broadly pale. Posterior wall of bursa copulatrix as in Figure 85, sclerotized rings as in Figure 128.

**Holotype:** male, August 12, Portland, Oregon, A. A. Nichol (USNM), Allotype and paratypes females taken with the type (USNM) (TAM) (CU).

Bellingham, on Douglas fir, 7-19-1979, G. Stonedahl (OSU).

Material illustrated: male and female from Victoria, B.C., 6-4-1927, W. Downes (UBC).

Distribution: *D. incertus* is exclusively a western species. It is known from the Coast Ranges, the Cascade Range, the Sierra Nevada, San Bernardino Mountains, San Jacinto Mountains and the Rocky Mountains.

Biology: very little is known about the habits of this species. Based on the records, it is likely to overwinter in the egg stage and may have one or two generations per year. The known host-plants of *D. incertus* are: *Abies grandis* (Dougl.) Lindl., *A. concolor* (Gord. and Glend.) Lindl., *A. procera* Rhed., *A. magnifica* var. *shastensis* Lemmon and *Pseudotsuga menziesii* (Mirb.) Franco. This species has been observed by the writer feeding chermids.

*D. incertus* shows a great deal of variation in color and size, perhaps as a result of the wide range of distribution of this species. *D. rufusculus* Knight is considered here as a synonym of *D. incertus* Knight. The writer has examined the types of these taxa and found no difference in the parameres and that both have exserted hairs on the second antennal segment. *D. rufusculus* Knight is simply the darker color form of *D. incertus*. Such variation of color from one extreme to another is common in local populations of *D. incertus* and in most species of *Deraeocoris*. Male and female genitalia of specimens from various parts of the species range have been compared and no significant variation was found in these structures.
Deraeocoris picipes Knight, new status

Deraeocoris incertus var. picipes Knight, 1921, Rept. Minn. St. Ent. 18:111, 116; Knight, 1927, Canad. Ent. 49:37.

Deraeocoris incertus var. carneolus Knight, 1921, Rept. Minn. St. Ent. 18:111, 116 (new synonymy).

**Diagnosis:** very similar to *D. incertus* but larger in size; femora piceous, only pale at the very apex; tibiae usually with only one pale band on apical half; genitalia, although related to *D. incertus*, show some differences in the left and right claspers and in the sclerotized rings of the female.

**Male.** Length 5.28 - 7.02. **Head** length 0.64, width 1.04, vertex 0.32; markings similar to *D. incertus*; dorsal width of an eye greater than vertex. **Antennae** segment I, length 0.40; segment II, 1.76 - 1.92, piceous to black, nearly cylindrical, covered with dense, short pubescence and beset with fewer exserted longer setae; segment III, 0.48; segment IV, 0.40; last two segments piceous, cylindrical, with short pubescence and with fewer longer setae. **Pronotum** length 0.96 - 1.04, anterior angles, 0.72, width at base, 1.76; disk of pronotum uniformly piceous, lighter-colored specimens having pale spots behind calli; lateral and basal margins of pronotum narrowly ivory-white, lateral margins more carinate and more sinuate than in *D. incertus*; calli piceous to black, convex, area before calli usually pale; scutellum, punctate, dark brown to piceous black, angles narrowly pale. **Hemelytra** width 2.24; uniformly reddish brown to piceous, translucent, in light-colored specimens; basal area of
corium, embolium and clavus pale; cuneus dark brown to piceous, basal one-third pale in light-colored specimens; membrane infuscated except narrowly behind cuneus and areoles clear. Legs reddish brown to piceous; femora narrowly pale at apices; tibiae banded with one pale annulus on apical half, row of spinose setae on anterior face of tibiae; tarsi and claws piceous. Venter piceous, covered with golden pubescence. Genitalia parameres as in Figure 10, right clasper distinct from that of D. incertus, vesica as in Figure 49, closely related to that of D. incertus.

Female. Length 4.96 - 5.76. Maximum width 2.24 - 2.48. Second antennal segment, length 1.60, slender, thickening toward apex. More broadly pale, more robust and more ovate than male. Dorsum often tinged with red. Latero-anterior angles of calli invaded with pale. Very similar to D. incertus but larger in size, tibiae usually with only one pale annulus; femora narrowly pale at apices. Posterior wall of bursa copulatrix as in Figure 87; sclerotized rings as in Figure 129; genitalia showing close relationship to D. incertus but distinct.


Material examined: Arizona; Cochise Co.: Deer Park, Chiricahua Mts., 8000', 7-7-1927, J. A. Kusche (CAS); S.W.R.S., 5 mi. W. Portal, 5400', 7-18-1957, M. Statham (AMNH); Rustler Park, Chiricahua Mts., 8200', 6-22-1955, A. Anderson and M. Statham (AMNH); Huachuca Mts., 8-2-?, H. G. Barber (USNM); Chiricahua Mts., 8-9000', on Pinus ponderosa, 8-31-1976, J. D. Pinto (UCR); 7-8-1932, R. H. Beamer (UK).
Coconino Co.: Flagstaff, 7-27-1936, R. H. Beamer (UK); Williams, 8-4-?, H. H. Knight (USNM). Graham Co.: Graham Mts., 7-6-1955, Ordway and Statham (AMNH). 

Colorado.


New Mexico.


Beaver Co.: Beaver, 6-23-1966, G. F. Knowlton (USU).

Material illustrated: male, Cloudcroft, New Mexico, 6-27-1940, R. H. Beamer (UK); female, Flagstaff, Arizona, 7-27-1936, R. H. Beamer (UK).

Distribution: D. picipes is only found in the southern parts of the Rocky Mountains, in Utah, Colorado, Arizona, New Mexico and probably in Mexico. Biology: The habits of this species are not known. Collection records indicate that it may have only one generation per year and that it overwinters in the egg stage. D. picipes is known to breed
on conifers: *Pinus ponderosa* Dougl., *Picea* sp. and *Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco.

*D. picipes* has been described by Knight (1921) as a variety of *D. incertus*. It is elevated to the species level because it differs from *D. incertus* chiefly in the genital structures and size. The variety *carneolus* Knight of *D. incertus* does not differ structurally from *D. picipes*. It appears to be only the light color form of the latter and should not be given any taxonomic rank.

The fasciolus Group

**Diagnosis:** elongate in form; dorsum glabrous or only with short and sparse pubescence; moderate to large size, usually larger than 6 mm. except for *Deracocoris fulvus*; scutellum impunctate; hemelytra usually strongly flexed posteriorily; right clasper of males showing similarity between species of this group; sensory lobe of left clasper ranging from absent to very elongate; posterior wall of bursa copulatrix similar in western species, except for *D. fasciolus* (Fig. 90), claws strongly cleft near base.

The species of this group are known from both eastern and western parts of the North American continent. However, *D. fasciolus* and *D. quercicola* are the only species that are common to both sides of the Rocky Mountains. *D. fasciolus* is widely distributed, north of latitude 40°. With the exception of *D. fasciolus*, which breeds on *Corylus* sp. and *Alnus* sp., all the western species of this group breed on different species of oak. All these species are known to
overwinter in the egg stage and have one or more generations per year. The following species belong in this group: D. fasciolus, D. cochise, D. fulvus, D. quercicola, D. shastan and D. triannulipes. Many species of this group are known to be predatory (Knight, 1921).

Key to the Species of the fasciolus Group

1. Calli largely pale, heavily outlined with black, dorsum pale yellow. Known from Arizona; collected from Quercus oblongifolia Torr., Q. emoryi Torr. and Juniperus sp. ...........
   .................. .................. cochise n.sp., p.80
   Calli not as above; dorsum not uniformly pale yellowish, variously stained with brown or black .............. 2

2. Hind tibiae pale, not distinctly triannulated with brown or black. .................. .................. 3
   Hind tibiae distinctly triannulated with brown or black .... 4

3. Calli fulvous or light brown, concolorous with pronotal disk. Known from Arizona; breeds on Rocky Mountain white oak, Quercus gambelii Nutt. ........ fulvus Knight, p. 86
   Calli solid black. Mostly eastern in distribution but known from Wyoming, Utah, Colorado and New Mexico;
   breeding on oak .................. quercicola Knight, p.88

4. Pronotum uniformly blackish brown or black, lateral margins broadly pale; hind femora pale with one brown band on apical half, in darker specimens an additional but often indistinct and incomplete is present.
Known only from northern California and southwestern Oregon; breeds on Quercus garryana Dougl. and Q. garryana var. breweri Engelm. shastan Knight, p.90

Pronotum not as above; hind femora with two distinct brown or black bands on apical half. 5

5. Sensory lobe of male left clasper short and evenly rounded, as in Figure 12; calli dark brownish to black, latero-anterior angles more or less pale. Known from all northern states from New York to Oregon. Also known from Colorado and New Mexico. In the West, it is known to breed on Corylus sp. and Alnus sp. and various orchard trees. fasciolus Knight, p.83

Sensory lobe of male clasper well-developed and protruding as in Figure 15; calli black, not invaded by pale as above. Known from Colorado and Utah; probably breeding on oak. triannulipes Knight, p.93

Deraeocoris cochise, new species

Diagnosis: dorsum pale yellow, nearly glabrous; hemelytra translucent; scutellum impunctate; legs uniformly pale yellow; claws deeply cleft near bases; genitalia distinctive for the species.

Male. Length 5.92. Head length 0.80, width 1.04, vertex 0.48, pale yellow, median line of front, carina and spot near margin of eye ivory-white; narrow spot between anterior margin of eye and antennal base, dark brown; carina slightly carinate; collum pale yellow, brown
on sides; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.48, pale yellowish with erect setae; segment II, 1.36, nearly cylindrical but more slender at base, pale yellow, black at apex, covered with short pubescence and a longer erect setae; segment III, 0.54; segment IV, 0.40; last two segments pale yellow covered with short pubescence and longer erect setae. **Pronotum** length 1.28, anterior angles 0.36, width at base 2.16; pale yellowish, only slightly darker on each side of median line and behind calli, coarsely punctate, with short and sparse pubescence near lateral margins; lateral margins nearly straight, slightly carinate; calli slightly convex, confluent, smooth, largely pale yellowish, anterior and posterior margins irregularly delimited by heavy black lines, transverse spot inside each callus and spots at their latero-anterior angles, dark brown or black; two deep punctures present at middle of posterior margin of calli; scutellum, impunctate, convex, pale to ivory-white, spots on each side of median line, dark brown. **Hemelytra** width 2.48, uniformly pale yellowish, translucent, punctures fine, yellowish brown, cuneus pale, translucent; membrane pale, translucent. **Legs** pale yellow; femora with long erect setae on ventral side; tibiae only slightly brownish at apex beset with long setae; claws cleft near bases. **Venter** brownish yellow and tinged with red, covered with semi-erect setae. **Genitalia** parameres as in Figure 11; vesica as in Figure 50.

**Female.** Length 6.22, width 2.88. Very similar in general appearance to male but more robust and more ovate. Second antennal
segment, length 1.28, pale yellowish and slender, apical one-fifth thicker and brown. Genitalia as in Figure 89 and Figure 131.


This species is closely related to D. hyalinus, described by Carvalho and Schaffner (1973) from Mexico. It differs from the latter by the following characters: vertex of front devoid of black spots; length of first antennal segment equal to width of vertex; scutellum having two black spots on each side of median line; embolium distinctly punctate, although punctures are often concolorous; genital claspers very distinct from that of D. hyalinus.

According to R. T. Schuh, this species is very abundant on oak at the types locality. However, at present, its biology is not known.

The sensory lobe of the left clasper on some of the paratypes is shorter than that of the holotype. This species resemble closely D. knightonius which occurs in California and Oregon but they are easily separated by the genital structures.
Deraeocoris fasciolus Knight

Deraeocoris fasciolus Knight, 1921, Rept. Minn. St. Ent. 18:123;
Knight, 1923, Conn. Nat. Hist. Surv. Bull. 34:486; Blatchley,
British Columbia (23):14; Gilliat, 1937, Canad. Ent. 69(7):145;
Knight, 1941, Ill. Nat. Hist. Surv. Bull. 22(1):69; Carvalho,
Janeiro, 44:64; Sanford, 1964, Canad. Ent. 96(9):1185; McMullen,

Diagnosis: relatively large in size; pronotal disk uniformly
colored, median line usually indicated with pale; sensory lobe of
left clasper very short, rounded.

Male. Length 5.92 - 6.72. Head length 0.64, width 0.96 -
1.04, vertex 0.48; pale yellowish brown, spots on each side of median
line of front, behind antennae, on vertex just before carina, dark
brown; rostrum reaching upon middle coxae. Antennae segment I,
length 0.48 - 0.56, piceous; segment II, 1.28 - 1.60, nearly cylin-
drical, black, covered with short pubescence and with longer semi-
erect setae; segment III, 0.78; segment IV, 0.48. Pronotum length
1.12 - 1.36, anterior angles 0.80 - 0.96, width at base 1.92 - 2.28;
disk uniformly yellowish brown to dark brownish, median line usually
indicated with pale, coarsely punctate, lateral margins carinate,
early straight; calli, convex, black, anterior angles invaded by
pale; separated behind by two deep punctures; scutellum convex im-
punctate, dark brown, apex, basal angles and median line pale, in
light-colored specimens scutellum pale yellow. Hemelytra width 2.56 - 2.88; uniformly dark brownish, sometimes apical half of corium black; cuneus pale, translucent, punctate, apex black; membrane and areoles infuscated, area around cuneus and behind areoles clear. Legs pale yellowish, hind femora biannulate with dark brown on apical half; tibiae triannulate with dark brown, hind tibiae more distinctly so, beset with long setae. Venter piceous or reddish brown, densely covered with pale pubescence. Genitalia as in Figure 12 and Figure 51.

Female. very similar to the male but slightly larger in size. Length 5.60 - 7.36. Maximum width 2.72 - 4.80. Antennal segment II length 1.60 - 1.76, slender thicker at apex, black, broadly pale at middle, beset with long, erect setae, often reaching 0.16 in length. Posterior wall of bursa copulatrix as in Figure 89; sclerotized rings as in Figure 134.

Fifth instar nymphs (females). Similar in structure to nymphs of D. validus, but much larger in size, dorsum covered with simple long black setae and finer pale hairs; length 4.16 - 4.64; maximum width 2.56 - 2.88. Head length 0.80, width 0.96, vertex 0.48. Antennae segment I, length 0.48; segment II, 1.28; segment III, 0.64; segment IV, 0.48; all segments pale except apex of segment II and segment IV brown, covered with long dark setae and finer pale hairs. Dorsum white, head, pronotum and tip of wing pads largely brown; abdomen tinged with reddish. Wing pads reaching fifth abdominal segment. Dorsal abdominal scent gland openings bordered by piceous; spiracular plates red.
Holotype: male, July 8, Ithaca, New York, H. H. Knight (USNM).


Distribution: Deraeocoris fasciolus is widely distributed in most northern states from Oregon to New York. Its occurrence in Colorado and New Mexico is somewhat outside of its range which in general is north of latitude 40°.

Biology: D. fasciolus overwinters in the egg stage. Nymphs and adults are collected from June to September. According to McMullen (1967), this species has two generations per year. In the West,
this species is found on *Corylus* sp. and on *Alnus* sp. It is as well found on apple and pear trees. *D. fasciolus* has been reported to feed on the rosy apple aphid, *Anuraphis roseus* Baker (Blatchley, 1926) and the pear psylla, *Psylla pyricola* Förster (McMullen, 1967). The writer has observed its feeding on the filbert aphid, *Myzocallis coryli*. In laboratory conditions, this species has been observed to feed on a wide range of small insects and partially on leaves and plant materials.

**Deraecoris fulvus** Knight


**Diagnosis:** small in size, less than 5 mm; general coloration fulvous to piceous; scutellum convex, pale or yellowish; membrane clear; genital structures distinctive for the species.

**Male.** Length 4.16 - 4.48. **Head** length 0.48, width 0.80, vertex 0.40; yellowish brown; spots along margin of eye, on each side of median line of tylus, on genae, blackish brown to piceous; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.32; segment II, 1.20, pale yellowish, cylindrical, constricted at base and apex, covered with pale short pubescence and longer setae; segment III, 0.48, segment IV, 0.32. **Pronotum** length 0.96, anterior angles 0.72, width at base 1.68; disk fulvous, dark brown in front of calli and in basal area; punctures concolorous; calli, slightly convex, confluent, fulvous; scutellum, convex, impunctate, pale to
yellow; lateral margins of pronotum nearly straight, carinate.
Hemelytra width 1.92, pale yellow, translucent, corium largely piceous,
punctures black, cuneus pale yellowish, translucent, apical half dark
brown; membrane clear, veins brown. Legs pale yellow; femora marked
with brown on anterior face; tibiae, slightly darker at apex; claws
distinctly cleft. Venter black or piceous, covered with pale pubes-
cence. Genitalia not illustrated, the specimens examined were
teneral.

