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Entomological Department.



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ARTICLE I.--Progress of work: Codling Moth, Hop Louse, Flea Beetles, Radish Flies, Cut Worms and Wireworms, Tent Caterpillars, Illustrations of Oregon Insects and Insect work, Gophers and Moles.



ARTICLE II.--Capon and Caponizing.

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PROGRESS OF WORK.

F. L. Washburn.

The following is a brief report of work accomplished in this department during the year. Article I treats on work with various insects. Article II on Capons and Caponizing. The insects discussed are the, Codling Moth, Hop Louse, Flea Beetles, Radish Flies, Cut-worms, Wire-worms, and Tent Caterpillars. There is also a short paragraph on Gophers and Moles. To Article I two plates are appended, one illustrating a few Oregon insects, the other, specimens of insect work. Article II is illustrated with two half tone plates and a number of line cuts.

While there has been no specially injurious outbreak of insects the past season, nevertheless Tent Caterpillars have been exceedingly numerous in at least three forms, and, in places quite destructive. *Clisiocampa erosa* Streck. and *C. pluralis* Dyar, have swarmed in some apple orchards, and have also fed generously on Plum and Prune, as well as on the foliage of Roses.

The third species of Tent Caterpillar, *C. constricta*, has in places, stripped the leaves from large areas of oak trees. It by no means follows, because these pests are troublesome for one or two seasons, that the same locality will be afflicted permanently. They may, after one or two years leave a place where they have been present in enormous numbers.

Large crickets, a species of *Anabrus*, have been numerous in wheat fields in Eastern Oregon. The Mediterranean Flour Moth, which has proved so troublesome in parts of Canada and the United States, may, at any time appear in flour mills in this state.

As the season of Spring approaches the irrepressible small boy appears on the scene with sling-shot and target rifle and begins the cruel work of murdering our familiar birds. Most of these birds are, in the long run, beneficial to the horticulturist and farmer. Moreover, for every bird slain a large number are only wounded and escape, to drag out a wretched existence until death relieves them. The thought of the unnecessary suffering, inflicted upon helpless animals by the thoughtless or cruel, prompts me to take this opportunity to appeal to citizens of our towns and cities, urging them to see that the laws which forbid the use of sling-shot or gun within the corporate limits, and the laws which protect our birds be rigidly enforced.

In the following pages, all half tones and line cuts, except Fig 2, 3, 6, 9, 10, and moth on title page, have been made by Mr. Pernot, photographer to the station and college, and I wish here to acknowledge my appreciation of his courteous efforts.

CODLING MOTH.

Two years ago it was shown that spraying with paris green solution would save from 70 per. cent to 80 per. cent of fruit which would otherwise be destroyed by the apple-worm. It remained to be seen with how few sprayings this could be accomplished, and the minimum cost of labor and material. The solution used in the experiment the past season was paris green and water (1 lb. of paris green to 300 gals. of water) and whale-oil

soap in the proportions of 1 lb. to every 8 gals. of water. As this soap was used simply to secure an even spreading of the liquid and, possibly, to insure the permanency of the solution, I believe that ordinary soft soap would have answered the purpose equally well.

To this solution IXL was added, crushed in small pieces, 1 lb. of IXL to every 16 gals. of the liquid. This, as is well known, is a patent insecticide consisting of lime, sulphur and salt and sold by Wm. Beck & Co., 112 California St. S. F. and 26 North Front St. Portland. Or. Cost in Portland 4 cents per lb. in bbls. (500 lbs. to bbl.) $4\frac{1}{2}$ cents per lb. in 60 lb box and 5 cents per lb. in bricks, any quantity. It was used the past season because previous experiments appeared to indicate that fewer sprayings were necessary when it was used, and on account of its fungicidal qualities.

The first application was made June 12th. but rain interrupted the work, and, more rain occurring a few days later, this first spraying was disregarded and a second application made June 17th., five days later. On June 27th. the fruit was sprayed for the third time, in reality the second time, and the fourth or really the third spraying was made Aug. 18th. None of the Waxen or Summer Sweets were treated on this last date.

On August 5th the fruit on the sprayed trees appeared to be quite free from worms, even on a few which were not treated on June 27th and had, therefore, gone seven weeks since the last spraying. Two weeks later, however, Aug. 18th, the Baldwins and Rambos were found to be somewhat wormy, showing that they should have received a spraying three or four weeks earlier. This would have brought the third spraying three weeks after June 27th, *i. e.* about July 18th. *The need of thorough work at about this date is referred to later on.*

The apple-worm, owing largely to the very inclement spring, was not as bad this year as the preceeding season, and unsprayed orchards looked fairly well in comparison with those which had been sprayed. In October, and earlier, the leaves on some of the trees in the sprayed orchard were noticeably burned, more particularly on the Baldwin trees. The cause of this cannot, in this case, be ascribed to using too strong a mixture, but in the following facts which have been discovered by previous experiments. It has been observed that trees in counties adjacent to, or near, the coast, are more likely to be burned than those in the interior. Further, if a *light rain* occur during or immediately after the application, the leaves are apt to be burned. Such burning does not show, when paris green is used, for sometime after the application. A heavy dew, or hot sunlight, immediately after spraying are conducive to burning. Strangely enough, it has been found that the older leaves are more susceptible to injury than the younger leaves. The under side of the leaf also is more easily burned than the upper side. The very slight rain occurring during our first spraying, June 12, aided by other climatic conditions prevalent here undoubtedly caused the burning of the foliage. This injury was but slight, and, another season, might be absent altogether. It must be said, however, that the presence of soap in the mixture appears to make it more liable to burn, than when used without the soap, and for that reason it would be well to use a min-

imum amount, just enough to cause the liquid to spread over fruit and leaf.

The effectiveness of wrapping burlap bands about the apple trees, as an adjunct to spraying, has been referred to before. Yet it must be borne in mind that the worm found beneath the band has accomplished its work, and spoiled the apple in which it was working. At the same time, many of the worms so killed, would, had they lived, produced female moths, which would have laid hundreds of eggs upon the fruit. In our experiments banding began in July, and the bands were examined every five days. In examining the bands, the greatest number of worms were found Aug. 25th, and Aug. 31st, 78 on the first date and 76 on the second,—from about forty-five trees. Inasmuch as it has been found that the larva lives four weeks in the apple before seeking a hiding place, it is evident that the mature worms found in such numbers from Aug. 25th—31st, were hatched about July 25th—31st,—*another argument to prove the necessity of a thorough application about July 20th*, in ordinary seasons.