Females. Length 4.32 - 4.80; maximum width 2.08 - 2.24; very
similar to male but larger in size and dorsum more uniformly ful-
vous; antennal segment II, length 1.12, slender, thicker at apex.
Posterior wall of bursa copulatrix as in Figure 90; sclerotized rings
as in Figure 132. Genital structures distinctive for the species.

Holotype: male, August 4, Williams, Arizona, on white oak, H. H.
Knight (USNM); allotype and paratypes bearing the same data as the
type were also examined at the U.S. National Museum.

8-5-1924, E. P. Van Duzee (AS); Chiricahua Mts., 7-8-1932, R. H.
Beamer (UK); Rustler Park, Chiricahua Mts., 8-9000', 7-27-1927, J.
A. Kusche (CAS). Coconino Co.: Grand View, Grand Canyon, on white
oak, 8-3-1917, H. H. Knight (CU) (USNM); Coconino Co., 7-28-1932;
R. H. Beamer (UK); Bill Williams Mt., Williams, 6-8-1940, L. L.
Stitt (WSU). Pima Co.: Mt. Lemon, Santa Catalina Mts., 7000',
7-26-1924, J. O. Martin (CAS); Mt. Lemon, 9000', July 26, H. H.

**Distribution:** D. fulvus is only known from Utah and Arizona. This is likely to occur also in the mountains of northern Mexico.

**Biology:** Very little is known about this species. It breeds on the Rocky Mountain white oak, *Quercus gambelii* Nutt., at elevation of 6000 to 9000 feet.

**Deraeocoris quercicola** Knight


**Diagnosis:** very similar to *D. nitenatus* Reuter but easily recognized by its left clasper with well-developed and protruding sensory lobe; slightly smaller than *D. triannulipes* Knight in size; tibiae pale; membrane uniformly pale or slightly fumate.

**Male.** Length 5.12 - 5.76. Head length 0.64, width 0.96, vertex 0.48; pale yellowish, dark brown markings similar to those of *D. fasciolus*; rostrum reaching upon middle coxae. Antennae segment I, length 0.40; segment II, 1.12 - 1.44, pale yellowish, darker at apex, nearly cylindrical, basal one-fourth more slender, covered
with pale and short pubescence and fewer erect setae; segment III, 0.54; segment IV, 0.40; last two segments brownish yellow, pale pubescent and with few erect setae. Pronotum length 1.12 - 1.20, anterior width 0.96, width at base 1.92 - 2.08; brownish black, median line, lateral and basal area more or less broadly pale; area between and in front of calli ivory-white; calli convex, black, separated at median line by two deep punctures, a black arc extending from latero-anterior angle of each callus to anterior margin of pronotum; scutellum convex, impunctate, ivory-white, sometimes brownish black on each side of median line. Hemelytra width 2.40 - 2.56; brown to dark brown, translucent; embolium and clavus largely pale, black punctate; cuneus, pale translucent, black punctate, apex black; membrane pale or slightly fumate. Legs pale; tibiae slightly darker at apices; hind femora marked with brownish black near apices; claws deeply cleft near bases. Venter brown to black, covered with pale pubescence. Genitalia claspers as in Figure 13; sensory lobe of left clasper very long, longer than that of D. triannulipes; vesica as in Figure 53, closely related to that of D. shastan.

Female. Length 4.80 - 5.60; maximum width 2.24 - 2.72. Very similar to males in size and color; second antennal segment 1.12 - 1.36. Posterior wall of bursa copulatrix as in Figure 92, closely related to that of D. triannulipes; sclerotized rings as in Figure 133.

Holotype: Male, July 16, Conesus Lake, New York, H. H. Knight (USNM).

Distribution: this species is widely distributed east of the Rocky Mountains; it is also known from New Mexico, Wyoming, Colorado and Utah (Knight, 1921).

Biology: D. quercicola is known to occur on Quercus alba L. and Q. macrocarpa Michx. east of the Rocky Mountains. The western host plant of this species is not known with certainty, although the series of specimens from Vivian Park, Utah, could have been collected from Q. gambelii Nutt., which is abundant at that location.

Deraecoris shastan Knight


Diagnosis: very suggestive of D. quercicola; lateral margins of pronotum broadly pale yellowish; scutellum dark brown to black, basal angles and apical half of median line pale; male genital claspers distinctive for the species.

Male. Length 5.60 - 5.92. Head length 0.72, width 1.04, vertex 0.48, pale yellow, black or dark brown markings similar to that of D. fasciolus and D. quercicola; rostrum reaching upon middle coxae. Antennae segment I, length 0.48; segment II, 1.28 - 1.52,
apical three-fourths heavily pubescent, beset with few erect setae, brownish; segment III, 0.56; segment IV, 0.48; last two segments densely pubescent and with few erect setae. Pronotum length 1.12 - 1.28, anterior angles 0.96, width at base 2.08 - 2.24; disk dark brown to black behind calli, lateral margins broadly pale, in light-colored specimens basal area of pronotum broadly pale; lateral margins abruptly convex, carinate, slightly sinuate when viewed from the side; punctures, black, deep and coarse; calli, black, a black arc extends from the latero-anterior angle of each callus to anterior margin of pronotum, area in front of calli pale yellow; scutellum convex, impunctate. Hemelytra width 2.24 - 2.56, black punctate, brown to black, embolium, corium and clavus more or less broadly pale; cuneus, pale, apex black; membrane, pale, fumate in dark colored specimens; veins brown to black. Legs pale; femora twice banded with dark brown at apex; tibiae triannulated with brown or dark brown, also a dark spot on the knee; claws piceous, deeply cleft near bases. Venter piceous, pale pubescent. Genitalia parameres as in Figure 14; sensory lobe of left clasper very distinctive for the species; vesica as in Figure 53, closely related to that of D. triannulipes.

Female. Length 5.76 - 6.72; maximum width 2.72 - 2.96. Very similar to male in coloration but slightly larger in size. Second antennal segment length 1.28 - 1.52, slender and gradually thickening toward apex, beset at interval with long erect setae, reaching 0.20 in length, only apical one-third covered with short pubescence. Posterior wall of bursa copulatrix as in Figure 92; sclerotized
rings as in Figure 134.

Holotype: female, May 28, 1911, Siskiyou County, California, F. W. Nunenmaker (USNM).

Material examined: California. Butte Co.: Oroville, on Quercus lobata Neé., 4-14-1926, 4-28-1927, 4-17-1928, H. H. Keifer (CAS).

Calaveras Co.: Murphy, 2500', 5-23-1936, E. E. Baisdell (CAS).


Material illustrated: male and female from Monticello, California (CDFA).

Distribution: this species known only from the northern half of California and southwestern Oregon.

Biology: The adults of this species are collected from March through June. It breeds on Quercus garryana Dougl. and Q. lobata Neé. The biology of D. shastan is not known but it appears to overwinter in the egg stage and have only one generation, considering that the host-plants are deciduous.
Deraeocoris triannulipes Knight


Diagnosis: similar in size and appearance to D. quercicola; pronotum uniformly dark brown to black, median line indistinctly marked with pale, except in light-colored specimens; sensory lobe of left clasper shorter than that of D. quercicola distinctive for the species.

Male. Length 6.08 - 6.56. Head width 1.04, vertex 0.48, length 0.72; pale yellowish, black markings on front and vertex similar but broader than those of D. quercicola; rostrum reaching upon middle coxae. Antennae segment I length 0.48, dark brownish; segment II, 1.44 - 1.60, dark brown, basal one-third more slender, apical two-thirds more densely covered with pale pubescence and few erect setae; segment III 0.64, pale pubescent and beset with few erect setae; segment IV, missing on all the specimens examined. Pronotum length 0.64 - 0.72, anterior width 0.96, width at base 2.24; uniformly brownish black, black punctate basal and lateral margins, area before calli narrowly yellowish pale, median line indistinctly marked with pale, except in light-colored specimens, calli, black, convex; scutellum, convex, black, angles and apical half of median line pale brownish. Hemelytra width 2.72 - 2.88; dark brown, black punctate, embolium, spot at base of corium and middle of clavus pale brownish translucent; cuneus pale translucent, black punctate, apical half black; membrane, fumate, paler behind cuneus. Legs pale; femora
with two black bands on apical half, anterior face of hind femora with a row of black spots; tibiae triannulated with black and also a spot on the knee; tarsi pale, apices and claws piceous. Venter black, shiny, covered with pale pubescence. Genitalia parameres as in Figure 15, sensory lobe of left clasper distinctive for the species; vesica as in Figure 54, very similar to that of D. shastan.

Female. Length 6.08 - 7.04; width 2.88 - 3.04; segment II of antennae 1.28 - 1.44, pale, slightly darker at apex, slender, apical one-fourth thicker. Very similar to males in coloration but slightly larger in size. Posterior wall of bursa copulatrix as in Figure 93, sclerotized rings as in Figure 135; genital structure of female distinctive for the species.

Holotype: male, August 2, 1900, Rico, Colorado, E. D. Ball (USNM); female paratype with the same data as the type (USNM).


Material illustrated: male and female from Logan, Cache County, Utah.

Distribution: This species is known at present from Colorado and Utah, at elevations above 6000 feet.
Biology: The host plant of this species is not known but judging by the habit of the species of this group, D. triannulipes should be collected on oak species above 6000 feet of elevation.

The variety flavisignatus Knight is somewhat of a problem. Although the type-specimens Knight has based his description (1927) upon are similar to those of D. triannulipes; these two taxa have a disjunct distribution and appear to live in very different types of habitats. The variety flavisignatus Knight is likely to be proven a different species when more is known about these taxa.

The schwarzii Group

Diagnosis: small to medium size, 4.00 - 6.00 mm; lateral margins of hemelytra more or less arcuate; hemelytra strongly flexed down at cuneal fracture; scutellum convex; impunctate; claws deeply cleft near bases; genital structure showing relationship between the species of the group.

This group is named after Deraeocoris schwarzii (Uhler) because this species is the most widely distributed of the four species recognized in this group. The other three species are: D. bullatus Knight, D. convexulus Knight and D. fulgidus (Van Duzee). The species of this group are found only west of the Rocky Mountains in North America. They are found in dry and fairly dry habitats. They breed on shrubs and low vegetation. The adults of the species of this group are collected generally from May to July. The records apparently indicate that they overwinter in the adult stage and have only one
generation per year, due to harshness of the environmental conditions. Nymphs and adults of D. fulgidus have been observed by the writer to feed on Dactinotus sp. (Aphididae) and Chlamydatum sp. (Miridae) like Deraeocoris bakeri Knight, which also occurs in the same kind of habitat as the schwarzii group.

Key to the Species of the schwarzii Group

1. Scutellum pale, brown along median line; calli brown to black, largely pale on antero-lateral angles. Known from British Columbia and all western states except Arizona. Usually collected on Purshia tridentata Nutt. and Artemesia tridentata Nutt. . . . . . . schwarzii (Uhler), p. 106

2. Scutellum dark brown, lateral angles and median line pale; kind femora pale yellow, with two brownish black bands on apical half. Known from southern California and western Arizona; collected on Lycium cooperi Gray. . . . . . . . . . . . . convexulus Knight, p. 100

3. Dorsum usually black, shining; scutellum uniformly yellowish red to dark red (light-colored forms similar to D. bullatus but larger in size and distinguished by the genital structures). Known to occur in Washington, Oregon, California and Nevada. Mostly common in sage brush scrub and chaparral
types of vegetation. Collected on Purshia, Arctostaphylos and Cercocarpus. . . . . . . fulgidus (Van Duzee), p. 102
Dorsum never entirely black, hemelytra pale yellowish, black punctate, spots at middle of corium, apices of clavus, embolium and corium brown to black; scutellum often red, darker on each side of median line; sensory lobe of male left clasper as in Figure 16. Known from southern California, Nevada, Utah, Arizona and Colorado. Mostly collected on shrubs within Pinyon-Juniper woodlands such as Cowania mexicana (Torr.) Jeps., Artemesia tridentata Nutt. and Purshia glandulosa Nutt. . . . . . . bullatus Knight, p. 97

_Deraeocoris bullatus_ Knight


_Diagnosis:_ slightly smaller than _D. convexulus_; scutellum reddish or dark reddish median line pale; easily distinguished from _D. convexulus_ by the male and female genital structures; sensory lobe of left clasper shorter than that of _D. convexulus_.

_Male._ Length 4.00 - 4.70. _Head_ length 0.80, width 0.96, vertex 0.48; pale yellowish brown, median line of front and tylus, carina, white; front convex, carina marginate; collum yellowish brown; rostrum reaching upon hind coxae. _Antennae_ segment I, length 0.40, piceous, sparsely pubescent; segment II, 1.12, slender on basal half,
thicker on apical half, piceous, darker toward apex, covered with pale pubescence and a few exserted setae; segment III, 0.40; segment IV, 0.40; last two segments piceous, pale pubescent, beset with several exserted hairs. Pronotum length 1.04 - 1.12 width at anterior angles 0.96, width at base 1.92; black punctate; yellowish brown to sordid white, usually more or less broadly piceous behind calli on each side of median line; in dark-colored specimens disk piceous to black except anterior angles, area before calli, a spot behind middle of calli and narrowly around margins, sordid white to ivory-white; calli piceous to black with an arc projecting forward from latero-anterior angle of each callus; underside of thorax red; scutellum with 2.24; lateral margins arcuate; black punctate pale yellow, spots at middle and apex of corium more or less broadly piceous; cuneus pale, apical half and inner angle black; membrane fuscous, pale behind areole and cuneus, veins dark brown posteriorly. Venter reddish to piceous. Legs reddish to piceous; tibiae triannulate with pale; claws left near base. Genitalia claspers as in Figure 16; vesica as in Figure 55; distinctive for the species.

Female. Length 4.64 - 5.12; width 2.24 - 2.72; antennal segment II, length 1.28, slender, apical one-fifth thicker, reddish brown, black at apex. Similar to male in coloration but slightly larger and more ovate. On some females, scutellum black on each side of median line, but pale coloration distinctly reddish and underside of thorax, abdomen and legs marked with red to piceous. Posterior wall of bursa copulatrix as in Figure 94; sclerotized rings as in Figure 136; genital structure showing relationship with D. convexulus but distinct.
Holotype: male, August 3, 1917, Grand View, Grand Canyon, Arizona, H.H. Knight (USNM). Allotype and paratypes collected with the type on Cowania mexicana, cliff rose, were also examined at the U.S. National Museum.


Material illustrated: male, from Caliente, Lincoln Co., Nevada (AMNH); female, from Oasis, Mono Co., California (AMNH).

Distribution: distribution of this species coincides with that of the Pinyon Pine-Juniper woodland of southern California, Nevada, Arizona, Colorado and Utah.

Biology: the adults of this species are collected from May to August depending on the locations. There is no evidence of its overwintering in the adult stage in collection records. It is known
to breed on shrubs within Pinyon Pine-Juniper woodland such as: Cowania mexicana (Torr.) Jeps., Artemesia tridentata Nutt. and Purshia glandulosa Nutt.

**Deraeocoris convexulus Knight**


**Diagnosis:** very similar to *D. bullatus*; scutellum pale white, black on each side of median line; male and female genitalia similar to that of *D. fulgidus* but distinct; venter and underside of thorax without red, hind femora distinctly banded with brown near apices.

**Male.** Length 4.64 - 4.96. **Head** length 0.80, width 1.04, vertex 0.56; pale yellowish, darker on each side of median line of front and typhus, carina slightly raised and arcuate posteriorly; collum pale yellowish; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.40, dark brown to piceous, segment II, 1.28, gradually thicker from base to apex, with pale pubescence and with several erect setae, piceous; segment III, 0.48; segment IV, 0.32, last two segments piceous, with pale pubescence and beset with erect setae. **Pronotum** length 1.20, anterior width 0.96, width at base 2.24; pale yellow, black punctate; coloration of punctures connecting to form brownish black spots on disk of pronotum; calli black, invaded by pale at antero-lateral angles; black arc projecting from antero-lateral angle of each callus to anterior margin of pronotum; area before calli pale yellow; sternum and pleura yellowish brown, without any red;
scutellum, convex, impunctate, pale yellow, black on each side of median line. Hemelytra width 2.72; very similar to D. bullatus but lateral margins more arcuate and punctures coarser. Legs pale yellow; femora twice banded with dark brown at apices, more distinctly so on hind femora; tibiae triannulate with dark brown, with additional narrow band on the knee; tarsi brown, darker at apex; claws brown to piceous. Venter piceous, pale pubescent. Genitalia parameres as in Figure 17, more closely related to D. fulgidus than to D. bullatus; vesica as in Figure 56.

Female. length 5.6 - 5.92; width 2.88; second antennal segment, length 1.28, as in D. bullatus; very similar to the male but more ovate and robust. Posterior wall of bursa copulatrix as in Figure 95; sclerotized rings as in Figure 137; genitalia closely related to D. bullatus and D. fulgidus.

Holotype: male, May, Los Angeles County, California, Heidemann (USNM); allotype collected with the type.


Material illustrated: male from Victorville, California (UCR), female from Montezuma Well, Arizona (ASU).

Distribution: this species is known from the Mohave Desert of southern California and from Yavapai County, Arizona. The small
number of specimens in various collections does not permit an accurate approximation of the range of this species. However, the known host-plant of this species, *Lycium cooperi* Gray, is associated with Creosote Brush Scrub, Blackbush Scrub, Joshua tree Woodland and Pinyon-Juniper Woodland. These habitats are rarely collected for mirids. Judging by the habits of the group, *D. convexulus* could be found in the above kinds of habitats.

**Biology:** Like *D. bullatus* the adults of *D. convexulus* have been collected from May - July. *D. convexulus* occurs at lower elevation than the former species.

*Deraeocoris fulgidus* (Van Duzee)


*Deraeocoris fulgidus*, Knight, 1921, *Rept. Minn. St. Ent.* 18:145, 149;


**Diagnosis:** dorsum usually black; scutellum red; light color forms easily distinguished from *D. manitou* by the toothed claws, and from *D. convexulus* by the red scutellum; sensory lobe of male left clasper longer to that of *D. bullatus*.

**Male.** Length 4.32 - 5.28. Head length 0.80 - 0.88, width 1.04 - 1.20, vertex 0.56; yellow to yellowish red, apex of tylus and bucculae, black; carina slightly marginate; collum yellow, rostrum
reaching upon middle coxae. Antennae segment I, length 0.40 - 0.48; segment II, 1.12 - 1.28; segment III, 0.48; segment IV, 0.40; all segments piceous to black, with pale pubescence and several erect longer setae, segment II gradually thicker toward apex. Pronotum length 1.12 - 1.44, anterior width 1.04 - 1.12, posterior width 2.00 - 2.24; disk, black and shiny; in teneral specimens, dark brown and black punctate; variously invaded by pale, yellow in lighter color forms; calli convex, black, confluent; in light-colored specimens, calli as in D. convexulus; lateral margins of pronotum strongly carinate, nearly straight; posterior margin, in light-colored specimens, narrowly pale; underside of thorax, dark brown to black, ostiolar peritreme often blackish; scutellum, convex, yellowish red to dark reddish. Hemelytra width 2.40 - 2.80; lateral margins arcuated as in D. convexulus; dark brownish to black; in light-colored specimens, spot at base of corium pale white; cuneus black; basal half pale, opaque, in light-colored specimens; membrane darker than that of D. convexulus. Legs black, in light-colored specimens, basal half of femora reddish and tibiae biannulate with pale; claws deeply cleft near bases. Venter piceous to black, pale pubescent. Genitalia parameres as in Figure 18; vesica as in Figure 57; genital structures closely related to D. convexulus.

Female. Very similar to males but larger in size and more ovate; length 4.64 - 6.08; maximum width 2.50 - 3.12; second antennal segment length 1.12 - 1.36, slender, only thicker near apex.

Fifth instar nymphs. Length 3.36, maximum width 2.16; dorsum covered with simple dark setae (reaching 0.24) and finer pale setae.
Head width 0.96, length 0.72, vertex 0.56; brown; carina pale, convex; rostrum reaching upon middle coxae. Antennae segment I, length 0.32; segment II, 0.96, slightly thicker at apex; segment III, 0.48; segment IV, 0.32, covered with dense pubescence; all segments beset with long dark setae. Wing pads and pronotum, brown, median line pale; wing pads reaching fourth abdominal segment. Abdomen, white, tinged with red; dorsal abdominal scent gland openings bordered by black; spiracular plates and apex of abdomen dark brownish. Legs, as in adults, tarsi two-segment, claws distinctly cleft.

Holotype: not seen, but parts of the series from San Diego that E. P. Van Duzee based his description upon, were examined at the U.S. National Museum, in Washington, D.C.


Santa Cruz Co.: Ben Lomond, 5-17-1931, E. P. Van Duzee. **Shasta Co.:** Mt. Shasta, 6-29-1935, R. H. Beamer (UK). **Siskiyou Co.:** Weed, 6-29-1935, R. H. Beamer (UK); McCloud, E. P. Van Duzee (USNM).


Material illustrated: male and female from Bend, Oregon.

**Distribution:** This species is known from Washington, Oregon, California, Nevada and Utah.

**Biology:** The adults of this species are collected from May to
July. Its known host plants are the following: \textit{Purshia tridentata} (Pursh.) D.C., \textit{Cercocarpus betuloides} Nutt., \textit{C. ledifolius} Nutt., and \textit{Arctostaphylos} sp. It is mostly common on sage brush scrub and chaparral types of vegetation.

This species shows a great amount of color variation. Teneral specimens are generally brown in color and are only recognized by the red scutellum. In addition, this species shows color polymorphism, as mentioned in the description. There is also a pronounced variation in size.

\textit{Deraeocoris schwarzii} (Uhler)

\textit{Deraeocoris schwarzii}, Knight, 1921, Rept. Minn. St. Ent. 18:145, 146;

\textbf{Diagnosis}: dorsum usually pale gray, black punctate; scutellum pale white, brown to black on median line; head marked with brown to black; genitalia distinctive for the species.

\textbf{Male}. Length 4.48 - 4.80. \textit{Head} length 0.64, vertex 0.48, width 0.96; pale yellow, transverse spots on front on each side of median line, spots on vertex and along inner margins of eyes, at base and
on each side of tylos and on juga brown to black; carina flat; collum black; rostrum reaching hind margin of middle coxae. Antennae segment I, length 0.32, black, pale at apex; segment II, 1.12, thicker toward apex, pale pubescent and with longer dark setae, black, basal half usually pale; segment III, 0.48; segment IV, 0.40. Pronotum length 0.96, anterior width 0.88, width at base 2.00; disk convex, pale gray, black punctate, sometimes brown behind calli; calli slightly convex black, antero-lateral angles invaded by pale, with black arc extending from anterior angle of each callus to anterior margin of pronotum; area in front and between calli pale; lateral margins of pronotum carinate, nearly straight; scutellum convex, pale white to yellowish, impunctate, median line brownish to black. Hemelytra width 2.32, pale gray, opaque, black punctate, middle and apex of corium sometimes brown; cuneus pale, inner margin at apex dark brown; membrane clear, apical half sometimes infuscated, veins brown. Legs pale; coxae brown at base, femora biannulate with dark brown on apical half, two rows of brown spots usually visible on anterior face of hind femora, tibiae biannulate with dark brown on basal half; tarsi darker at apex; claws cleft near bases. Venter dark brownish to black, first two to five segments and side of each segment often pale, pubescence pale. Genitalia parameres as in Figure 19, vesica as in Figure 58, genital structures distinctive of the species.

Female. Length 4.72, maximum width 2.56. Very similar to male in coloration and size but slightly more ovate. Antennal segment II, length 1.12, slender, pale, apical one-fifth thicker and black. Posterior wall of bursa copulatrix as in Figure 97; sclerotized rings
as in Figure 139. Genital structures distinctive for the species.

Lectotype: male, June 22, 1891, American Fork, Utah, E. A. Schwarz (USNM).


Material illustrated: male and female from Lytton, B.C. (UBC).

Distribution: D. schwarzi has been recorded from British Columbia and all the western states but Arizona, on dry slopes and plains at elevations of 3000 to 10000 feet.

Biology: The adults of this species are collected from June to August. It has one generation per year and overwinters in the egg stage. Its known host plants are Artemisia tridentata Nutt., Purshia tridentata Nutt. and Sarcobatus sp. Like D. schwarzi these plants are found in many types of vegetation ranging from sage brush scrub to pine forests.

The fenestratus Group

Diagnosis: small to large in size, 4.40 - 7 mm.; dorsum pubescent or distinctly pilose, at least with few long setae at anterior angles of pronotum; scutellum impunctate, moderately to strongly convex;
with exception of genital segments both sexes are very similar in most species; sensory lobe of left clasper more or less elongate, except in D. apache, where it is evenly rounded; vesica with four or more spicules; posterior wall showing strong relationship between species.

The species of this group are mainly distributed in California, Oregon, Nevada, Utah, Arizona, Colorado and New Mexico. The similarity between the species of this group is definitely stronger than in any other groups. Most of the species show a great range of color and, to a lesser degree, size variation. The relationships with their host plants for the species of this group are not well documented. Many of the species represented in this group are known to breed on different species of oak and tanbark oak and some on Amelanchier sp., Arctostaphylos sp. and Alnus sp. Information on the feeding habits of most species are not available. However, D. fusifrons has been observed by the writer to feed on aphids and psocids of Quercus garryana Dougl. No evidence indicates that the adults of the species of this group hibernate.

Key to the Species of the fenestratus Group

1. Calli pale, heavily outlined by black or piceous along anterior margins and posterior margins; usually with a black or piceous arc running from middle of each callus to anterior margin of pronotum; often lines obsolete .................. 2
   Calli not outlined as above, solid brown, piceous or black; sometimes pale inside of calli or at latero-anterior angles ... 6
2. Scutellum and hemelytra distinctly pilose; longest setae on scutellum at least equal in length to longest setae on second antennal segment .................................. 3
Scutellum and hemelytra shortly and sparsely pubescent; longest setae on scutellum much shorter than longest setae on second antennal segment .................................. 5

3. Scutellum and calli amber to reddish yellow; cuneus red on apical half. Known from Colorado, Idaho and Nevada; collected on *Amelanchier* sp. and *Pinus monophylla* Torr. and Frém ........................................... *bali* Knight, p.116
Scutellum and calli not as above; cuneus usually piceous or black at apex ................................................... 4

4. Scutellum strongly convex; pronotum deeply and irregularly punctate; length usually less than 5 mm.; male genital claspers as in Figure 25. Occurring in Arizona, collected on oak ........................................... *gilensis* n.sp., p.129
Scutellum moderately convex; pronotum finely and closely punctate; length usually greater than 5 mm.; male genital claspers as in Figure 25. Known from the southern Coast Ranges, Los Angeles County, Santa Cruz Island, Riverside County and San Diego County in California and also from Baja, California; collected on *Quercus agrifolia* Neé. and *Q. chrysolepsis* Liebm. ........................................... *cerachates* Uhler, p.118

5. Scutellum strongly convex, piceous, lateral angles pale, often median line indicated with pale; pronotum finely and closely punctate; calli nearly flat; hind tibiae biannulate
with reddish brown on basal half and darker at apices. Known from southern California, southwestern Utah and Arizona; breeds on oak. \textit{vanduzeei} Knight, p.137

Scutellum moderately convex, pale, sometimes narrowly pale brown to black on each side of median line; pronotum deeply, coarsely, and irregularly punctate; calli distinctly swollen; hind tibiae pale, undistinctly annulate. Known from northern California and Oregon; breeds on several species of alder. \textit{knightonius} n.sp., p.131

6. Pronotum pale brown to dark blackish brown, broadly pale yellow pale along lateral margins; tibiae clothes with long erect setae, often equal to or greater than 0.32 mm. in length. 7

Pronotum not distinctly as above; length of setae on tibiae rarely reaching 0.32 mm. \textit{Apache} Knight, p.114

7. Hind femora pale, distinctly banded with brownish red to piceous at middle of apical half and usually with two rows of pale brown spots on basal half of anterior face; hind tibiae triannulate with reddish brown to piceous, also a dark spot on the knee; sensory lobe of male clasper not produced, evenly rounded, as in Figure 20. Known from Arizona; probably breeding on oak. \textit{Apache} Knight, p.114

Hind femora brownish black, inconspicuously banded with pale near apices, sometimes paler on basal half; hind tibiae banded with blackish brown below the knee and broadly at middle, apices pale; sensory lobe of male left clasper well-developed, conical in shape. Known from Utah,
Arizona and New Mexico; breeds on oak. . . . comanche Knight, p.121

8. Hemelytra and scutellum with short and often sparse
     pubescence, longest setae on scutellum much shorter than
     longest setae on second antennal segment; femora red to
     dark red, in light-colored specimens basal half yellowish
     pale; dorsum yellowish red to dark red and piceous. Known
     from southern part of California; breeds on Arctostaphylos
     sp. ........................ .rufiventris Knight, p.134

Hemelytra and scutellum distinctly hairy; longest setae
     on scutellum equal in length to longest setae on second
     antennal segment; femora pale yellowish, hind femora banded
     with reddish brown to black at middle of apical half, and
     additional but incomplete band may be present near apices;
     dorsum yellowish red or yellowish brown with piceous or
     black. ........................... 9

9. Hand tibiae triannulate with brown or reddish brown; dorsum
     pale yellow darkened with red to piceous. Occurring in
     Oregon, Nevada and California; collected on Arctostaphylos
     sp., Ceanothus sp. and Castilleja sp. ........................
     ...................................... fenestratus (Van Duzee), p.123

Hind tibiae pale, sometimes more or less distinctly banded
     with blackish brown at middle; dorsum pale yellow darkened
     with blackish brown to black, often entirely black. Occur-
     ring in Oregon and California; collected on Quercus garryana
     Dougl., Q. kellogii Newb., Q. agrifolia Neé. and Adenostema
     sp. .............................. fusifrons Knight, p.126
**Deraeocoris apache** Knight


**Diagnosis:** fairly large in size; dorsum brownish to dark brown, densely setose; lateral margins of pronotum more or less broadly pale; sensory lobe of left clasper short and rounded; femora pale, annulate with piceous on apical half; claws deeply cleft.

**Male.** Length 6.72. **Head** length 0.80, width 1.12, vertex 0.56; pale yellow, spots along eye margin and recurved on vertex, large rounded spot on front connected to spots on base and on each side of tyulus, black; juga, lorae and genae marked with brown; front convex, setose; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.64, piceous; segment II, 1.76, nearly cylindrical, slightly narrower at base, pale yellow apical one-third piceous, with dense pubescence and with long setae equal in length to twice the greatest thickness of the segment; segment III, 0.64; segment IV, 0.48; last two segments brownish pale. **Pronotum** length 1.44, anterior width 1.12, posterior width 2.64; pronotal collar brown, pruinose and with long setae; disk convex, coarsely punctate, brown to piceous, lateral margin broadly pale, setose (setae reaching 0.32 mm. in length); calli flat, black, area in front and between pale yellowish, a black arc extending from lateral angle of each callus to anterior margin of pronotum, a deep puncture present on inner angle of each callus; scutellum convex, pilose, piceous, lateral angles and median line pale. **Hemelytra** width 3.12; densely setose, uniformly brownish.
or piceous, cuneus piceous narrowly pale on outer angle; membrane fuscous, veins reddish brown. Legs pale, densely clothed with long setae; femora broadly banded with piceous on apical half, two rows of brown spots on anterior face of basal half; tibiae triannulate with piceous, apical annulus not very distinct on front and middle pairs; claws deeply cleft. Venter piceous, yellowish pale at the sides, spiracular plates piceous. Genitalia claspers as in Figure 20, vesica as in Figure 59, distinctive of the species.

Female. very similar to male but generally lighter in color. Length 6.56 - 7.90, maximum width 3.04 - 3.36, antennal segment II, 1.76 - 1.92; cuneus concolorous with corium, apex and margin dark red. Genitalia as in Figure 98 and Figure 140.

Holotype: male, June 20, Prescott, Arizona, H.S. Barber (USNM).


Material illustrated: female, from Oak Creek Canyon, Coconino Co. (AMNH); male, from Sierra Ancha Mts., Gila Co. (UA).

Distribution: D. apache is known only from Arizona.
Biology: Very little is known about this species. The adults are collected from late May to early July. This species probably breeds on oak.

**Deraeocoris balli** Knight


Diagnosis: related to *D. vanduzeei* but much larger in size; calli and scutellum amber to brownish red; anterior margins of calli outlined in part with piceous; cuneus pale yellow, apical half red; dorsum pale yellow, coarsely black punctate; genitalia of female closely related to *D. vanduzeei* but much larger in size.

Female. Length 6.08 - 6.24. Head length 0.80, width 1.04 - 1.12, vertex, 0.56; pale yellowish brown, slightly paler on median line of front and on vertex; front moderately convex; rostrum reaching hind coxae. Antennae segment I, length 0.48; segment II, 1.36, slender apical one-fifth thicker, pale yellowish brown, darker at apex, sparsely pubescent with long erect setae reaching in length two and a half times the greatest thickness of segment; segment III, 0.64, dark brown; segment IV, missing on both specimens examined. Pronotum length 1.28, anterior width 1.12, posterior width 2.16 - 2.32; disk sparsely but coarsely punctate, more densely punctate near lateral margins, clothed with long setae, lateral margins nearly straight, carinate, disk pale yellow, brown coloration spreading from punctures; calli amber to yellowish brown, anterior margin outlined in part by
piceous; scutellum pale yellowish brown to pale reddish brown (lateral angles slightly paler in one specimen), with long setae. Hemelytra width 2.80 - 2.88; coarsely black punctate, densely setose, pale yellow, dark coloration spreading from punctures; embolar margins moderately arcuate; cuneus pale yellowish brown, apical half red; membrane infuscated, veins brown, red at apex of smaller areole. Legs pale yellowish brown, densely clothed with long setae; hind femora biannulate with red on apical half; tibiae biannulate with red; tarsi dark brown at apices; claws deeply cleft at base. Venter pale yellowish, sides and genital segment reddish brown. Genitalia posterior wall as in Figure 99, sclerotized rings as in Figure 141 closely related to D. vanduzeei but distinct and much larger in size.