I am convinced that three sprayings, with a fourth on later varieties, will, if judiciously applied, save a large percent of the fruit, and, as a result of the work of the past three years I unhesitatingly make to the farmer and fruit grower the following

RECOMMENDATIONS.

Spray with the solution above given for the first time about June 10th—15th, in ordinary seasons. A very early spring might call for an earlier application, yet it is very apparent that fruit growers, as a rule spray too early, there is no need for action until the apples are as large as marbles.

Let a second spraying follow the first in about three weeks, or a little earlier,—say July 1st—6th, and a third July 20th—25th. That should be sufficient on all early apples. A fourth is recommended for late apples Aug. 15th.—20th. These dates cannot be taken as criterions always, but they are based on careful observations here for three successive seasons.

As good a showing may be obtained, possibly, with some other agent in the place of IXL; we suggest it because with it we have had good results. Do not use too much of the solution, for it only makes burning more probable.

It might be well to decrease the amount of soap used, to about 1 lb. in every 15 gallons, just enough to cause the liquid to spread evenly over leaf and fruit. Begin banding about July 4th.

COST.

The large trees used in the above experiments were 30—40 years old and each tree required from 2 to 3 gals. of the mixture. This called for an expenditure of 7 cents per tree for each application, for labor and material. Smaller trees, requiring less, would not call for that sum.

It is an interesting fact, though having no especial bearing on our work here, that in Nebraska, in 1892, the Codling Moth caused a loss of \$2,000,000, a very large proportion of which might have been saved by judicious spraying.

PROPOSED WORK

The Botanist and Entomologist are planning a series of experiments for the coming season to determine the practicability, as far as Oregon is

concerned, of combining fungicides with the arsenites, that the scab and other fungus diseases together with insects which prey upon apple, pear &c. may be killed with the same application. This operation saves the cost of a special treatment for either vegetable or animal pest, and is much to be desired.

HOP LOUSE.

This pest was not as bad this season as the year preceding, owing to the cold rainy spring, unfavorable to any insect life. The statement having been made, by a few hop growers, that kerosene emulsion, 1 part to 30 parts of water, injured the foliage of the hop plants, the Entomologist applied it considerably stronger, 1 part emulsion to 20 parts water, on hops planted on the College grounds. Even at this strength no injurious results were observed, and it must be concluded that the fault, in the cases referred to, lay in its manufacture or application, or both. Kerosene however in the hands of the uninitiated, is a dangerous agent, and our hop growers feel more confidence in the quassia soap remedy, or tobacco and soap, which compounds have frequently been quoted in publications emanating from the U. S. Department of Agriculture, in bulletins published by this department of the experiment station, and elsewhere.

If opportunity offers, experiments will be instituted the coming season with a weak solution of Koebele's Resin Wash.* This wash promises to be a valuable agent against all forms of plant lice. It has in fact, already proved itself an efficacious agent. Its special value lies in the fact, that in a weak form it may prove fatal to the tender-bodied lice, and at the same time not kill the predaceous insects which feed upon them, and are found amongst them in considerable numbers.

The experiments proposed for next season are to determine how weak a solution will kill the hop lice and not injure the beneficial insects which occur on the hop.

It is probable that our hop growers will always have this pest to combat, and during some seasons, its ravages will be felt very severely if radical efforts are not made against it.

FLEA BEETLES AND RADISH FLIES.

Briefly, this experiment consisted in testing on turnips and radishes the comparative value of tobacco water (1 lb. of waste stems steeped in 2½ gals. water) air-slaked lime, and ashes as a preventive of the attacks of *Phyllotreta decipiens* and species of *Anthomyia*. The small "worms" found in minute brownish burrows near the top of radish and turnip roots are the larvae of the above flies. The result was a corroboration of previous work in this direction, viz. while lime and ashes are good, more frequent application are called for than when tobacco water is used. About three applications of tobacco water liberally applied with a watering pot, at intervals of two weeks, beginning when the plants are about a week old, will be found efficacious. As stated in a previous bulletin, this liquid is not only repulsive to the insect, but, sinking about the roots acts as an excellent fertilizer. Especially is this noticeable in the case of radishes.

The lime was applied to the plants with a Leggetts' London Purple

* RECIPE FOR RESIN WASH: To 3 lbs of carbonate of soda (common washing soda), add 4 lbs of resin and 1 gal. of water. Heat until dissolved, and while boiling gradually add 4 gal. of hot or warm water, stirring all the time, and continue the boiling until the mixture is the color of molasses. When wanted for use, warm and dilute as follows with cold water: For Woolly Aphis 1 part wash to 6 parts water; for any other aphids 1 part wash to 10 or 12 of water; for Mealy Bug, 1 part wash to 10 parts water.

Gun (Leggett & Brother, 301 Pearl St, New York City) which is shown in a line cut below. By means of a strap which accompanies this machine and which passes over the shoulder of the manipulator, the gun can be held at the level of the waist, with the muzzle end just above the plants, and any dry insecticide easily applied.

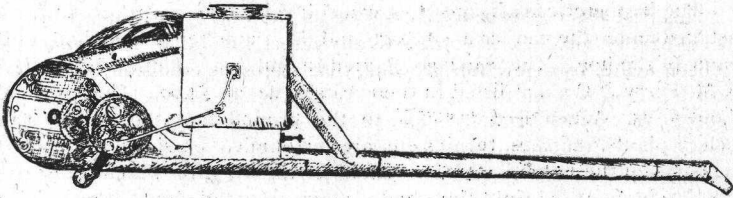


FIG 1.—Leggett's London Purple Gun.

Through courtesy of G. C. Davis of the Michigan Agricultural College we are privileged to insert here a cut from an original drawing of a machine of his invention, proposed, primarily to kill leaf hoppers, but also well adapted to catching and killing flea beetles on very young plants.

The machine is called a "hopperette".

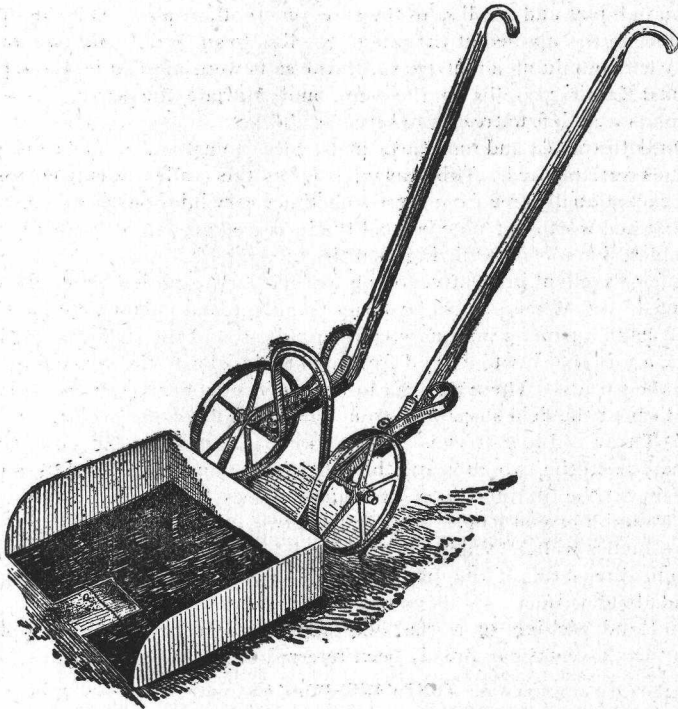


FIG. 2.— A Hopperette.

Quoting from his description: "A small tarred pan is attached to a hand wheel hoe as shown in figure. The pan is made of sheet iron. The bottom is 16 in. by 20 in. with a notch 6 in. deep by 4 wide cut in the centre of the front edge. On two sides and back is an upright sheet about 4 in. high. The edges of front edge and notch are rolled up about $\frac{1}{8}$ in. simply enough to keep the coal tar on bottom from rolling off.

The hopperette is attached to a wheel hoe by two strips of strap iron fastened under the pan as a support and at the other end bolted to the frame of the hoe. The carriage figured in cut is a "Planet Jr." sold by D. M. Ferry & Co. and listed in their catalogue at \$4.00. The pan costs about \$1 25. When used it is close to the ground and the young plants (celery plants, radishes, turnips etc.) are surrounded on sides and back by the edges of the notch. At *a* is a small string or wire which causes the insect to jump at the right time, and also prevents the plants from striking the sharp edge of the iron. As the machine is wheeled along and the plants disturbed as indicated, a large proportion of the insects will jump on to the tar and perish".

WIRE WORMS AND CUT WORMS.

Three plats each containing about 900 sq. ft. were treated May 10th. with Kainit & Muriate of potash, in the proportion of Kainit, 1000 lbs. to acre on one plat and 600 lbs. to the acre on another plat. On the third plat Muriate was applied at the rate of 600 lbs. to an acre. On two other plats, each containing about 450 sq. ft. the salts were applied in these proportions: Kainit 2000 lbs. to the acre, and Muriate the same. In each case, plats were left untreated to serve as checks.

On both treated and untreated plats, corn, tomatoes, peas, beans, and cabbages were planted. This season, as far as this valley was concerned, being exceptionally free from these sometimes very injurious pests, no result was obtained worthy of note beyond the increased growth of certain of the vegetables, due to the fertilizing qualities of the salts.

A few excellent preventives of cut-worm injury to garden plants are here appended. (a) When planting cabbage plants, tomato plants, etc., hold in the left hand a paper 3 in. square, and wrap it around the stalk of the plant in such a way that it will extend from about 2 in. above the ground to one below the surface. These papers can be easily cut, strung on a wire and carried about the field suspended from a button hole of one's coat.

(b) Throw old tomato cans and the like into a bonfire and allow them to remain until the two ends and the side become unsoldered. With a pair of shears cut the tin tube into two equal pieces lengthwise. Wrap each piece around a broom handle so as to form two tubes about 6 inches long and 2 $\frac{1}{2}$ inches wide. When wanted for use, the tube can be sprung open to admit the stalk of the plant, and it should then be pressed into the ground about $\frac{1}{2}$ inch.

(c) Hand picking of worms and digging them out from near a plant which they have cut has already been referred to.

TENT CATERPILLARS.

These pests have been so prevalent the past season, that remedies and

preventive measures, which were given in Bulletin No. 14 are here repeated. The hairy larvæ, so prettily marked, are by this time very well known to our citizens. They turn into moths much like the one figured on the title page of this bulletin.

Where fruit trees are sprayed with the arsenical solutions for the codling moth the foliage is necessarily poisoned, and the above caterpillars being leaf eaters, are killed by eating the leaves. A very excellent, and very necessary preventive is to destroy the egg clusters on the leafless trees in autumn, winter, and early spring when they can be easily seen, by cutting off and burning infested twigs. The eggs are clustered in a dark band around the twig. Another remedy is equally simple; saturate a rag with kerosene, attach it to a pole, light it and burn the webs when the caterpillars are within. Crushing the very young caterpillars with the gloved hand, when they are massed together, is also recommended. Several parasites attack this larva, so man is not alone in his efforts to destroy them. A few of our birds, but not many, feed upon these pests. The eggs of *Clisiocampa* found in August will not hatch until the following spring.

GOPHERS AND MOLES.

The station has obtained a sample of the breech-loading Breese Riggs Animal Gun, invented, manufactured and sold (\$3.00) by Miss Emma Riggs of Crowley Or. The principle involved in its use is the same as in the muzzle-loading Dickinson Gun figured in Bulletin No. 25.

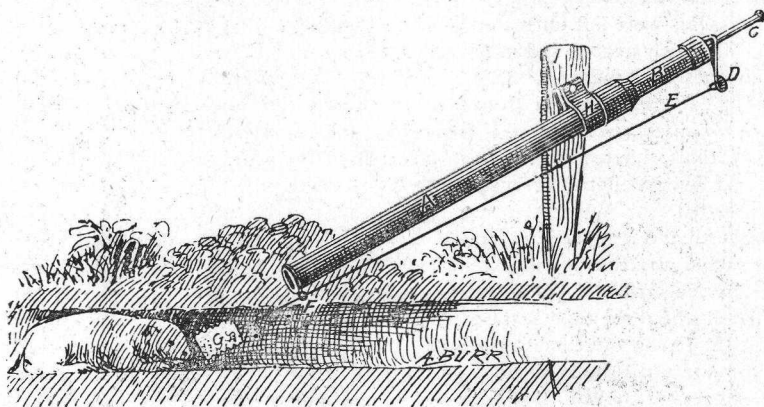


FIG. 3.—The Breese Riggs Animal Gun.