Male. received too late for description.

Holotype: female, August 3, 1900, Dolores, Colorado, E. D. Ball (USNM).


Distribution: This species occurs in Idaho, Nevada, Utah and Colorado. It lives probably within Pinyon-Juniper woodland.

Biology: the known host-plants of this species are: Amelanchier sp., A. utahensis Koehne, and Pinus monophylla.
Deraeocoris cerachates Uhler


Deraeocoris californicus Knight, 1921, Rept. Minn. St. Ent. 18:185: new synonymy.

**Diagnosis:** size medium to fairly large; dorsum distinctly pilose; calli outlined by piceous or black; pronotum deeply but finely punctate; scutellum convex but not as strongly as in *D. vanduzeei*; scutellum and hemelytra distinctly pilose; ground color honey yellow or brown often darker at middle and apex of corium; genitalia distinctive for the species.

**Male.** Length 5.28 - 6.34. Head length 0.64 - 0.80, width 1.04 - 1.12, vertex 0.48, plate yellow, pubescent; spots on sides and base of tyulus, along eye margin and row of transverse spots on each side of median line of front, pale brown to black; front moderately convex; rostrum reaching hind margins of middle coxae. Antennae segment I, 0.48 - 0.56, pale yellow; segment II, 1.44 - 1.60, pale yellow, apical one-fifth black, in light-colored specimens apical one-fifth just slightly darker, slender, apical one-fifth thicker, longest setae
approximately one and a half times the greatest thickness of the segment, short pubescent hairs found mainly on thickened part of the segment; segment III, 0.64; segment IV, 0.64. Pronotum length 1.28 - 1.44, anterior width 1.12, posterior width 2.24 - 2.28; disk moderately convex, deeply but finely punctate, densely pilose, pale yellow to brown, punctures concolorous or brown, black in dark-colored specimens, basal half brown to brownish black; calli pale yellow heavily outlined by piceous to black, a line extending from middle of each callus to anterior margin of pronotum; in light-colored specimens, these lines are broken or even obsolete; lateral margins carinate, nearly straight, posterior margin narrowly pale; ostiolar peritreme pale to white; scutellum, distinctly pilose, brown to black, lateral angles and apex pale, often median line also pale, in light-colored specimens scutellum entirely pale yellow to pale brown. Hemelytra width 2.56 - 3.04; finely punctate, distinctly pilose, pale yellowish brown, often translucent, spot at base and middle and more broadly at apex of cerium brownish to black, in darkest specimens these spots are connected; embolar margins arcuate; cuneus pale yellow to testaceous, apical on third light brown, black or reddish; membrane infuscated, more darkly so in dark specimens, veins brown to dark brown. Legs pale yellow clothed with semi-erect setae; femora with a brown band on apical half, often obsolete; tibiae usually with brown band at middle, entirely pale in light-colored specimens; claws deeply cleft. Venter testaceous, tinged with reddish brown, entirely black in dark specimens, longly pilose. Genitalia claspers as in Figure 21, sensory lobe shorter than in D. fusifrons; vesica
as Figure 60, closely related to *D. fusifrons*.

**Female.** Very similar to the male in size but more ovate and usually paler in coloration. Length 5.44 - 6.34, maximum width 2.56 - 3.20; second antennal segment, length 1.36 - 1.60; posterior wall and sclerotized rings as in Figure 100 and Figure 142.

**Holotype:** female, San José del Cabo, type number 566, California Academy of Sciences. The writer has compared the types of *D. californicus* Knight to this specimen and found them to be structurally identical.

**Distribution:** this species is known from California and Baja California, Mexico. It is distributed in the Southern Coast Ranges, San Jacinto Mts., and the coastal mountains of southern California.

**Biology:** Depending on the location, the adults of this species are collected from late April to early September. It is known to breed on various species of oaks such as *Quercus agrifolia* Neé. and *Q. chrysolepis* Liebm.

Uhler (1894) described this species with a single female from San José de Cabo, Baja, California. The writer has compared this specimen with the types of *D. californicus* Knight and found them identical.

At present the varieties *dessicatus*, *bradleyi* and *rufocuneatus* of *D. californicus* Knight are not interpreted as subspecies, because all these forms are present in the series of specimens from Tanbark Flat, Los Angeles County, California. The types of these varieties were examined and found to be identical to *cerachates*.

**Deraeocoris comanche** Knight

*Deraeocoris comanche* Knight, 1921, Rept. Minn. St. Ent. 18:177;

**Diagnosis:** similar to *D. apache* in general appearance but much smaller in size; male segment II of antennae entirely brown to piceous; femora dark brownish, banded with pale near apices; genital structures distinctive of the species.

**Male.** Length 5.28 - 6.08. Head length 0.64, width 1.04, vertex 0.48, pale yellowish, longitudinal spots on sides and triangular spots
at base of tylus, transverse spots on each side of front and on back of vertex brownish to piceous; juga, lorae and bucculae brownish; front convex with long setae; rostrum reaching posterior margin of hind coxae. Antennae segment I, length 0.48, pale brown; segment II, 1.36, brown to piceous, nearly cylindrical, densely pubescent and with long erect setae; segment III, 0.48; segment IV, 0.40. Pronotum length 1.12 - 1.20, anterior width 0.96, posterior width 1.76 - 2.00; calli as in D. apache, but more convex and punctures between calli closer together; disk of pronotum as in D. apache, lateral margins sinuate when viewed from the side; scutellum dark brown, angles and apex pale yellow. Hemelytra width 2.20 - 2.36; brownish black, basal half of embolium, middle of clavus, spots near base of corium, along claval fracture and near cuneal fracture pale translucent; hemelytra densely setose; cuneus concolorus with corium; membrane infuscated, paler around apex of cuneus, veins dark brown. Legs brownish black, densely covered with long erect setae; femora banded with pale near apices; tibiae banded twice and narrowly with pale on basal half, apices pale; claws as in D. apache. Venter brownish to piceous, broadly yellowish pale on central area. Genitalia claspers as in Figure 22, sensory lobe of left clasper longer than that of D. apache, vesica as in Figure 61.

Female. Not available for description.

Holotype: male, June 16, Williams, Arizona, Barber and Schwarz (USNM). Allotype: female, July 1, Williams, Arizona, H. Barber and paratypes with same data as the allotype were also seen at the U.S. National Museum.

Material illustrated: male from San Juan Co., Utah (AMNH).

Distribution: This species known from Arizona, New Mexico and Utah.

Biology: D. comanche is very little known. It probably breeds on oak.

Deraeocoris fenestratus (Van Duzee)


Diagnosis: larger than D. vanduzeei in size; setae on dorsum longer than in D. vanduzeei and D. rufiventris especially those on scutellum and hemelytra; calli dark brown to piceous, sometimes paler inside; median line of scutellum usually pale; dorsum yellow, marked with reddish brown and piceous but not distinctly reddish as D. rufiventris; genital claspers distinctive for the species.

Male. Length 5.12 - 5.92. Head length 0.64 - 0.72, width 1.04, vertex 0.48, pale yellow; longitudinal marks on sides and triangular spot at base of tylus piceous to red; brown marks on front, vertex and eye margins often inconspicuous; juga, lorae, bucculae
and genae marked with reddish and piceous; rostrum reaching hind coxae. Antennae segment I, length 0.48, yellowish pale; segment II, 1.52 - 1.68, yellowish pale, slender, apical one-fourth thicker and black, covered with long setae (reaching approximately twice the greatest thickness of segment), short pubescence confined to apical one-fourth of segment; segment III, 0.64 - 0.72; segment IV, 0.48 - 0.56. Pronotum length 1.12 - 1.28, anterior width 0.88 - 0.96, posterior width 1.92 - 2.08; disk setose, longest setae at lateral margins, yellow to pale reddish brown, posterior half becoming piceous, in darkest specimens disk piceous except more or less broadly on the sides and median line pale; punctures black, coarse, and sparse, near the lateral margins punctures; more dense; calli flat, piceous, with an arc extending from lateral side of each callus to anterior margin of pronotum, area before and between calli pale yellow, calli separated at middle by two deep punctures; posterior margin of pronotum narrowly pale, lateral margins not as distinctly carinate as in D. rufiventris; scutellum moderately convex, pilose, pale yellow to pale red, piceous on each side of median line. Hemelytra width 2.56 - 2.88, pale yellowish to reddish brown, spots at base and middle of corium piceous, apex of embolium and corium broadly piceous; punctures black; cuneus pale, basal margin and apical one-third piceous; membrane infuscated, area bordering the veins darker, dark brown to piceous. Legs pale yellow, clothed with long setae; femora marked with brown or red on apical half; tibiae triannulate with brown or red on apical half; tibiae triannulate with brown or red, apical band often not very distinct; claws deeply cleft. Venter red to piceous, pale
pubescent, longest setae on genital segment. Genitalia claspers as in Figure 23, distinctive for the species; vesica as in Figure 62.

Female. Length 5.76 - 6.24; maximum width 2.64 - 3.20; segment II of antennae, length 1.60 - 1.68; very similar to male in coloration; posterior wall of bursa copulatrix as in Figure 101, sclerotized rings as in Figure 143.


Material illustrated: male and female from Deschutes Co., Oregon (OSU).
Distribution: *D. fenestratus* occurs in California, northwestern Nevada and Oregon.

**Biology:** The adults of this species are collected from late June to August. *D. fenestratus* is known to breed on *Arctostaphylos* sp., *Ceanothus* sp. and *Castilleja* sp.

The light color form of this species is difficult to distinguish from *D. vanduzeei* and *D. californicus*; the darkest color form is very similar to *D. rufiventris*. However, these species can be separated by the shape of the scutellum, the length of the setae on the dorsum and the genitalia.

*Deraeocoris fusifrons* Knight


**Diagnosis:** similar to *D. fenestratus*, larger in size; calli solid black, even in light-colored specimens; pronotum more sparsely puncate than *D. californicus*; front often marked with brown to black; scutellum black, median line, apex and lateral angles pale white, longly pilose; genitalia closely related to that of *D. fenestratus*, but distinct.

**Male.** Length 5.80 - 6.40. **Head** length 0.80 - 0.88, width 1.04 - 1.12, vertex 0.56; pale yellow, spots on sides and at base of tylus, transverse impressions on each side of median line of front, spots along eye margins and curving on vertex, brownish to black; these
marks are inconspicuous in light-colored specimens; rostrum reaching hind margins of middle coxae. Antennae very similar to *D. fenestratus*; segment I, length 0.48 - 0.56; segment II, 1.36 - 1.76; segment III, 0.64; segment IV, 0.48. Pronotum length 1.28 - 1.36, anterior width 1.04 - 1.12, posterior width 2.24 - 2.40; disk longly setose, sparsely punctate, black or dark brown, area before calli, more or less broadly on the sides and behind calli often pale yellowish brown, lateral margin carinate, posterior margin narrowly pale; calli moderately convex, piceous or black, a black arc extending from each callus to anterior margin of pronotum; scutellum convex, longly pilose, black lateral angles and median line pale, in darkest specimen, scutellum entirely black and in light-colored specimens scutellum entirely pale white. Hemelytra width 2.56-3.04, brown, often paler along clavus and embolium; spots at middle and apex of corium black, often connected; embolar margin slightly arcuate; pubescence as long or longer than in *D. fenestratus*; cuneus pale yellow, apical one-third and narrowly along basal margin black; membrane slightly infuscated, area bordering veins darker; veins dark brown. Legs pale yellow, covered with pilose setae; femora often with two incomplete red bands on apical half; tibiae often with a brown band at middle, apices and bases inconspicuously darker; claws as in *D. fenestratus*. Venter piceous to black. Genitalia claspers as in Figure 24, vesica as in Figure 63; closely related to *D. fenestratus*; right clasper distinct.

Female. Length 5.76 - 6.40; maximum width 2.88 - 3.20; segment II of antennae, 1.44 - 1.60; very similar to male in coloration but more ovate. Posterior wall of bursa copulatrix as in Figure 102,
sclerotized rings as in Figure 144; showing strong relationship to D. fenestratus.

**Holotype:** male, Santa Clara County, California, May, Coleman (USNM). The female specimen that Knight designated as the holotype of this variety deletans was examined also at the U.S. National Museum.

**Material examined.** California. **Contra Costa Co.:** Mt. Diablo, 5-20-1952, on Adenostema sp., J. D. Lattin (OSU). **Los Angeles Co.:** Camp Baldy, 7-8-1950, W. C. Bentinck (UCB); Tanbark Flat, 6-23-1950, W. M. McDonald (LACM). **Mendocino Co.:** U.C. Hopland Field Sta., 5-18-1968, W. J. Turner (UCB). **Monterey Co.:** Monterey, 5-13-1923, L. S. Slevin (CAS); Bryon, 5-20-1920, E. P. Van Duzee (CAS). **Modoc Co.:** 18 mi. S. Rt. 139, 1340 m. elevation, on Quercus garryana and Q. kellogii, 7-6-1979, R. T. and J. Schuh (AMNH); Buck Creek, 7-21-1922, C. L. Fox (CAS). **San Bernardino Co.:** Mill Creek, 9-6-1923, E. P. Van Duzee (CAS). **Santa Barbara Co.:** Lompoc, 8-6-1938, R. I. Sailer (UK). Aliso Canyon, 7-9-1965, E. M. Omi (UCB). **Riverside Co.:** Vandervanter Flat, San Jacinto Mts., 6-4-1940, D. J. Raski (UCB). **Santa Cruz Co.:** Santa Cruz, 6-13-1965, G. F. Kraft (WWU); Mt. Hermon, 7-19-1922, F. E. Blaisdell (CAS). **Oregon.** **Benton Co.:** Corvallis, on Quercus garryana, 7-17-1977, J. D. Lattin, July and August, 1978, on Q. garryana, V. Razafimahatratra (OSU). **Curry Co.:** Loeb St. Park, 8 mi. E. Brookings, 8-22-1977, on Lithocarpus densiflora, J. D. Lattin (OSU); Little Redwood Campground, on L. densiflora, 8-11-1979, G. Stonedahl (OSU). **Jackson Co.:** 5 mi. S. Siskiyou Summit, 6-26-1979, R. T. and J. Schuh (AMNH); Siskiyou, 7-5-1951, B. Malkin (CAS).
Material illustrated: male and female from Monterey Co. (CAS).

Distribution: *D. fusifrons* is distributed in the Coast Ranges from Los Angeles County, California, to Benton County, Oregon, including the mountains of northern California and southern Oregon.

Biology: The adults of this species are collected from May to August. In Corvallis, Oregon, it has one generation per year and was found to feed on aphids and psocids on *Quercus garryana* Dougl. The other known host plants are: *Adenostema* sp., *Q. kellogii* Newb. and *Q. agrifolia* Neé.

The variety *deletans* is recognized only as the light-colored form of the species and should not be given taxonomic status.

Deraeocoris gilensis new species

Diagnosis: closely related to *D. vanduzeei*, but setae on dorsum, antennae and legs denser and distinctly longer; punctures on dorsum more sparse, except for cluster of punctures behind calli; male genitalia similar but distinct from that of *D. vanduzeei*, female genitalia distinctive for the species.

Male. Length 4.64. Head length 0.64, width 0.96, vertex 0.48; pale yellowish; front more convex than in *D. vanduzeei*; pubescence longer; posterior margin of vertex more sinuate; rostrum reaching hind margins of middle coxae. Antennae segment I, length 0.40, pale yellow, segment II, 1.12, gradually thickening toward apex, pale yellowish, slightly darker at apex, covered with long erect setae, length reaching three times greatest thickness of segment; segment III, 0.48, pale yellow; segment IV, 0.40, pale brown. Pronotum length 1.12, anterior
width 0.96, posterior width 2.00, very similar to D. vanduzeei, pale yellow, darker on posterior half of disk; punctures deeper than in D. vanduzeei; cluster of deep punctures behind calli; calli as in D. vanduzeei, pair of punctures separating calli more widely separated; setae of pronotal disk distinctly longer; scutellum pale yellow, spots on each side of median line black, densely and longly setose. Helytra width 2.30, pale yellow, black punctate, punctures deeper and more sparse, setae longer than in D. vanduzeei; spots at middle of corium, at apices of embolium, clavus and corium brown, translucent; cuneus, pale, apical one-third and basal margin black; membrane infuscated, veins darker. Legs pale yellow, densely clothed with long erect setae, distinctly longer than in D. vanduzeei; femora with two red bands near apices; tibiae with three reddish bands, apical band paler, setae on tibiae reaching in length twice the thickness of article; claws deeply cleft. Venter reddish, pale near sides.