The hard wood stake to which it is attached is driven into the ground and the barrel can be pointed down the burrow at any angle. It calls for a 16 gauge shell, a very light charge of powder (about 1½ thimbles full) and about 30 pellets of No. 6 shot. We regard it as a very efficacious machine, and the fact that it is a breech loader makes it an easy gun to load or unload.

Moles can be shot with an ordinary shotgun, if one is so fortunate as to have such a weapon when he observes the earth of the mound moving. Such movements indicate that the mole is just below, and a good marksman can kill the animal when standing 25 or 30 feet away. Spearing them

when so engaged has been referred to in a previous bulletin. The so-called "Mole plant" (*Euphorbia lathyris*) is thought by some to prevent depredations, of moles at least, when planted in gardens. This idea however meets with but little encouragement from close observers.

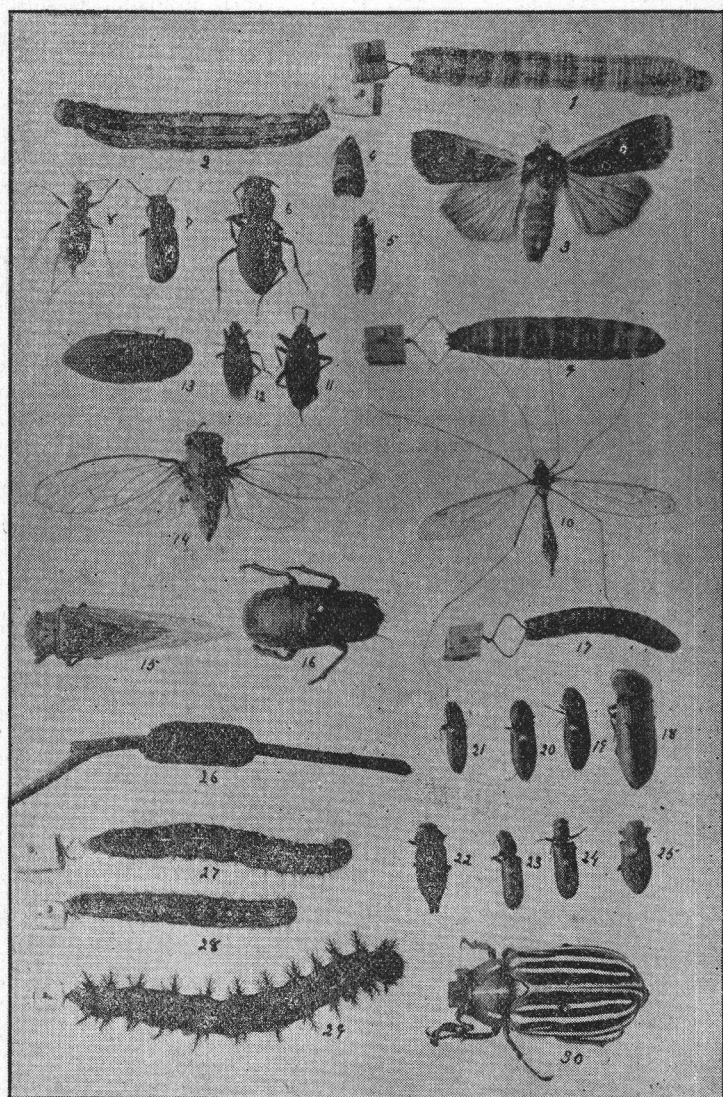


PLATE I.

EXPLANATION OF PLATE I.

Figs. 1 & 2, Cut worms, *Hadena devastatrix* and *Leucania* (Sp?) respectively. Fig. 3, Moth (*Rhynchagrotis confusa*) from cut worm. Figs. 4 & 5, Codling Moths. Fig. 6, *Omus californicus* a predaceous beetle and hence a beneficial insect. Fig. 7, Another predaceous beetle (*Pterostichus californicus*). Fig. 8, *Cicindella 12-guttata*, a Tiger Beetle, predaceous in habits and commonly regarded as a useful insect. Fig. 9, Larva of Crane Fly. Found in decaying vegetation. Fig. 10, Perfect insect or imago of Crane Fly. Fig. 11, *Largus succinctus*. Fig. 12, *Leptocaris trivittatus*. This and the preceeding belong to the order known as Hemiptera or bugs. They are abundant, frequently seen about maple trees, and also feed on the juice of bruised cherries, berries etc. Fig. 13 A beetle which bores in fir (*Buprestis aurulenta*) quite common in Oregon. Fig. 14, *Cicada areolata* (allied to 17-year Locust) with wings expanded. Fig. 15, Same with wings closed. Fig. 16, Pupa of a Cicada. Fig. 17, A wire-worm; injures wheat, tomato plants, potatoes, beans, etc. Fig. 18, Click or Snapping Beetle which comes from the wire-worm. Fig. 19 and 20, Two Click beetles (*Corymbites fabrax*). Fig. 21, Another Click beetle (*C. cylindriciformis*). Fig. 22, *Dicerca divericata*, a beetle frequently seen on peach, cherry, or prune trees. Its larva bores in the wood of these trees just below the bark and resembles the larva of the Flat-headed Apple-tree Borer (*Chrysobothris femorata*) Fig. 23 and 24 Branch and twig borer, (*Polycaon confertus*.) Fig. 25, The beetle which comes from the Flat-headed apple-tree Borer, (*Chrysobothris femorata*). Fig. 26 Eggs of "Tent Caterpillar". Fig. 27 and 28 "Tent Caterpillars" larva of *Clisiocampa* (*C. pluvialis* and *C. erosa*, respectively) Fig. 29, Larva of *Pseudohazis eglanderina* which feeds on Wild Rose. Fig. 30, "Ten-lined leaf eater" *Polyphylla decemlineata*.) Its larva feeds on roots of grass.

All figures in Plate I but slightly reduced from natural size.

PLATE II.—SOME SAMPLES OF INSECT WORK.

- I. Woolly Aphis (*S. lanigera*) on apple.
- II. San Jose Scale (*Aspidiotus perniciosus*.)
- III. Oyster-shell Scale (*Mytilaspis pomorum*.)
- IV. Work of Scolytid Borers on young Baldwin. Piece of bark removed to show burrows.
- V. Work of Blackberry and Raspberry Cane Borer.
- VI. *Corythuca* on under side of Apple leaf. This insect has been reported to the station at various times but is not numerous enough or injurious enough to be regarded as a pest.
- VII. Work of Pear and Cherry-tree Slug.
- VIII. Currant stem hollowed by the Currant Borer.

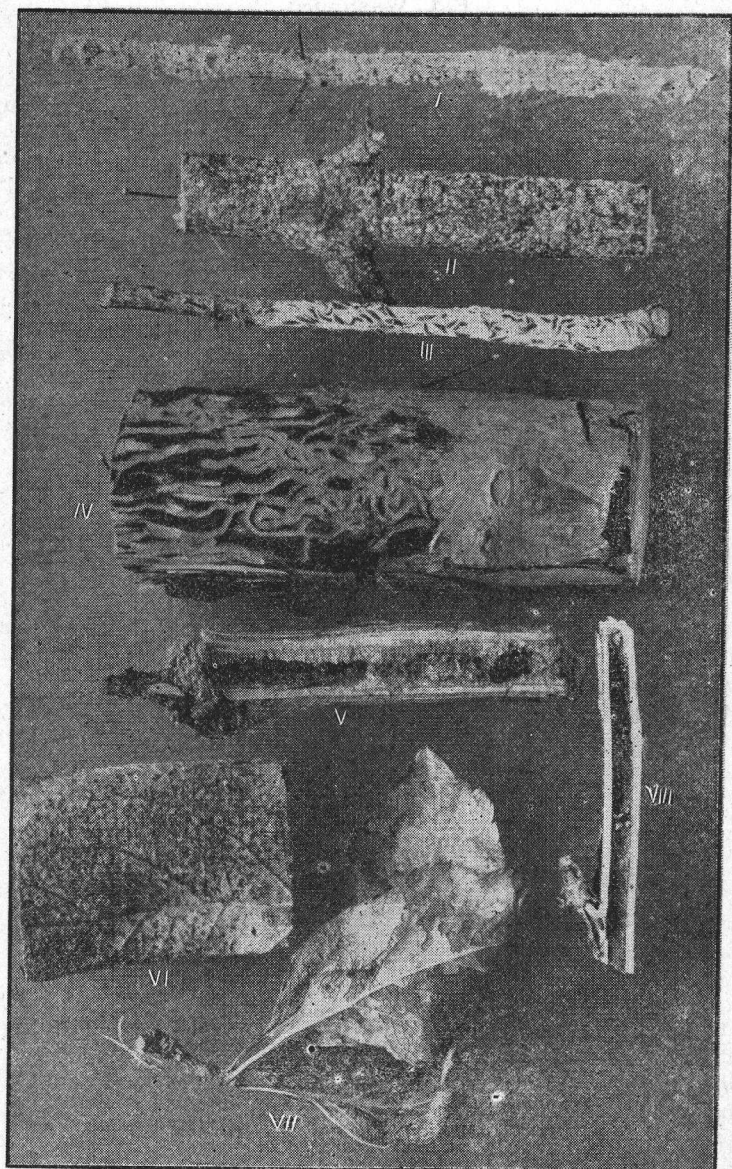


PLATE II.

CAPONS AND CAPONIZING.

F. L. Washburn..

WHAT IS A CAPON?

A capon bears the same relation to a cockerel that a steer does to a bull; it is an altered rooster. As in the case of steers, a capon is more quiet, lays on much flesh and fat and remains tender for many months after the operation. Caponized birds 17 and 19 months old have been killed here whose meat was extremely delicate and tender. They will, furthermore, weigh from 20 to 30 per cent more than a rooster of the same age if kept the proper length of time, and, in many Eastern markets will bring from 18 to 30 cents per pound. The comb and wattles do not grow after the operation. The feathers of neck and saddle grow enormously long and become very glossy. They do not chase the hens; they neither crow nor fight. For a few months after caponizing they are very hearty eaters, but later do not consume appreciably more food than ordinary fowls. If the operation does not succeed in removing all of the testicular matter or the sac (*tunica vaginalis*) inclosing it, the glands grow,—sometimes to an enormous size, and assume distorted shapes. The bird is then what is known as

A SLIP.

A slip gains flesh and fat and better flesh than a cockerel,—grows rapidly, and for a time resembles, as far as outward appearances go, a genuine capon. But after a while,—three or four months after the operation, the comb and wattles grow, the bird develops a crow, and chases the hens worse than a cockerel. It is evident that its period of gain has at this point ceased and it should be killed without delay. The meat of a slip is superior, as said above, to that of a cockerel and in some markets sells for nearly as much per pound as that of a capon.

IS THE OPERATION CRUEL?

No more so, and not so much, as the same operation performed on pigs, colts and calves. It is quickly done, and the bird begins to eat directly after being released from the caponizing board. Not over 2 per cent of birds need be lost by even an indifferent operator, and any chick so killed dies from hemorrhage and is as good for table use as though death had been caused by beheading. The beginner should practise on two or three dead cockere's first, in order to become familiar with appearance and position of organs before attempting to handle a live bird.

INSTRUMENTS NEEDED.

Caponizing instruments are sold in sets by Geo. Q. Dow, North Epping N. H., by W. H. Wigmore and Co. 107 So. 8th St. Phila., the latter firm represented on this coast by the Petaluma Incubator company, Petaluma, Calif.,—by Geo P. Pilling & Son 116 South 11th St., Phila., and others. Single instruments can be purchased from most of these firms, as shown in their catalogues. These tools sell, in sets, for from \$2.00 to \$5.00 and over. The instruments actually necessary are a sharp penknife or scalpel, a spring or spreader. Fig. 4 (A & B) to keep the ribs apart, a caponizing canula Fig. 4 C. in some form, a delicate steel hook Fig. 4 D, and a pair of fine long

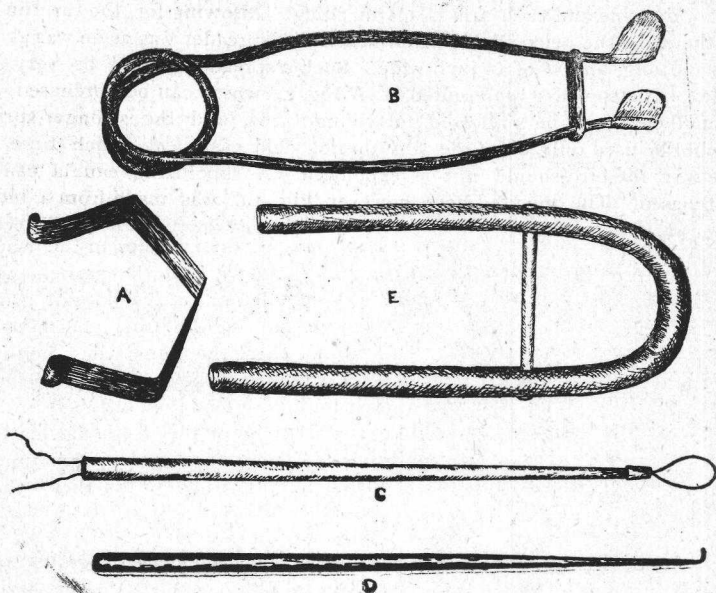


FIG. 4.—(All figures in this group are about $\frac{1}{2}$ actual size.)

forceps. To these might be added a pair of small sharp pointed scissors. One should have also an oval caponizing board (Fig 5.)