Genitalia claspers as in Figure 25, sensory lobe of left clasper distinct from that of D. vanduzeei; vesica not illustrated, related to that of D. vanduzeei but different in the shape of the spicules (the vesica of the male did not inflate).

**Female.** Length 4.88; maximum width 2.56; segment II of antennae, length 1.20; very similar to male but slightly larger in size. Posterior wall of bursa copulatrix as in Figure 103, sclerotized rings as in Figure 145, distinct from these of D. vanduzeei.

Holotype: male, Gila Co., 2 mi. W. Miami, Arizona, 3800' elev., on oak, 5-4-1979, J. D. Pinto and E. M. Fisher (UCR). Allotype:
female with same data (UCR). **Paratypes**: three males with same data as the type; three males from Molino Basin, Mt. Lemmon, Arizona, 5-19-1953, A. and H. Dietrich (CU).

Like *D. vanduzeei*, this species lives on oak. The above specimens have been compared to the holotype of *D. vanduzeei* which was in the possession of the writer at the time of the writing of this description.

The head of some of the paratypes are marked with brownish as in *D. comanche*.

The species name *gilensis* is derived from the name of the County, Gila County, the type locality.

*Deraeocoris knightonius* new species


**Diagnosis**: more elongate in form than *D. cerachates* Uhler; dorsum, especially the pronotum, very coarsely punctate; shortly and sparsely pubescent, except near anterior margin of pronotum where few longer setae are present; calli more convex than in *D. cerachates*.

**Male.** Length 5.76 - 6.72. **Head** length 0.80, width 0.96 - 1.12, vertex 0.48 - 0.56; pale yellowish, marked brown or dark brown on sides and base of tylus, on each side of median line of front, along eye margin and on each side of median line of vertex; front moderately convex; lorae and genae marked with reddish to blackish brown; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.48 - 0.56,
pale brownish; segment II, 1.44 - 1.76, yellowish pale, apical one-fourth infuscated, slender, thickening toward apex, clothed with pale pubescence and longer setae; segment III, 0.64; segment IV, 0.48. Pronotum length 1.12 - 1.52, anterior width 0.96 - 1.12, posterior width 1.92 - 2.40; disk deeply and more coarsely punctate than D. cerachates, sparsely and shortly pubescent, few long setae often present on anterior angles and lateral margins, yellowish pale to rich brownish, posterior half brown to dark brown, median line pale; lateral margins slightly concave when viewed from above, posterior half carinate; calli distinctly convex, heavily outlined with brown or black as in D. cerachates; scutellum, moderately convex, pale to ivory-white, often brown to black on each side of median line. Hemelytra width 2.40 - 3.04; pale yellow, corium, clavus, and embolium irregularly brown, dark coloration spreading from puncture, pubescence sparse and shorter than in D. cerachates; cuneus pale, often narrowly at apex and along basal margin brown; membrane slightly infuscated, sometimes darker on apical half; veins dark brown. Legs pale yellow, covered with long setae as in D. cerachates; femora slightly brownish on apical half; tibiae slightly brownish at apex, not very distinctly banded with brown at middle, claws deeply cleft. Genitalia claspers as in Figure 26, vesica as in Figure 64, showing close relationship to D. cerachates. Venter brownish and marked with piceous, pale pubescent. Genitalia as in Figure 104 and Figure 146.

Female. Length 5.44 - 6.72, maximum width 2.40 - 3.20; segment II of antennae 1.44 - 1.76, very similar to the male in size and coloration.
Holotype: male June 9, Santa Cruz County, California, alt. 600 ft., W. M. Gifford; California Academy of Sciences.


Distribution: This species is known from California and Oregon. It has a more northern distribution than D. cerachates.

Biology: The adults of this species are collected from May to September. It is known to breed on Alnus sp., and A. rhombifolia Nutt.
This species was thought by H. H. Knight (1921) to be Uhler's cerachates because he has not seen Uhler's type himself. He asked E. P. Van Duzee to compare a male specimen with Uhler's type. The latter declared them identical. In fact, they are different in the structure of the pronotum, hairiness and general appearance. Uhler's cerachates is ovate in form and distinctly pilose while the specimens described by Knight as cerachates are rather elongate and not conspicuously hairy.

**Deraeocoris rufiventris** Knight

*Deraeocoris rufiventris* Knight, 1921, Rept. Minn. St. Ent. 18:184;

**Diagnosis:** similar to *D. vanduzeei* but dorsum distinctly red to piceous; calli piceous; scutellum piceous, lateral angles and median line usually paler; setae on scutellum and hemelytra shorter than in *D. fenestratus*; genital structures closely related to *D. fenestratus*.

**Male.** Length 4.96 - 5.76. **Head** length 0.64 - 0.72, width 1.04, vertex 0.48; pale yellow to red, similar to *D. vanduzeei*; in darkest specimens head nearly marked as in *D. comanche*; rostrum reaching posterior margins of hind coxae. **Antennae** segment I, length 0.48 - 0.56, pale yellow to red; segment II, 1.60 - 1.76, similar to *D. fenestratus*; segment III, 0.56 - 0.64; segment IV, 0.48. **Pronotum** length 1.04 - 1.20, anterior width 0.48 - 0.56, posterior width 2.00 - 2.24; reddish brown to piceous, sometimes sides and area behind calli and median line pale, lateral margins distinctly carinate, posterior
margin narrowly pale; punctures black, coarse; setae of pronotal disk as in D. fenestratus; calli black or piceous, in light-colored specimens area between and before calli pale; scutellum strongly convex, pubescence shorter than in D. fenestratus, piceous, lateral angles pale, in light-colored specimens median line also pale. Hemelytra width 2.56 - 2.80, pubescence as in D. vanduzeei, reddish brown to piceous, in light-colored specimens, clavus and apical half of embolium paler; cuneus red or yellow tinged with red, apical one-third and basal angle piceous; membrane infuscated, paler behind areoles and cuneus, veins dark brown or dark red. Legs femora largely red, paler at base; tibiae triannulated with dark brown or red, apical band often paler, claws as in D. vanduzeei. Venter red to piceous, pale pubescent. Genitalia clasper as in Figure 27, closely related to D. vanduzeei but right clasper distinct; vesica as in Figure 65, similar to D. fenestratus, but with one more spicule.

Female. Length 4.80 - 5.60; maximum width 2.56 - 2.88; segment II of antennae 1.44 - 1.76. Posterior wall as Figure 105, sclerotized rings as in Figure 147, genital structure exhibiting close relationship to D. fenestratus; female similar to male in coloration but in general paler.

Holotype: male, San Diego County, June 28, E. P. Van Duzee (CAS). The type has not been seen by the writer. Paratypes: males and females collected with the type were examined at the U.S. National Museum.

Material examined. California. Los Angeles Co.: Acton, on manzanita, 7-4-1948 (UCR); Bouquet Canyon, 6-9-1940, E. I. Schlinger
(UCR). Marin Co.: Mt. Tamalpais, June 1925, F. E. Blaisdell (CAS).
Monterey Co.: Paraiso Springs, 5-27-1927, L. S. Slevin (CAS); Jamesburg, 8-11-1938, R. H. Beamer (UK); San Antonio Canyons, 8-4-1938, R. I. Sailer (UK). Riverside Co.: Pinon Flat, San Jacinto Mts., on Arctostaphylos, 1-28-1940, C. D. Michener (UCB); San Jacinto Mts., 7-20-1941, R. H. Beamer, 7-21-1929, L. D. Anderson (UK); Pine Flats Camp, Indio, 7-12-1941, R. H. Beamer (UK). Santa Barbara Co.: Lompoc, 8-7-1938, R. I. Sailer (UK); Santa Barbara, 7-2-1958, W. J. Gertch (AMNH). San Bernardino Co.: Mill Creek, 6000', 8-18-1951, Timberlake (UCR); Cajon, 6-28-1945, A. L. Melander (UCR); 3 mi. E. Frawnskin, 7-5-1966, O'Brien (UCB). San Luis Obispo Co.: 5 mi. N. Lompoc, 8-2-1962, E. I. Schlinger (UCR). San Diego Co.: 6-6-1914, 6-21 and 25-1914, 7-25-1914, E. P. Van Duzee (CAS); Idylwild, on Arctostaphylos pungens, 7-29-1978, R. H. Beamer (UK); Guatay, 7-19-1941, R. H. Beamer (UK); Pine Valley, 7-18-1941, E. L. Todd, R. H. Beamer (UK); La Jolla, 8-13-1941, R. H. Beamer (UK).

Material illustrated: male and female from San Diego County (CAS).

Distribution: D. rufiventris is known only from California, from Marin County to San Diego County.

Biology: This species is known to breed on Arctostaphylos sp. and on A. pungens H.B.K. The adults are collected from June to August. The feeding habit of the species is not known.

The separation of D. rufiventris and D. fenestratus is often difficult but the two species can be distinguished by their genital structures, the shape of the scutellum and the length of the setae of the dorsum. The setae on the scutellum and the hemelytra of D.
rufiventris are definitely shorter than in D. fenestratus. In addition, D. rufiventris is distributed along the Coast Ranges south from Marin County, in the San Bernadino Mountains and in the San Jacinto Mountains, while D. fenestratus has is distributed mainly in the northern Coast Ranges, the Sierra Nevada and the Cascade Mountains.

**Deraeocoris vanduzeei** Knight


**Diagnosis:** fairly small in size; dorsum hairy, pale yellow with reddish brown; calli outlined with piceous; scutellum usually dark brown, lateral angles broadly pale, sometimes median line also pale; closely related to *D. fenestratus* but smaller in size.

**Male.** Length 4.48 - 5.28. **Head** length 0.72 - 0.80, width 0.96 - 1.04, vertex 0.48; pale yellowish brown, indistinctly marked with light brown, tinged with red; front moderately convex; rostrum reaching upon hind coxae. **Antennae** segment I, length 0.40, yellowish pale, tinged with reddish; segment II, 1.28 - 1.44, yellowish pale of piceous at apex, slender, apical one-fourth thicker, densely covered with long setae (reaching three times greatest thickness of segment in most specimens); segment III, 0.48 - 0.56; segment IV, 0.40. **Pronotum** length 1.04 - 1.92, anterior width 0.80 - 0.96, posterior width 1.92 - 2.08; disk moderately convex, punctures piceous, coarse; lateral margins carinate slightly arcuate when viewed from sides; disk mainly pale yellowish brown often piceous on posterior half;
calli slightly convex, yellowish brown, margins outlined with piceous, posterior margin recurved, a piceous are extending from each latero-anterior angle to anterior margin of pronotum; calli separated at middle by two deep punctures; scutellum strongly convex, dark brown, basal angles broadly and apex narrowly pale, sometimes apical half of median line marked with pale; pronotal disk and scutellum distinctly hairy, longest setae on anterior angle of pronotum. Hemelytra width 2.40 - 2.72; pale yellowish black punctate, pubescence short and sparse, spots at base, middle and apex of corium, at apices of clavus and embolium dark brown to piceous, translucent; embolar margin arcuate; cuneus pale, apical half red or piceous, basal margin narrowly dark brown; membrane infuscated veins brown, darker around apex of small areole. Legs yellowish pale to yellowish brown; femora red to piceous; tibiae trannulate with red, apical band often indistinct; in teneral specimens red mark on the legs inconspicuous; tarsi pale yellowish brown; claws deeply cleft. Venter red, pale pubescent. Genitalia claspers as in Figure 28; vesica as in Figure 66.

Female. Length 4.80 - 5.08; maximum width 2.40 - 2.72; second antennal segment, length 1.28 0 1.36; very similar to the male in size, color and structure. Posterior wall of bursa copulatrix as in Figure 106, sclerotized rings as in Figure 148, closely related to D. balli, much smaller in size.

Holotype male, San Diego Co., California, 6-5-1913, E. P. Van Duzee (CAS); allotype and paratypes with the same data as the type (USNM).

Material illustrated: male and female from San Diego Co., California.

Distribution: D. vanduzeei is known from southern California, southwestern Utah and Arizona.

Biology: the adults of this species are collected from April to July. This species breeds on Quercus sp. but the exact identity of the host plant is not known.

D. vanduzeei is often difficult to distinguish from the light color form of D. fenestratus. However, the pubescence of D. vanduzeei is much shorter and more sparse than in D. fenestratus.

The barberi Group

Diagnosis: medium to large size 5 - 2.0 mm.; scutellum often transversally rugose on basal half, impunctate, except in D. piceicola where it is sometimes shallowly punctate; in most species, males more elongate then females; claws not cleft at base; vesica with three or more spiculi; sensory lobe of left clasper short or elongate; female
genitalia distinct; dorsum nearly glabrous to densely pilose.

This group is known from North America, east and west of the Rocky Mountains. To species, *D. kennicotti* and *D. albigulus* have a boreal distribution. Four species are found in the eastern part of North America, while eight are known to occur only west of the Rockies. All the species of this group breed on conifers. The host plants represented are of the following genera: *Abies*, *Pseudotsuga*, *Pinus*, *Picea*, *Tsuga* and *Larix*. This group is related to the *incertus* and to the *schwarzii* group. Many members of this group are known to feed on chermids and aphids.

Key to the Species of the *barberi* Group

1. Dorsum distinctly pubescent or hairy; pubescence or setae on scutellum and hemelytra dense, nearly as long or longer than longest setae on second antennal segment.............. 2
   Dorsum nearly glabrous; long setae sometimes present on lateral margins and anterior angles of pronotum but pubescence on scutellum and hemelytra sparse and much shorter than longest setae on second antennal segment.............. 5

2. Hind femora uniformly dark reddish black, not distinctly annulated with pale on apical half. Northern distribution; known at present from Pennsylvania, Iowa, Indiana, Michigan and northern Idaho, breed on *Pinus contorta* Dougl. in Idaho................. *albigulus* Knight, p.144
   Hind femora not uniformly dark reddish black, usually distinctly banded with pale on apical half paler on basal half . . 3
3. Dorsum pale reddish brown, sometimes with brown or piceous on pronotum, at middle and apex of corium; tibiae dark red or piceous, hind femora banded with pale near apices. Known from Arizona, Colorado and New Mexico; collected on *Pinus ponderosa arizonica* (Engelm.) and *P. edulis* Engelm. .......... .......... ..... *fulvescens* Reuter , p.154 Dorsum not pale reddish brown but variously brown to black; tibiae and femora pale, ganded with red, brown or black .......... .......... .......... .......... 4

just barely surpassing tip of abdomen ............... 6

6. Scutellum pale, only slightly brown or red at middle; calli ferruginous red to rich brown, concolorous with pronotal disk; cuneus red, piceous at apex in darker specimens. Occurring in the Cascade Mountains and in the Coast Ranges from British Columbia to northern California, collected most often on *Pseudotsuga menziesii* (Mirb.) Franco, also on *Pinus contorta* Dougl. and various species of the genus *Abies* ....... 

............................... .rubroclarus Knight, p.171

Scutellum brown or black with lateral angles and median line pale or pale with brown on each side of median line; calli not as above. ................................. 7

7. Pronotum pale yellow, tinged with red or not, often narrowly brown along posterior margin and at posterior angles; marks on front reddish brown or red ............... 8

Pronotum largely yellowish brown, brown or black; works on front dark brown or black. ................................. 9

8. Hemelytron tinged with red at apex of corium embolium and clavus, also at middle of corium; posterior half of calli often pale; sensory lobe of male left clasper as in Figure 37. Known from Arizona and New Mexico; collected on *Cowania mexicana* D. Don. and also on *Pinus edulis* Engelm. ............................... navajo Knight, p.165

Hemelytra marked with light brown at apices of corium, embolium and clavus, also at middle of corium; antero-
lateral angles and middle of calli usually pale; sensory lobe of male left clasper as in Figure 40. Known from northern California; collected on *Abies magnifica* var. *shastensis* Lemmon.  

9. Scutellum rugose-punctate or shallowly punctate, sometimes punctures obsolete; front strongly convex, lateral margins of pronotum indistinctly carinate; male very elongate in form; female ovate, hemelytra slightly shorter than tip of abdomen or barely surpassing it. Widely distributed in the Rocky Mountains and the Cascades, south from British Columbia; collected on *Picea engelmannii* Parry, also on different species of *Abies* and *Pinus*.  

Scutellum not as above, although slightly wrinkled on basal half; front not strongly convex; lateral margins of pronotum distinctly carinate; female only slightly more ovate than male.  