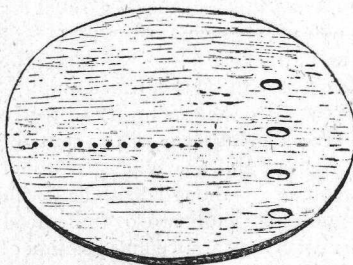


FIG. 5.

The board we used is 2 ft. by $1\frac{1}{2}$ in its two diameters. Eight inches from one side is a row of thirteen holes $\frac{1}{4}$ in. in diameter and one and one half inches from each other. At one end are four oval holes about $1\frac{1}{2}$ in. long and $\frac{3}{8}$ in. wide, (see Fig. 5.) The small round holes are to hold the ends of the staple, Fig. 4 E, which passes over the wings of the fowl. Through the oval holes a double strap is carried

over the *scaly part* of the legs and, by means of a weight at the end beneath the board, holds them firmly. The iron staple, which is used as above indicated, is four inches long, with a cross bar $1\frac{1}{2}$ inches from the rounded end. The staple must fit snugly in the round holes. The distance between any two of the round holes is just one half the distance between the free ends of the staple. The hook, Fig. 4 D, can be made from a dentist's pick or from a crochet needle, and is used to tear the delicate membranes found in the body cavity of the fowl, and concealing the viscera. A spreader Fig. 4 A can be made with a well tempered piece of steel. It

is $2\frac{1}{2}$ in. wide and each arm is $1\frac{1}{2}$ in. long. Allowing for the turning up of the ends, the peice of steel from which this spreader was made was about $6\frac{1}{2}$ in. long, and $\frac{3}{8}$ of an inch wide. Such a spreader should be very pliable. The spreader represented at *B* Fig. 4, which can be purchased for a small sum is to be preferred for young birds, and the stronger spring should be used only when the ribs do not yield easily; at which time, by the way, the bird should not be caponized. A caponizing canula can be purchased. The one used here, however, Fig. 4 *C* was made from a blow-pipe which had its smaller end flattened and just enough of a slit left at this end to allow of the passage of the wire loop. We prefer fine silvered wire (Malin & Co No. 32) to the horse hair used by many. The spreader shown above, Fig. 4 *B*, is somewhat too long and we would reccommend the shorter improved style shown in Fig. 6.

THE OPERATION.

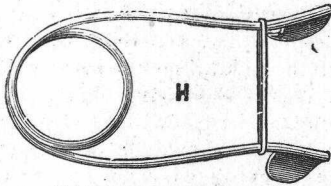


FIG. 6. Improved Spreader.

The bird, which should be between $2\frac{1}{2}$ and 4 months old, has been kept without food or water for 24-30 hours in order that the intestines may be perfectly empty. It is placed on the caponizing board, its wings pinioned with staple (do not press wings too closely together) and

its legs fastened firmly by the weighted strap referred to above. The board has been placed on a barrel, say, or something of the proper height, and preferably out of doors, where plenty of light, direct sunlight if possible, is obtainable. It is well to wet the feathers on side, in front of thigh, that they may the better be kept out of the way. Brush them back to bare the

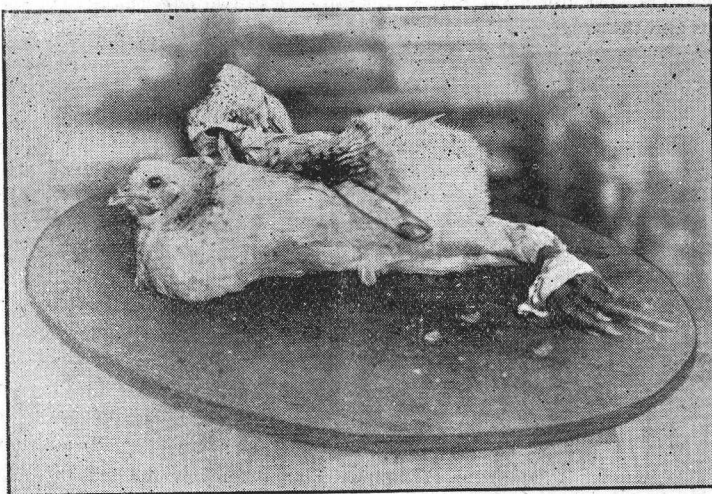


FIG. 7.

skin. With a scalpel or sharp pen-knife cut through the skin at right angles to back-bone, and half way between shoulder and thigh. Let this cut be about 1 in. long or more. Then push the skin back and cut through the muscles *between the last two ribs*. Insert spreader to keep ribs apart. Your bird will then have something of the appearance shown in Fig. 7. Allow no foreign matter, feathers etc., to fall into the cavity while operating. With hook tear away the delicate tissue which you see hiding the intestines. This tissue is the wall of an abdominal air-sac. The intestines exposed, push them to one side and note the testicle of the side upon which you are working, lying close to the back and about on a level with the front edge of the thigh. It is an oval body, generally whitish, but not constant either in size or coloration. If the chick is very young it may not be much larger than a grain of wheat, but in the larger breeds of fowls, at four months of age, it will be considerably larger, and in quick growing fowls, like the Leghorns [and, by the way, it does not pay to caponize these] the glands at four months, may be nearly as large as a sparrow's egg. Note the blood vessels close to the testicle, and sometimes directly in contact with it, running along the back in the middle line; the pulse in the artery [*dorsal aorta*] is distinctly visible. Insert caponizing canula and place wire loop over testicle. Extreme care must be taken *not to include either of the large bloodvessels in the loop*. If you tear either of these your bird will bleed to death. At the same time the entire gland must be included; *failure in this particular means a slip*. Now keep the end of the canula closely applied to the gland and draw upon the wires firmly. The result is that the wire cuts the testicle free from the tissue supporting it and it can be picked out of the abdominal cavity with the long handled forceps. With forceps also, or with spoon, remove all foreign particles which may have got into the abdominal cavity such as peices of feathers, clotted blood etc. The spreader is then removed, the skin drawn over the cut beteen the ribs and the two edges of the skin stitched together. This takes a little

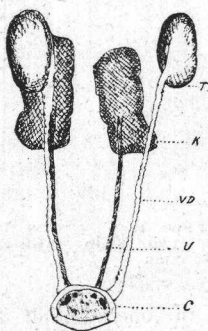


FIG. 8. Urogenital organs of male fowl: T. testicle, V. D. vas deferens, K. kidney, U. ureter, C. cloaca. (reduced.)

more time, but we believe it is far more humane than just twisting the feathers together. Turn the chick over and repeat the operation on the opposite side. Many professional caponizers remove both glands through the same cavity, *i. e.* open only one side of the bird, but it is hardly advisable unless one has the finest set of instruments, the Chinese tools for instance, and has become very expert in their use. The bird is then placed in a dry coop, and given plenty of water and soft food frequently (but not too much at a time) for three or four days and then allowed to run with the other fowls. Sometimes a bird becomes "wind-puffed" a few weeks after the operation. In other words, when the cut in the skin has healed, air gets between the skin and the muscles, from the broken air sac. This can be easily remedied by puncturing the distended skin with a coarse

needle and forcing the air out. Or, if left alone, it will eventually remedy itself.

BEST BREEDS, AGE, ETC.

In our estimation the Light Brahmas or the Plymouth Rocks make by far the best capons. The black Langshans are excellent also, albeit they are very slow growers. Partridge Cochins are highly spoken of. The Indian Games make fine capons, as well as crosses of this species on other large breeds. A turkey was caponized here the last season, but results are not definite enough to warrant a report yet.

As to age, many caponize as soon as they can distinguish the sex of the chick. The important point is not to wait until the glands are large and the ribs become stiff, and unyielding.

EXPERIMENTS AT CORVALLIS,

These experiments were not intended to give results in minute detail. That will come later perhaps, when a flock of capons can be kept at the Experiment Station. The conditions under which the work was done here has been purposely made the same as would be found on any farm. The capons were given no special care nor special food, and the results show conclusively a gain over birds untreated. About thirty fowls were used in the experiments. Two or three of the first caponized were accidentally killed. A few proved slips. Untreated roosters of the same species and same brood were used as checks in many cases, but, owing to the fact that all the birds belonged to the writer's flock, it was impracticable to keep checks for each bird caponized, hence the apparent meagerness of the report in this direction. The following table gives the data as regards comparative gain of a few of the subjects, enough being quoted to give a fair idea of the experiment.

| No. | Breed. | Date of Caponizing. | Age and weight at operation. | Date of 2d weighing & amount of weight. | 3d weight. | 4th weight. | Date of killing and age at death. | Live weight at death. | Weight dressed. |
|-----|---------------------------------------|---------------------|------------------------------|---|---------------------|---------------------|-----------------------------------|-----------------------|-----------------|
| 13 | Cross; Plymouth Rock & Brown Leghorn. | Nov. 20 1891 | 5 months 2lbs 15½ oz. | Feb. 3 1892 4¼ lbs. | Mar. 12 1892 5lbs | | Apr. 9 1892 10m 21d | 5lbs | 3½lbs |
| 14 | Same; check on No. 13. | | 2lbs 8½ oz | 4lbs. | 4lbs | | " | 4lbs | 2½lbs |
| 12 | Black Langshan. | Nov 20 1891 | 5 months 2lbs 11 oz. | Feb. 3 1892 6lbs. | Mar. 12 1892 7¼ lbs | Apr. 30 1892 7¾ lbs | Dec. 9 1892 17m 19d | 10½lb | 7¾lbs |
| 25 | Light Brahma. | Dec. 11 1892 | 5 months 3lbs 6 oz. | Feb. 1 1893 6½lbs | Sept. 12 1893 8lbs | Feb. 12 1894 8½ lbs | Feb. 12 1894 19ms. | 8½lb | 6½lbs |

No. 12, In excellent condition. No. 25, In good condition. see Plate III.

No 12 shows an average gain per month, after the operation, of 9.9 oz. The check on No. 12 was not kept as long as the capon, for lack of facilities, but during eight months time, it showed an average gain of 6 oz. per month. Number 25 should have been killed in Sept. 1893 for, as shown in table, there was hardly any appreciable gain after that time. The bird is figured alive and dead in Plate III at the end of this bulletin.

HOW TO PREPARE A CAPON FOR MARKET.

Keep the bird twelve hours without food, that its crop may be entirely empty. Then suspend by the feet in a convenient place. Have ready a two or three pound weight attached to a hook. This is to fasten to the lower mandible or "lower jaw" of the bird after he is dead to keep him steady and facilitate picking. Seize the head of the fowl, open his mouth and cut the veins and arteries [jugulars and carotids] at the back part of the throat by running a sharp-pointed knife into the back of the mouth. a French Poultry Killing Knife is made expressly for this purpose. As soon as blood vessels are cut, run the knife through the roof of the mouth into the brain. Then pluck the bird immediately, without scalding. This method is most approved of by experts, as the bird is not in any way disfigured. One may cut both of these bloodvessels from the outside by running a sharp pen-knife into one side, a little back of and below the ear, thus making only one wound. This one wound however might be objected to by the marketman. *Never chop off the head!* In plucking, the feathers of the two outer joints of the wing, the feathers of the upper part of the neck, the tail feathers, together with the long feathers of the saddle, and a few feathers on the lower end of the drumstick should be left [See Plate III]. Do not cut off the feet. If the head is bloody, wash off the blood. As regards dressing; cut carefully around the vent and pull out the intestines, scraping off the fat with which they are covered and leaving it (the fat) in the body cavity. when the end of the intestines is reached, break them off just below the gizzard. Leave gizzard and every-thing else, except the intestines, in the bird. Turn the mass of fat, around the opening you have made, outward, and let it harden, it will improve the appearance.