10. Sensory lobe of male left clasper as in Figure 36; known from the Cascade Mountains and the northern part of the Sierra Nevada Mountains; collected on *Pinus ponderosa* Dougl. and *P. contorta* Dougl.  

Sensory lobe of male clasper short, as in Figure  

11. Calli solid dark brown or black. Distributed in the Rocky Mountains, also recorded from the Great Plains states; collected from *Pinus ponderosa* Dougl.  

Antero-lateral angles and inside of calli usually marked
with yellow or reddish pale. Known from the Cascade
Mountains and Sierra Nevada Mountains, collected on *Pinus*
*contorta* Dougl. . . . . . . . . . . *barberi hesperus* Knight, p.149

**Deraeocoris albigulus** Knight

*Deraeocoris albigulus* Knight, 1921, Rep. Minn. St. Ent. 18:171;
Knight, 1923, Conn. Nat. Hist. 34:493; Blatchley, Het. E. N.

**Diagnosis:** closely related to *D. nigritulus*, but embolar margins
less arcuate; suggestive of dark specimens of *D. barberi* but dorsum
densely setose; pronotum broadly dark brown or black, hemelytra with
paler spots; sensory lobe of left clasper elongate, similar to that
of *D. nigritulus* but right clasper distinct.

**Male.** Length 5.76 - 6.08. **Head** length 0.80, width 1.12, vertex
0.56; dark spots on head similar to *D. barberi* and *D. mutatus*; front
moderately convex, pubescent; carina of vertex slightly marked, head
margin slightly arcuating posteriorly at middle rostrum reaching
posterior margin of middle coxae. **Antennae** segment I, length 0.48,
black; segment II, 1.28 - 1.44, black, apical two-thirds densely
pubescent, basal one-third more slender and paler, segment beset with
long dark setae; segment III, 0.56; segment IV, 0.48. **Pronotum** length
1.28, anterior width 1.04, posterior width 2.08 - 2.24; disk and
calli black, densely setose; lateral margins distinctly carinate;
posterior margin narrowly pale, spots near lateral margins often pale, ostiolor peritreme white, blackish dorsally; pronotal collar, blackish, setose; scutellum black, densely setose, angles and apex narrowly pale. **Hemelytra** width 2.56 - 2.72; brownish translucent, base middle, apex of corium and apex of clavus black, densely setose; cuneus black, apical half pale; membrane and veins heavily infuscated, spots around tip of cuneus and inside areoles more or less broadly pale. **Legs** uniformly brownish black; hind tibiae often with an indistinct pale annulus on apical half; claws as in *D. barberi*. **Genitalia** related to that of *D. nigritulus*, sensory lobe of left clasper elongate as in Figure 29; vesica as in Figure 67, related to that of *D. piceicola*. **Venter** black, pale pubescent.

**Female.** similar to male in coloration and form, slightly more ovate. Length 5.6 - 5.92; maximum width 2.72 - 2.88. Antennal segment II, length 1.44 - 1.60, slender, apical one-fourth thicker, pale yellowish, apex black, length of setae twice the greatest thickness of segment. Posterior wall as in Figure 107, sclerotized rings as in Figure 149, genital structures related to *D. rubrocharus*.

**Holotype:** male, Ithaca, New York, June 30, H. H. Knight (USNM).

**Material examined:** male and female from Benewah Co., Idaho (OSU).

**Distribution:** This species has been recorded from New York, Pennsylvania, Michigan, Iowa and Indiana. The type series and many of the specimens from these states have been collected from *Pinus sylvestris* L. which has been extensively introduced into southeastern Canada and northeastern United States. *D. albigulus*, however, is not
known from western Europe. At present, no species of the genus Deraeocoris with an unclawed claw is known to occur in western and central Europe. Knight (1921) supposed that this species could be found on _P. resinosa_ Ait. Blatchley (1926) collected specimens of this species from Indiana, on _P. banksiana_ Lamb. The specimens described here have been collected on _P. contorta_ Dougl., which is known to hybridize with _P. banksiana_. The specimens from Idaho have been compared with the type series of H. H. Knight and no significant differences have been found. Their genital structures are identical to those of specimens from Pennsylvania. _D. albigulus_ is likely to be distributed along the range of _P. banksianna_ and the northern range of _P. contorta_.

_Deraeocoris barberi_ Knight


Diagnosis: dorsum dark brownish to piceous, nearly glabrous; calli solid black or brownish black, sometimes with a depression at the middle of each callus; scutellum, brownish black, basal angles and apical half of median line pale; genital structures distinctive of the species.

Male. Length 5.28 - 6.24. Head length 0.80, width 1.04 - 1.20, vertex 0.48 - 0.56; pale yellow, large spot on front, along margin of eye and curving before carina of vertex, longitudinally on each
side of tylus, brownish black; juga, loraes and bucculae brownish; 
carina flat, separated by a groove from collum; rostrum reaching 
posterior margin of hind coxze. Antennae segment I, length 0.40, 
segment II, 1.20 - 1.28, thicker toward apex, pale pubescent, more 
densely so on apical one-third, beset with longer setae; segment III, 
0.48; segment IV, 0.40; all segments brown to black. Pronotum length 
1.12 - 1.28; anterior width 0.88 - 0.96; posterior width 1.76 - 2.08; 
pronotal collar brown to black, pruinose; pronotal disk coarsely, 
black punctate, fuscous brown to black, lateral angles and area in 
front of calli usually pale white to yellow, lateral margins slightly 
carinate, calli moderately convex piceous to black, confluent, a 
small depression usually present at middle of each callus, black arc 
extending from latero-anterior margin of each callus to anterior mar-
gin of pronotum; sterna and pleura brownish black; ostiolar peritreme 
white, more or less infuscated, becoming black laterally; scutellum 
piceous to black, basal angles and at least apical half of median 
line ivory-white. Hemelytra maximum width 2.40 - 2.56, black punc-
tate, yellowish brown, corium and clavus more or less largely piceous 
or black; cuneus piceous to black; basal half usually paler; mem-
brane infuscated, paler behind cuneus, veins and areoles dark brown-
ish. Legs dark brown to piceous; usually basal half of femora and 
a broken annulus at middle of apical half paler, in dark-colored 
specimens; femora entirely piceous; tibiae often with pale annuli at 
middle, on basal half and indistinctly below the knee; claws brown, 
not cleft at base. Venter dark brown to piceous, covered with pale pu-
bescence. Genitalia claspers as in Figure 30; vesica as in Figure 68.

Female. Length 5.76 - 6.40; maximum width 2.72 - 2.88, antennal segment II, 1.44, slender, only thicker on apical one-fifth; very similar to male in coloration and size but more robust. Posterior wall of bursa copulatrix as in Figure 108; sclerotized rings as in Figure 150; these structures are distinctive for the species.

Holotype: male, August, 1906, Glen Sioux Co., Nebraska, H. G. Barber (USNM); allotype and paratypes taken with the type (USNM).

Utah. Summit Co.: Kamas, Beaver Creek, on pine, 7-4-1922, E. P. Van Duzee (CAS). Wyoming. Sublette Co.: Middle Piney Creek, Sacajawea Camp, 8400', 8-14-1953, F. and P. Rindge (AMNH).

Material illustrated: male from Cloudcroft, New Mexico (UK); female from Clark County, Nevada (AMNH).

Distribution: D. barberi occurs on both slopes of the Rockies from Montana to Arizona and New Mexico.

Biology: Very little is known about this species, except that it breeds on Pinus ponderosa Dougl. (Knight, 1972). Collection records, July-August, suggest that it overwinters in the egg stage and has one generation per year.

The variety lignipes of Knight appears to be only a color form which has no distinct geographical range. This color form is sometimes found along with lighter-colored specimens from the same locality. Deraeocoris barberi shows variation in size and coloration. A female specimen from Clark County, Nevada, was found to have the posterior wall of the bursa copulatrix distinct from that of the typical barberi but due to lack of information and specimens it is not given a separate status, Figure 109.

Deraeocoris barberi hesperus Knight


Diagnosis: very suggestive of D. barberi; genital structures,
except posterior wall of bursa copulatrix, very similar if not iden-
tical to D. barberi; calli usually pale brown or pale red, outlined by piceous or black; punctures on dorsum finer than in typical barberi; femora biannulated with piceous on apical half.

Male. Length 5.6 - 5.80. Head length 0.72 - 0.82; width 1.12, vertex 0.48; markings similar to that of barberi but broad spot on front broken into small transverse spots on each side of median line, head largely paler than in barberi. Antennae as in barberi, brown to piceous; apex of segment II, segments III and IV black; segment I, length 0.32; segment II, 1.12 - 1.28; segment III, 0.48; segment IV, 0.40. Pronotum anterior width 0.96, posterior width 1.92, length 1.28; more finely punctate than barberi, pale to dark brown, lateral margin more or less broadly pale; slenderly along margins and in front of calli, ivory-white, median line of pronotum often indicated with pale; calli outlined with piceous, posterior margin curved postero-laterally, line from middle of each callus curving forward to anterior margin of pronotum; in dark-colored specimens, calli as in barberi, scutellum as in barberi. Hemelytra width 2.32 - 2.56; as in barberi but more broadly pale brown, cuneus pale, translucid, apical half, dark red; basal half of inner margin ivory-white. Legs pale; femora biannulated with piceous; tibiae triannulated with piceous with an additional spot below the knee; tarsi piceous. Venter brown to piceous. Genitalia very similar to barberi, claspers as in Figure 31.

Female. Length 5.6 - 5.92; maximum width 2.72; very similar to
male but more robust and usually lighter in coloration. Sclerotized rings very similar if not identical to that of barberi; posterior wall of bursa copulatrix as in Figure 110, slightly distinct from that of barberi; sclerotized rings as in barberi.

Holotype: female, Summit, Placer Co., California, 7000', 8-24-1946, W. M. Gifford (CAS); allotype and paratypes with same data.


Material illustrated: male and female from Hood River Co., Oregon (OSU).

Distribution: D. b. hesperus is known from the Cascade and Sierra Nevada Ranges.

Biology: The adult of this subspecies is collected from July to
October. It breeds on *Pinus contorta* Dougl.

*D. barberi hesperus* is retained as a subspecies until more is known about its distribution.

**Deraeocoris diveni** Knight


**Diagnosis:** dorsum densely pilose; pronotum black; scutellum not punctate, transversely rugose on basal half; tibiae triannulate with dark brown; hemelytra broadly blackish brown; male and female genitalia distinctive for the species.

**Male.** Length 5.12 - 6.08. **Head** length 0.64, width 0.96, vertex 0.40; dark brown to black, pilose; trapezoid spot on vertex, median line of front and tylus, lines parallel to inner margins of eyes, sides and apex of tylus and transversely between tylus and front pale to white; carina of vertex flat; rostrum reaching upon middle coxae. **Antennae** segment I, length 0.40, segment II, 1.28 - 1.44, nearly cylindrical, narrowed at base, dark brown to black, pale pubescent and with several erect, long setae; segment II, 0.40; segment IV, 0.48; last two, pale pubescent and beset with several erect setae, black. **Pronotum** length 1.12 - 1.28, anterior width 0.72, posterior width 1.76 - 1.92; pronotal collar dark brown to black, coarsely punctate, densely covered with pilose setae, posterior margin sinuate and narrowly white; median line near posterior margin often indicated with pale; scutellum black angles and apical half of
median line pale, impunctate, basal half often transversely rugose. Hemelytra width 2.40; elongate, broadly dark brown or black, translucent; densely pilose; cuneus punctate, dark brown or black, basal angles often pale or white; membrane infuscated, paler behind cuneus, veins blackish. Legs brownish to black; femora sometimes pale on basal half, tibiae biannulate with pale; claws piceous. Venter piceous to black, pale pubescent. Genitalia claspers as in Figure 32, distinguishing the species from D. kennicotti; vesica as in Figure 69.

Female. Length 4.80 - 5.76; maximum width 2.40 - 2.56; similar to male, shorter and more ovate; wings only slightly surpassing tip of abdomen; second antennal segment slender, only thicker near apex, length 1.36; area between calli pale. Posterior wall of bursa copulatrix as in Figure 111; sclerotized rings as in Figure 151.

Holotype male, Canon Camp, 7700', Yellowstone Park, Wyoming, August 26, 1915, E. L. Diven (USNM).


Material illustrated: male and female from Three Creeks Meadow, Deschutes Co., Oregon (OSU).

Distribution: this species has been recorded from British Columbia, Oregon, California, and Wyoming.

Biology: the adults of this species have been collected from July to October, depending on the locality. It breeds on Pinus contorta Dougl., at elevations of 4500-8000 feet.

D. diveni does not belong to the incertus group as assumed by Knight (1921) because it has an impunctate scutellum and very different genital structures.

Deraeocoris fulvescens (Reuter)


**Diagnosis:** similar to *D. diveni*, but male less elongate pronotum of male not uniformly black, area in front and between calli pale; dorsum pilose; male and female genitalia distinctive for the species.

**Male.** Length 4.80 - 5.72. Head length 0.64 - 0.72, width 0.96 - 1.04, vertex 0.48; pale, dark brown markings as *D. barberi hesperus* but front distinctly pilose; rostrum reaching upon hind coxae. **Antennae** segment I, length 0.40; segment II, 1.12 - 1.20, brown, thicker toward apex, darker at apex, pale pubescent and beset with erect long setae; segment III, 0.48; segment IV, 0.40. **Pronotum** length 1.12 - 1.28, anterior width 0.96, posterior width 1.76 - 2.08; disk of pronotum as in *D. barberi* but densely pilose, yellowish brown to dark reddish brown, anterior angles, narrowly along margins and area in front and between calli pale to ivory-white, punctures brown to black; calli as in *D. barberi*; scutellum as in *D. barberi* but pilose; ostiolar peritreme, white, brownish black dorsally. **Hemelytra** maximum width 2.08 - 2.40, yellowish brown, translucent apical half of corium usually dark brown, densely pilose; cuneus pale yellow, apical half brown; membrane fumate, veins and apical half darker. **Legs** reddish brown to piceous, covered with long erect setae; femora often paler on basal half and with an incomplete pale band near apex; tibiae with large pale band on apical half and two narrow pale bands on basal half. **Venter** reddish brown to piceous, clothed with long, pale pubescence. **Genitalia** parameres as in Figure
33 closely related to that of D. kennicotti; vesica as in Figure 70, distinctive of the species.

**Female.** Very similar to the male in size and coloration but more ovate. Length 4.80 - 6.20; antennal segment II, length 1.12 - 1.44, slender, only thicker at apex, beset with prominent, long setae (equal in length to two-and-a-half or three times the greatest thickness of segment). Posterior wall as in Figure 112; sclerotized rings as in Figure 152, genital structures showing relationship to D. barberi.

The writer has not seen Reuter's type but a male bearing the following data were examined at the USNM in Knight's collection: allotype, male, July 24, 1900, Salida, Colorado.

Material illustrated: male and female from Leadville, Colorado (UK).

Distribution: This species is known from the southern parts of the Rocky Mountains, in Colorado, Arizona and New Mexico.

Biology: The adults of this species are collected in July and August, at elevations of 8000 to 10000 feet. The known host plants are Pinus ponderosa var. arizonica (Engelm.) Shaw and P. edulis Engelm.

Deraeocoris pilosus Knight is considered a synonym to D. fulvescens Reuter. These two taxa do not show any structural differences. The genitalia are identical. The specimens described by H. H. Knight are only slightly lighter in coloration than D. fulvescens.

Deraeocoris kennicotti Knight


Diagnosis: similar to D. diveni but distinctly larger in size; pronotum testaceous brown to uniformly dark brown; hemelytra of male very elongate; cuneus distinctly more elongate than in most species of the genus; dorsum densely hairy; genitalia distinctive for the species.

Male. Length 6.88 - 7.20. Head length 0.80, width 0.96, vertex 0.40, similarly marked as in D. diveni, dark coloration rather brown
than black, front and tylus with long pilose setae; rostrum reaching hind margin of middle coxae. **Antennae** segment I, length 0.48, segment II, 1.60, brown, nearly cylindrical but narrower at apex and base, clothed with short pubescence and longer erect setae; segment III, 0.54; segment IV, 0.48. **Pronotum** length 1.12 - 1.28, anterior width 0.80; posterior width 1.76 - 2.08; calli slightly convex, dark brown to black, separated posteriorly by two deep punctures, area between calli pale; disk of pronotum brownish testaceous to uniformly dark brown, convex, densely hairy, posterior margin narrowly pale, ostiolar peritreme white, becoming red laterally; scutellum, convex, longly hairy, dark brown to black, angles and apical half of median line pale. **Hemelytra** width 2.40 - 2.72, densely hairy, pale yellow, spots on apical half, middle and base of corium dark brown; lateral margins nearly parallel; cuneus, very elongate, brown, apical half pale; membrane infuscated, paler around apex of cuneus; veins, dark brown; distance between tip of membrane and tip of abdomen distinctly greater than in most species of the genus. **Legs** brown to piceous; femora paler at base; tibiae biannulate with pale; claws not cleft at base. **Venter** brown to piceous, densely pale pubescent. **Genitalia** parameres as in Figure 34, similar to but distinct from **D. fulvescens**; vesica not illustrated (the specimens examined were teneral), apparently more related to **D. diveni** than **D. fulvescens**.

**Female.** Length 6.24, maximum width 2.88; shorter, more ovate than male. Segment two of antennae, length 1.44, slender, thicker
at apex, pale yellowish, apical one-fourth black, with long erect setae; general coloration similar to but paler than male. Genitalia not illustrated.


Distribution: The above locations suggest that this species has a northern, boreal distribution.

Biology: Judging by the habits of the species of this group, D. kennicotti probably breeds on conifers. It is likely to be found on Pinus banksianna Lamb., which covers the presumed range of this species.

Deraeocoris manitou (Van Duzee)


Diagnosis: very suggestive of D. bullatus and D. convexulus but easily recognized by the untoothed claws; variable in size and coloration, genitalia distinctive for the species.
Male. Length 4.16 - 5.12. Head length 0.64, width 0.96 - 1.04, vertex 0.48; front convex; head pale yellow, spots along margins of eyes and projecting on vertex, transverse spots on each side of median line of front, longitudinal lines on sides of tylus and along base of genae, brown to piceous; rostrum reaching upon middle coxae. Antennae segment I, length 0.32 - 0.40; segment II, 0.96 - 1.12, gradually thickened toward apex, pale pubescent and beset with erect longer setae; segment III, 0.48; segment IV, 0.40; segments yellowish pale to dark brown. Pronotum length 1.04 - 1.12, anterior width 0.96 - 1.12, posterior width 1.76 - 2.08; glabrous, irregularly punctate; lateral margins slenderly carinate; disk pale yellow, black or dark brown coloration spreading from punctures; calli, flat, black, with black arc projecting from latero-anterior of each callus to anterior margin of pronotum, area in front of calli pale; in dark-colored specimens, pronotum entirely black except narrowly pale along margins; scutellum convex, dark brown to black, angles, apical half of median line and narrowly along lateral margins pale to ivory white; in dark-colored specimens scutellum entirely ivory-white or entirely brown or black; ostiolar peritreme white. Hemelytra width 2.00 - 2.56; lateral margins arcuate, strongly deflexed at cuneal fracture; pale to opaque yellow, dark coloration spreading from punctures; corium black of dark brown at base, middle and apex; in dark-colored specimens, hemelytra entirely black; cuneus pale, apical half black, becoming entirely black in dark-colored specimens; membrane infuscated, apical half and veins
darker. **Legs, coxae and femora uniformly piceous, paler at apices; claws not cleft at bases; in dark-colored specimens, legs paler, even uniformly pale yellowish in specimens with entirely black dorsum. Venter reddish to piceous, pale pubescent. Genitalia parameres as in Figure 35; vesica as in Figure 71; distinctive for the species.**

**Female.** very similar to the male but slightly larger in size. Length 4.64 - 5.44. Maximum width 2.40 - 2.72. Segment II of antennae, 1.04 - 1.28, slender, thicker at apex. Genitalia as in Figures 113 and 153.

**Holotype:** male, Manitou, Colorado, July 19, 1900, E. P. Van Duzee (CAS). This specimen has not been seen by the writer. Paraatypes bearing the same data and others collected by E. P. Van Duzee at the same locality, on July 25, 1903, were examined at the U.S. National Museum.

**Material examined.** Arizona. **Cochise Co.:** Cave Creek Canyon, 6-26-1929, J. O. Martin (CAS); Cave Creek Canyon, 5500', 6-16-1964, J. Burger (UA); Chiricahua Mts., 6-9-1933, R. H. Beamer (UK); 5 mi. W. Portal, 5400', 6-28-1955, M. Statham (UK); Sedona, 6-26-1957, Werner and Butler (UA). **Coconino Co.:** Williams, 7000', 6-15-1925, A. A. Nichol (USNM) (UA); Hyde Park, on Juniperus monosperma, 6-8-1966, J. H. Davidson (ASU); Grand Canyon, 6200', 6-20-1928, A. A. Nichol (UA). **Gila Co.:** Pinal Mts., 5-22-1937, E. D. Ball (UA). **Maricopa Co.:** Phoenix, 5-19-1969, D. H. Anderson (ASU). **Santa Cruz Co.:** Santa Rita Mts., 5-8000', July, F. H. Snow (UK). **California.**

Material illustrated: male and female from Mountain Park, New Mexico (UK).

Distribution: D. manitou is known from Arizona, California, Colorado, Idaho, Nevada, New Mexico and Texas.

Biology: The known host-plants of this species are: Juniperus monosperma (Engelm.) Sarg., Libocedrus decurrens Torr. and Juniperus sp. This species has the same range as D. bullatus. It apparently does not breed on the shrubs associated with Juniper and
Pinyon-Juniper woodlands but on juniper.

*D. manitou*, like *D. fulgidus*, shows a great deal of color variation. The darkest color form was named var. *atrus* and the intermediate form, var. *intermedius* by H. H. Knight (L921). These color forms, however, are found with the typical color form in the series of specimens collected from Mountain Park, New Mexico, by R. H. Beamer. For this reason, the varieties mentioned above are not recognized as of subspecific rank.

**Deraeocoris mutatus** Knight

*Deraeocoris mutatus* Knight, 1921, Rept. Minn. St. Ent. 18:161.

**Diagnosis**: very suggestive but smaller than *D. barberi*; distinguished by the genital structures, especially by the well-developed sensory lobe of the left clasper of the male.

**Male**. Length 5.12 - 5.44. Head length 0.64 - 0.72, width 1.12, vertex 0.48; similary marked as in *D. barberi*; rostrum reaching upon hind coxae. **Antennae** segment I, length 0.40; segment II, 1.12 - 1.28, gradually thickening toward apex, pale pubescent and beset with erect setae; segment III, 0.48; segment IV, 0.40; all segments dark brown to black. **Pronotum** length 1.28, anterior width 1.12, posterior width 2.08; lateral margins distinctly carinate and nearly sinuate when viewed from side; calli as in *D. barberi*, area before and between calli pale, often tinged with red; disk of pronotum, black punctate, brownish testaceous to dark brown; scutellum black, basal angles, apex and usually apical half of median line pale.
Hemelytra width 2.56 - 2.72; black punctate; testaceous brown, apical half and middle of corium dark brown to black; cuneus pale brown, translucent, apical half black; membrane infuscated, paler around tip of cuneus, veins black. Legs brownish black; femora obscurely banded with pale near apex; tibiae with two distinct pale bands and narrow additional pale band below the knees; claws as in D. barberi. Venter black, pale pubescent. Genitalia claspers as in Figure 36, well-developed sensory lobe distinctive for the species; vesica as in Figure 72.

Female. very similar to male; slightly larger in size; length 5.44 - 5.76; maximum width 2.72 - 2.88; antennal segment II, length 1.28 - 1.44, slender, thicker near apex. Genitalia as in Figures 114 and 154.

Holotype: male from Tallac, Eldorado County, California, August 22, 1916, W. M. Gifford (CAS). The writer has not seen this specimen. It is believed to be a part of the series listed below and collected by W. M. Gifford at the same locality and on the same date.


Material illustrated: male and female from Wallowa County,
Oregon (OSU).

**Distribution:** This species is known from California, Idaho and Oregon. Its range appears to be disjunct but fits within the ranges of its host plants, *Pinus ponderosa* Dougl. and *P. contorta* Dougl.

**Biology:** The adults of this species are collected in July and August. The presence of fully developed eggs inside many of the females from Oregon suggests that it overwinters in the egg stage.

This species is closely related to *D. barberi* but its genital structures and size are distinct. Like *D. barberi*, it breeds also on *P. ponderosa*.

*Deraeocoris navajo* Knight

*Deraeocoris navajo* Knight, 1921, Rept. Minn. St. Ent. 18:156.

**Diagnosis:** dorsum pale yellowish, punctures dark brown (pellucid in teneral specimens), posterior margin of pronotum, middle and apex of corium stained with reddish brown; scutellum pale yellow to white, more or less broadly dark brownish on each side of median line; genitalia distinctive for the species.

**Male.** Length 5.12 - 5.76. **Head** length 0.72 - 0.96, width 1.04 - 1.12, vertex 0.40; pale yellow spots on each side of vertex, along margins of eyes, transverse spots on each side of median line of front, triangular spot at base and longitudinal spots on side of tylius red to brown, juga and lorae stained with reddish brown; collum brown to black; rostrum reaching upon hind coxae. **Antennæ** segment I, length 0.40; segment II, 1.60, gradually thickening toward apex,
pale yellowish brown, apical half piceous; segment III, 0.64; segment IV, 0.48. Pronotum length 1.04 - 1.28, anterior width 0.96 - 1.12, posterior width 2.08 - 2.24; calli dark brown to piceous, with an arc extending from antero-lateral angle of each callus to anterior margin of pronotum, separated at middle by two deep punctures, area in front and between calli pale yellow, disk of pronotum pale yellow, punctures brown to dark brown (pellucid in teneral specimens), posterior angles and posterior margin of disk stained with reddish brown or dark brown, lateral margins carinate, nearly straight; scutellum convex, pale yellow, more or less broadly dark brown on each side of median line; ostiolar peritreme white. Hemelytra width 2.24 - 2.40; pale yellow, punctures dark brown; stained with reddish brown at middle and apex of corium; cuneus pale yellow, apical one-third brownish black; membrane fumate, veins red. Legs femora pale, brownish at apex; front and middle tibiae triannulate with reddish brown or piceous, with an additional red spot below the knee; hind tibiae reddish brown or piceous with only one pale band on apical half; tibiae beset with pale setae and dark spinose setae. Venter pale yellow, each segment stained with red on posterior margins and spiracular plates; ninth segment more broadly reddish brown. Genitalia claspers as in Figure 37; vesica as in Figure 72; genital structures distinctive for the species.

Female. very similar to male in coloration. Length 5.44 - 6.08; maximum width 2.64; antennal segment II, length 1.44 - 1.60, slender, apical one-fourth thicker, yellowish pale, black at apex.
Venter yellowish pale, margins of each abdominal segment and spiracular plates reddish to piceous. Posterior wall as in Figure 114, sclerotized rings as in Figure 154, distinctive of the species.

**Holotype:** male, Grand View, Grand Canyon, Arizona, August 3, H. H. Knight (USNM).


**Material illustrated:** male from Santa Rita Mts., Arizona (UK).

**Distribution:** *D. navajo*, at present, is known only from Arizona and New Mexico.

**Biology:** Very little is known about the habits of this species. The adults have been collected from June to August. Knight (1921) reported that the single male he based his description upon was swept from *Cowania mexicana* D. Don. This plant, according to Kearney et al. (1951), is common in juniper-pinyon association. However, judging by the habits of the species related to *D. navajo* it is believed to breed on pine. One specimen from the Grand Canyon
area has been collected on *Pinus edulis* Engelm.

**Deraecoris piceicola** Knight


Diagnosis: relatively large in size, length 6.4 – 8.00 mm; similar to *D. kennicotti* but scutellum punctate; male elongate; wings of female barely surpassing tip of abdomen; genital structures related to *D. navajo* and *D. rubroclarus*.

Male. Length 6.4 – 8.00. Head length 0.80 – 0.96, width 1.04 – 1.20, vertex 0.48 – 0.56; black, except trapezoid spot on vertex and sometimes median line of front, lines parallel to eye margins and spot at base of juga pale; front convex; rostrum reaching upon middle coxae. Antennae segment I, length 0.56 – 0.64; segment II, 1.76 – 1.92, cylindrical but slightly slender near base, pale pubescent and beset with long erect setae; segment III, 0.72 – 0.88; segment IV, 0.56; all segments black. Pronotum length 1.44 – 1.60, anterior width 0.96 – 1.12, posterior width 2.24 – 2.48; calli black, convex, area between and often before calli pale; pronotal collar black, sometimes beset with several setae; pronotal disk black, coarsely punctate, lateral margin slightly carinate only on posterior half, basal margin narrowly pale; several long setae are often present at anterior angles of pronotum and short setae on the disk of pronotum, scutellum and hemelytra; scutellum convex, black, lateral angles, apex and often apical half of median line pale, shallowly
rugulose-punctate; ostiolar peritreme white. Hemelytra width 2.48 - 3.20; black, spots near base at middle and at apex of corium pale; cuneus black, basal half pale, sometimes pale red; membrane infuscated, pale below margin of cuneus and small areole veins black. Legs black; basal half of hind femora pale with a row of rounded black spots on anterior face; tibiae biannulate with pale, covered with long, prominent setae; claws not cleft at base. Venter black, with long pubescence. Genitalia claspers as in Figure 38, sensory lobe of left clasper longer than that of D. kennicotti, right clasper distinct; vesica as in Figure 74, related to D. navajo.

Female. Length 5.28 - 7.2; maximum width 2.56 - 3.84; second antennal segment, length 1.44 - 2.08, gradually thickening toward apex black, pale pubescent and beset with long erect setae; lighter than male in coloration; membrane barely surpassing or shorter than tip of abdomen. Posterior wall of bursa copulatrix as in Figure 116, sclerotized rings as in Figure 156, distinctive for the species.

Holotype: male, Pingree Park, Colorado, 9000', August 20, 1925, H. H. Knight (USNM). Paratypes: males and females taken with the type (USNM) (CU) (TAM).


Material illustrated: from Three Creeks Meadow, Deschutes Co., Oregon (OSU).

Distribution: This species is distributed throughout the range of Picea engelmannii Parry; it has been recorded from Arizona, Colorado, Montana, British Columbia, Washington and Oregon.

Biology: The adults of this species are collected from July to early October. Adults collected late in the season contain fully developed eggs, suggesting that the species overwinters in the egg stage and has one generation per year. The known host plants of D. piceicola are: Picea engelmannii Parry, Abies procera Rehd., Abies amabilis (Dougl) Forbes and Pinus contorta Dougl. The writer has observed this species feeding on aphids and chermids both in the field and the laboratory.

This species shows great variation in size and color. In addition, the specimens from Whatcom and King Counties, Washington, were found to have longer and denser setae than specimens from other locations. D. piceicola may prove to be a polytypic species when more is known about its host-plant and prey association.

Deraeocoris rubroclarus Knight


Diagnosis: similar to D. barberi; dorsum reddish brown to rich
dark brown, long setae present on pronotal disk, at least on lateral
margins of pronotum; scutellum pale, often red at middle; cuneus
red, darker at apex; genital structures related to D. navajo but
distinct; sensory lobe of left clasper short.

Male. Length 5.28 - 5.60. Head length 0.64 - 0.72, width 0.96
- 1.04, vertex 0.40 - 0.48, pale yellow, nearly as in D. navajo but
markings only pale yellowish brown; rostrum reading upon middle
coxae. Antennae segment I, length 0.54, yellow to amber; segment II,
1.60, nearly cylindrical, narrower at base, densely pubescent and
beset with long erect setae, dark brown to black, basal half
paler; segment III, 0.64; segment IV, 0.48; last two segments dark
brown, pale pubescent and beset with longer setae. Pronotum length
0.72, anterior width 0.88, posterior width 2.08; disk densely but
finely punctate, yellowish brown to dark reddish brown, sparsely
pubescent, longer setae present on lateral margins; calli slightly
convex, reddish brown or darker, area between calli paler; lateral
margins of pronotum nearly rounded, basal margin narrowly pale
yellow; scutellum pale yellow or white, often tinged with red,
sparsely pubescent. Hemelytra width 2.40; embolar margin nearly
parallel, sparsely and shortly pubescent, yellow to reddish brown,
corium and clavus dark brown in dark-colored specimens; cuneus red
to dark red, apex black; membrane dark brown, paler around the tip of
cuneus, veins dark red. Legs pale yellow; femora biannulate with
red near apex, tibiae triannulate with reddish brown, the apical
annulus dark brown; tarsi brown, darker at apices, claws not cleft.
Venter red to piceous. Genitalia claspers as in Figure 39, related to D. navajo but sensory lobe short; vesica as in Figure 75.

**Female.** Similar to male but embolar margins of hemelytra arculate, larger in size. Length 4.76 - 6.40; maximum width 2.56 - 2.88; segment II of antennae, length 1.60 - 1.76, slender, thicker at apex, yellow, apex black, covered with pale pubescence and long erect setae (greater in length than greatest thickenss of segment). Posterior wall as in Figure 117, sclerotized rings as in Figure 157, showing relationship to D. navajo and D. piceicola.

**Holotype:** female, Portland, Oregon, August 12, 1920, A. A. Nichol (USNM).


Material illustrated: male and female from Lincoln Co., Oregon (OSU).

Distribution: D. rubroclarus occur in the Coast Ranges and the Cascade Range, from British Columbia to northern California.

Biology: The adults of this species are collected from July to October. It breeds on Pseudotsuga menziesii (Mirb.) Franco, but is also collected from Abies procera Rehd. and Pinus contorta Dougl. Nymphs of this species have been observed feeding on immature aphids of the genus Cinara on Douglas fir.

The dorsum of some specimens of this species is entirely dark brown to black with the exception of the head, the scutellum, the anterior half of the embolium and the apical half of the cuneus which are pale yellowish brown or reddish.

Deraeocoris schuhi new species

Diagnosis: dorsum largely pale yellowish brown; calli with dark brown and red impression; scutellum dark brown, transversally rugose, lateral angles, apex and apical half of median line pale yellow; wings of male long; membrane of female barely surpassing tip of abdomen; sensory lobe of very elongate; related to D. piceicola and D. navajo.
Male. Length 6.24. Head length 0.80, width 1.12, vertex 0.48; pale yellowish, longitudinal spots along margin of eye, on each side of tylus, on juga, on lorae and bucculae, and row of transversal spots on each side of median line of front red; front moderately convex; rostrum reaching middle coxae. Antennae segment I, length 0.48, pale yellow; segment II, 1.60, nearly cylindrical, basal one-fourth narrower, densely pubescent, beset with several erect setae, dark brown, paler at base; segment III, 0.56; segment IV, 0.48; last two, brown, pale pubescent and beset with long erect setae. Pronotum length 1.36, anterior width 0.96, posterior width, 2.40; disk, densely and coarsely punctate, pale yellowish brown, darker along posterior margin, shortly pubescent; pronotal collar, pale, pruinose; calli moderately convex, dark brown, outlined with red, antero-lateral angles invaded by pale, ray from posterior margin of each callus curving posteriorly and anteriorly to anterior margin of pronotum, each callus separated by two deep punctures; area between and before calli pale; posterior half of pronotal margin distinctly carinate; ostiolar peritreme white, tinged with red; scutellum dark brown, lateral angles, apex and apical half of median line pale, transversally rugose, shortly and sparsely pubescent. Hemelytra width 2.72; embolar margin nearly parallel; shortly pubescent, pale yellowish translucent apex of clavus, apex and middle of corium and along claval suture dark brown; cuneus concolorous with corium, apical half dark reddish brown; membrane infuscated, veins reddish brown. Legs yellowish brown; femora biannulate with dark red on apical half; tibiae
triannulate with dark red beset with long prominent setae; tarsi
darker at apices; claws slender, not cleft at base. Venter piceous.
Genitalia claspers as in Figure 40, sensory lobe of left clasper
very elongate; vesica as in Figure 76, related to D. piceicola.

Female. Length 5.60, width 2.76. Similar to male but paler
in coloration and more ovate. Second antennal segment, length 1.60,
slender, apical one thicker, pale yellow, brown near apex; cali
and scutellum more broadly pale; membrane barely surpassing tip of
abdomen. Posterior wall as in Figure 118, distinctive for the species;
sclerotized rings as in Figure 158.

Holotype: male, 9 mi. E. Shasta City, California, on Abies
magnifica var. shastensis Lemmon, August 8, 1956, J. Schuh (CAS).
Paratypes: two males and eight females taken with the types; one male,
Plaskett Meadows, Glenn Co., California, 6000', 7-27-1960, H. B.
Leech (CAS); one female, Martin Springs, Lassen Co., California, 7-
31-1922, J. O. Martin (CAS). One male, Haskell Creek, Sierra Co.,
at light, 8-18-1971, S. Frommer (UCR); one male, Biledo Meadow,

This species is named after Mr. J. Schuh, Klamath Falls, Oregon,
who collected the type series of this species.

D. schuhii is one of the most distinct species of the genus be-
cause of its coloration and form. This species is distributed widely
in northern California. It may occur also in southern Oregon.
Deraeocoris tsugae Bliven


The writer has not been able to examine any specimen of this species. The measurements from the original description are as follows: "Male. Length 6.4, width 2.78. Head: width 1.16, vertex 0.51. Rostrum: reaching middle coxae. Antennae: segment I, length, 0.56; segment II, 1.72; segment III, 0.66; segment IV, 0.56. Pronotum: length 1.52, width 2.38. Female. Length 6.8, width, 3.17; antennal segment II, 3.17."

The left clasper is described by the author as: "falciform in lateral view with a dorsal, evenly rounded prominence." The sensory lobe of D. rubroclarus Knight is also short and rounded. It is noted that D. rubroclarus has been recorded from the Coast Ranges, from British Columbia to Santa Cruz County, California. The description of this species fits that of D. rubroclarus except that the latter is slightly smaller in size.

D. tsugae is, however, the first species of the genus recorded to breed on hemlock.
CONCLUSIONS

The species of *Deraeocoris* of western North America are divided into six species-groups, based on morphological, ecological and distributional characteristics. These species-groups were defined by comparative morphological study and by quantitative and cladistic analysis. It was found that quantitative and cladistic analysis of the species-group was not contradictory to the conventional, comparative method.

Male and female genitalia are considered to be the best taxonomic characters for distinguishing species of the genus *Deraeocoris*. The genitalia show very little intraspecific variation when mature specimens are compared. The vesica is very similar in closely related species while the male clasper and the female genitalia show more specific variations. Size is more or less variable depending on the species and the structures measured. Most species of *Deraeocoris* vary in color. However, characters based on color are useful for preliminary identification of species when their ranges of variation have been assessed accurately.

Host plant species can be used as indicators of habitat types and distribution for the species of *Deraeocoris*. In general, most species breed on several host plant species in a given type of habitat. Several species are known only from a single host plant species, i.e., *D. barberi* is known only from ponderosa pine. *D. brevis* is known to occur in most of the habitat types of western North America and it
has been recorded from approximately 25 host plant species. Most species have limited distribution while others are widely distributed. Due to the limited number of specimens available and to the lack of information on host plants, the ranges of distribution are defined on a tentative basis for many species.

The biology of the majority of the species of Deraeocoris of western North America is still unknown. The species of the brevis group are known to overwinter in the adult stage and to have two or more generations per year. The species of the remaining groups overwinter in the egg stage and, based on collection records, the majority appear to have only one generation per year. The species of Deraeocoris are known to prey on aphids, psocids, chermids, coccids and on the eggs and the larvae of other insects. D. fasciolus, D. brevis and D. nebulosus are important in the control of some orchard pests. It is believed that the species breeding on conifers should be taken into consideration in the integrated management of many forest pests.

Partial phytophagy has been observed in several species occurring in Oregon. Its significance is not yet understood, but it could be interpreted as host plant recognition or a physiological requirement for these species.

The brevis group is different from the remaining groups in many characters including the male and female genitalia, the punctation of the scutellum and the life cycle. The species of this group conform with the former genus Camptobrochis, as illustrated by the Palearctic species Deraeocoris punctulatus (Fallén). A comprehensive study of
the genus *Deraeocoris* is needed to define its limits. The *incertus* group is related to the *brevis* group but it has no basal tooth on the claw.

It is hoped that this study would serve as the basis for biological and ecological studies of the species of *Deraeocoris* of western North America, many of which may prove to be of economic importance.


Bailey, R. G. Description of the ecoregions of the United States. U.S. Department of Agriculture, Forest Service, Intermountain Region, Ogden, Utah. 77p.


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. Annaes da Academia Brasileira de Ciencias 24:31-110.


———. 1900. A list of Hemiptera collected in the vicinity of Bellaire, Ohio. The Ohio Naturalist 1:11-12.


APPENDIX
List of Characters used for the Clustering of the Species-Groups

1. Length of the body: (1) shorter than 4.5 mm.; (2) between 4.5 and 5.5 mm.; (3) between 5.5 and 6.5 mm.; (4) greater than 6.5 mm.

2. Shape of the body: (1) elongate, length more than twice greatest width of body; (2) ovate, length less than twice greatest width of body; (3) male elongate, female ovate.

3. Basal tooth of the claw: (1) present; (2) absent.

4. Punctures of the scutellum: (1) punctate; (2) impunctate; (3) rugose.

5. Spines on anterior surface of tibiae: (1) present; (2) absent.

6. Shape of antennal segment II in male: (1) cylindrical; (2) more or less clubbed.

7. Shape of the scutellum: (1) flat; (2) moderately convex; (3) strongly convex.

8. Dorsum: (1) glabrous; (2) with short setae; (3) with long setae.

9. Sensory lobe of left clasper: (1) short and rounded; (2) moderately developed; (3) very elongate.

10. Apical process of left clasper: (1) brevis type; (2) fulgidus type.

11. Shape of right clasper: (1) brevis type; (2) fulgidus type.

12. Ductus seminis: (1) Camptobrochis type; (2) Deraeocoris type.

13. Sclerotized structures around secondary gonopore: (1) brevis type; (2) fasciolus type; (3) diveni type; (4) fenestratus type.

14. Spicules of the vesica: (1) brevis type; (2) fulgidus type.

15. Posterior wall type: (1) validus type; (2) brevis type; (3) incertus type; (4) barberi type; (5) balli type; (6) fenestratus type.

16. Sclerotized rings: (1) brevis type; (2) validus type; (3) fulgidus type; (4) barberi type; (5) vanduzeei type.

17. Structures supporting the sclerotized rings: (1) brevis type; (2) incertus type; (3) Deraeocoris type.
18. Host plant association: (1) breeding on single host; (2) on several related hosts; (3) on several unrelated hosts but in the same type of habitat; (4) on several unrelated hosts in different habitats.

19. Distribution (see text).

20. Membranous lobes of vesica: (1) Camptobrochis type; (2) diveni type; (3) Deraeocoris type.
Coding of the Species in the Phenogram

1. fenestratus Group

CERA: cerachates
FENE: fenestratus
FUSI: fusifrons
KNIG: knightonius
RUFI: rufiventris
VAND: vanduzeei
GILE: gilensis
COMA: comanche
BALL: balli
APAC: apache

2. fasciolus Group

TRIA: triannulipes
FULV: fulvus
COCH: cochise
SHAS: shastan
QUER: quercicola
FASC: fasciolus

3. schwarzi Group

FULG: fulgidus
CONV: convexulus
SCHW: schwarzi
BULL: bullatus

4. barberi Group

MUTA: mutatus
BAKA: barberi
HESP: hesperus
NAVA: navajo
MANI: manitou
TSUG: tsugae
RUBR: rubroclarus
PICE: piceicola
KENN: kennicotti
DIVE: diveni
ALBI: albígulus
SCHU: schuhí
FULE: fulvescens

5. brevis Group

FRAS: fraserensis
VALI: validus
NEBU: nebulosus
NIGR: nigrifrons
HIST: histrio
LURI: luridipes
BREV: brevis
BAKE: bakerí
TINC: tinctus

6. incertus Group

PICI: picipes
INCE: incertus
ATRI: atriventris
Phenogram of 44 species and one subspecies of Deraeocoris based on 20 multistate characters (Appendix A), using the Canberra metric as measure of dissimilarity and the UPGMA as clustering method. Species are coded as in Appendix B.
DERAEOCORIS CLUSTER
CANBERRA METRIC
GROUP AVERAGE

DISSIMILARITY

SPECIES
List of Characters used to Construct the Cladogram of Relationships between the Species Groups of Deraeocoris

1. Ratio length to body width (male): (0) less than .5; (2) greater than .5.

2. Claw: (0) toothed; (1) not toothed.

3. Scutellum: (0) punctate; (1) impunctate.

4. Dorsum: (0) glabrous; (1) hairy.

5. Claspers: (0) brevis type; (1) incertus type.

6. Vesica: (0) brevis type; (1) fasciolus type.

7. Posterior wall: (0) brevis type; (1) fenestratus type; (3) barberi type.

8. Sclerotized rings: (0) brevis type; (1) fulgidus type; (2) van-duzeei type.

9. Spines on anterior surface of tibiae: (0) present; (1) absent.

10. Host plants: (0) non-coniferous; (1) coniferous.
Cladogram of the relationships between the species-groups of the *Deraeocoris*. 
Map 1. Boreal distribution.
Map 2. Pacific Forest Province distribution.
Map 3. Sierran Forest distribution.

Map 5. Intermountain Sagebrush distribution.

Map 6. American Desert Province distribution.

Map 8. Mexican Highland Province distribution.
Figures 1-12. (A) dorsal view of left clasper; (B) right clasper; (C) lateral view of left clasper.

1. Deraeocoris bakeri
2. D. brevis.
4. D. histrio.
5. D. nebulosus.
7. D. validus.
8. D. atriventris.
11. D. cochise.
12. D. fasciolus.
Figures 13-22 and 27. (A) dorsal view of left clasper; (B) right clasper; (C) lateral view of left clasper.

15. D. triannulipes.
18. D. fulgidus.
20. D. apache.
22. D. comanche.
27. D. rufiventris.
Figures 23-35. (A) dorsal view of left clasper; (B) right clasper; (C) lateral view of left clasper.

23. *D. fenestratus*.
24. *D. fusifrons*.
25. *D. gilensis*.
28. *D. vanduzeei*.
29. *D. albigulus*.
30. *D. barberi*.
31. *D. barberi hesperus*.
32. *D. diveni*.
33. *D. fulvescens*.
34. *D. kennicotti*.
35. *D. manitou*. 
Figures 36-40. (A) dorsal view of left clasper; (B) right clasper; (C) lateral view of left clasper.

36. *D. mutatus*.
37. *D. navajo*.
38. *D. piceicola*.
39. *D. rubroclarus*.
40. *D. schuhi*.

Figures 41-49. Ventral view of vesica.

41. *D. bakeri*.
42. *D. brevis*.
43. *D. fraserensis*.
44. *D. histrio*.
45. *D. nebulosus*.
46. *D. validus*.
47. *D. atriventris*.
48. *D. incertus*.
49. *D. picipes*. 
Figures 50-63. Ventral view of vesica.

50. *D. cochise*.
51. *D. fasciolus*.
52. *D. quercicola*.
53. *D. shastan*.
54. *D. triannulipes*.
55. *D. bullatus*.
56. *D. convexulus*.
57. *D. fulgidus*.
58. *D. schwarzi*.
59. *D. apache*.
60. *D. cerachates*.
61. *D. comanche*.
62. *D. fenestratus*.
63. *D. fusifrons*. 
Figures 64-76. Ventral view of vesica.

64. D. knightoni.us.
65. D. rufiventris.
66. D. van.duzeei.
67. D. albigulus.
68. D. barberi.
69. D. albigulus.
70. D. diveni.
71. D. fulvescens.
72. D. manitou.
73. D. mutatus.
74. D. piceicola.
75. D. rubroclarus.
76. D. schuhi.

Figures 77-84. Posterior wall of bursa copulatrix.

77. D. bakeri.
78. D. brevis.
79. D. fraserensis.
80. D. histrio.
81. D. luridipes.
82. D. nebulosus.
83. D. nigrifrons.
84. D. validus.
Figures 85-98. Posterior wall of bursa copulatrix.

85. D. atriventris.
86. D. incertus.
87. D. picipes.
88. D. cochise.
89. D. fasciolus.
90. D. fulvus.
91. D. quercicola.
92. D. shastan.
93. D. triannulipes.
94. D. bullatus.
95. D. convexulus.
96. D. fulgidus.
97. D. schwarzi.
98. D. apache.

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<td>D. manitou</td>
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Figures 114-118. Posterior wall of bursa copulatrix.

114. D. mutatus.
115. D. navajo.
117. D. rubroclarus.
118. D. schuhi.

Figures 119-126. Sclerotized rings.

119. D. bakeri.
120. D. brevis.
121. D. fraserensis.
122. D. histrio.
123. D. luridipes.
124. D. nebulosus.
125. D. nigrifrons.
126. D. validus.
Figures 127-136. Sclerotized rings.

127. *D. atriventris*.
128. *D. incertus*.
129. *D. picipes*.
130. *D. cochise*.
131. *D. fasciolus*.
132. *D. fulvus*.
133. *D. quercicola*.
134. *D. shastan*.
135. *D. triannulipes*.
136. *D. bullatus*. 
Figures 137-146. Sclerotized rings.

137. *D. convexulus*.
138. *D. fulgidus*.
139. *D. schwarzi*.
140. *D. apache*.
141. *D. balli*.
142. *D. cerachates*.
143. *D. fenestratus*.
144. *D. fusifrons*.
145. *D. gilensis*.
146. *D. knightonius*. 
Figures 147-155. Sclerotized rings.

147. *D. rufiventris*.
148. *D. vanduzeei*.
149. *D. albigulus*.
150. *D. barberi*.
151. *D. diveni*.
152. *D. fulvescens*.
153. *D. manitou*.
154. *D. mutatus*.
155. *D. navajo*. 
Figures 156-158. Sclerotized rings.

156. *D. piceicola*.
157. *D. rubroclarus*.
158. *D. schuhi*. 