Capons should be packed, when thoroughly cooled, in new boxes lined with white paper. They should be packed solid, backs up, care being taken not to bruise them. This is the approved way of preparing a capon for the market. Buyers of capons at once recognize it as the bird calling for 30 per cent more per pound than an ordinary fowl. For our own use, however, we should never take such pains; it is recommended because such a method obtains fancy prices.

THE BEST AGE FOR KILLING.

On this point opinions seem to differ. One authority says: "Capons should be kept until two years old; another, Mr. Cushman of the Rhode Island Experiment Station, says "Capons killed at eleven months of age are preferred, as they get coarse and "soggy" if kept until twelve months or longer". In spite of this last assertion we have found at least two capons, Nos. 12 and 25 to be in good condition at 17 and 19 months, and they certainly gain after twelve months. As far as our experience goes we would recommend keeping them at least thirteen or fourteen months from date of hatching.

WILL IT PAY IN OREGON.

Unless fowls are sold by the pound it certainly will not pay from a financial standpoint. In Portland, we understand, and in a few of our other

large cities, the practice of selling poultry "by the dozen" is gradually disappearing. When fowls are sold by the pound, as they should be, it will be an easy matter for the raiser of capons to successfully compete with those furnishing the scrawny tough fowls now displayed in our markets.

Quoting from a list of prices in Boston Market for 1891 and 1892 we find that from Jan. 1st to May 15th, New Jersey Capons sold for from 20 to 28 cents per pound. At the same time broilers were bringing from 15 to 55 cents per pound. When capons are scarce, which happens in early summer, they bring much more per pound. On July 7th 1892 capons weighing nine and ten pounds were retailing in Fulton Market, New York City, for 35 cents per pound. The latter part of May 1891.—a member of the firm of Edson Bros. and Gilman wrote to Mr. Cushman of the Rhode Island Experiment Station, that he could that day sell a ton of capons, if he had them, at from 26 to 28 cents per pound.

It is probable, that if our wealthy people could be educated to the point of appreciating capon meat and they would doubtless prove apt pupils, this favorite of epicureans would command good prices in Portland and elsewhere throughout Oregon. A market man in our metropolis told me a short time since that he had no doubt but that fancy prices could be realized on capons, and expressed a willingness to contract for a large number for February. He did not, however, state what he would pay for them.

The use of the incubator, in order to bring capons on the market all through the year, and in large numbers, is, very evidently, a necessary adjunct to the business as well as an absolute necessity in the production of early broilers on a large scale.

NOTES

No antiseptic precautions were taken in our experiments.

A physicians head mirror strapped to the forehead will enable one to perform the operation by lamplight. Such a mirror can be purchased for from \$5 to \$6 of Geo. Tieman & Co. New York City.

Are slips fertile? Can they be used for breeding purposes? This question we attempted to solve a year ago, by placing a slip with a hen just beginning to lay while cooped with her chicks. She had been separated from the rest of the flock for about five weeks. For a week after the introduction of the slip into her yard, each egg laid was tested in an incubator and none were fertile.

Another experiment along the same line gave practically the same results, and, though, the experiment *must not be regarded as by any means conclusive* it would seem, that, owing to mechanical injuries incurred in the operation, slips as a rule cannot be used for breeding purposes. It is easy, however, to imagine exceptions.

In the course of this latter experiment, an interesting fact, though not a new one to many, was brought out. It was necessary that the hen used in the experiment should be laying sterile eggs, and to insure this the eggs of the isolated hen were tested daily in an incubator. *Each egg so tested proved fertile until the 17th day after isolation*, at which time the slip was placed in the pen.

Professionals have written to us stating that, when a fowl believed to be a capon is observed treading a hen, such fowl must necessarily be a slip. This is directly opposed to our observations. Capons were occasionally seen to bristle up to a hen and at other times to tread. Such fowls when killed were dissected and carefully examined, but not a trace of testicular tissue was found, and both *vasa deferentia* (the "cords") were rudimentary, that is, had not grown to any extent since the operation. It would seem that the genuine capon is as likely to show this instinct, as a steer in a drove, or cows at pasture.

Quoting from a very excellent bulletin on the subject of caponizing from the Rhode Island Station; "Large birds sell the best; the heavier the better. When ten pound birds bring 22 cents, 25 cents will be given for twelve pounders and 28 cents for those weighing fourteen pounds.

Some workers in this line claim to be able to caponize a bird in five minutes or less, but such do not sew up the wound.

Do not use fingers in removing glands or any spoon forceps recommended for twisting off the testicles. We have found caponizing canulas which allow of the wire being pulled through them, thus cutting off the testicle, superior to anything else and we would heartily recommend them. Others may have had a different experience.

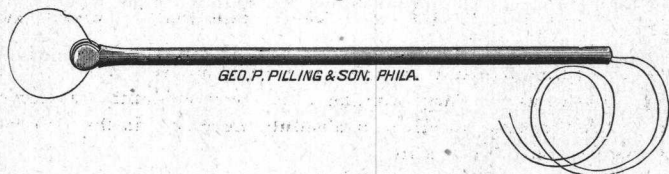


FIG. 9. The Pilling Canula, made by Geo. P. Pilling and Sons, Philadelphia.

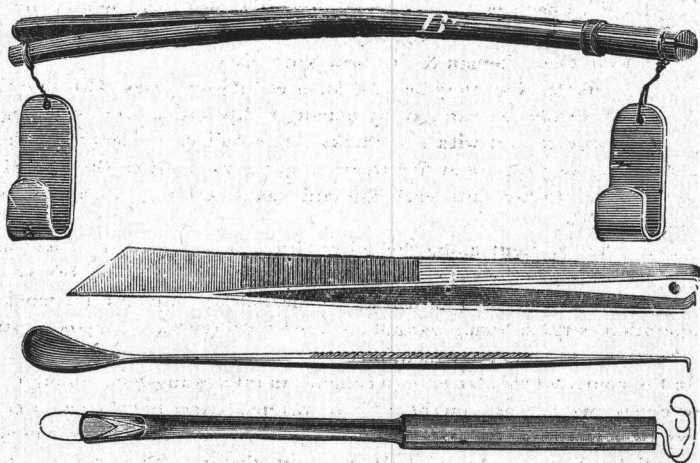


FIG. 10.—A whale bone spreader in the Chinese set of tools; a combined knife and forceps and a combined spoon book, also in this set. The last illustration is a canula made by Wigmore and Co.

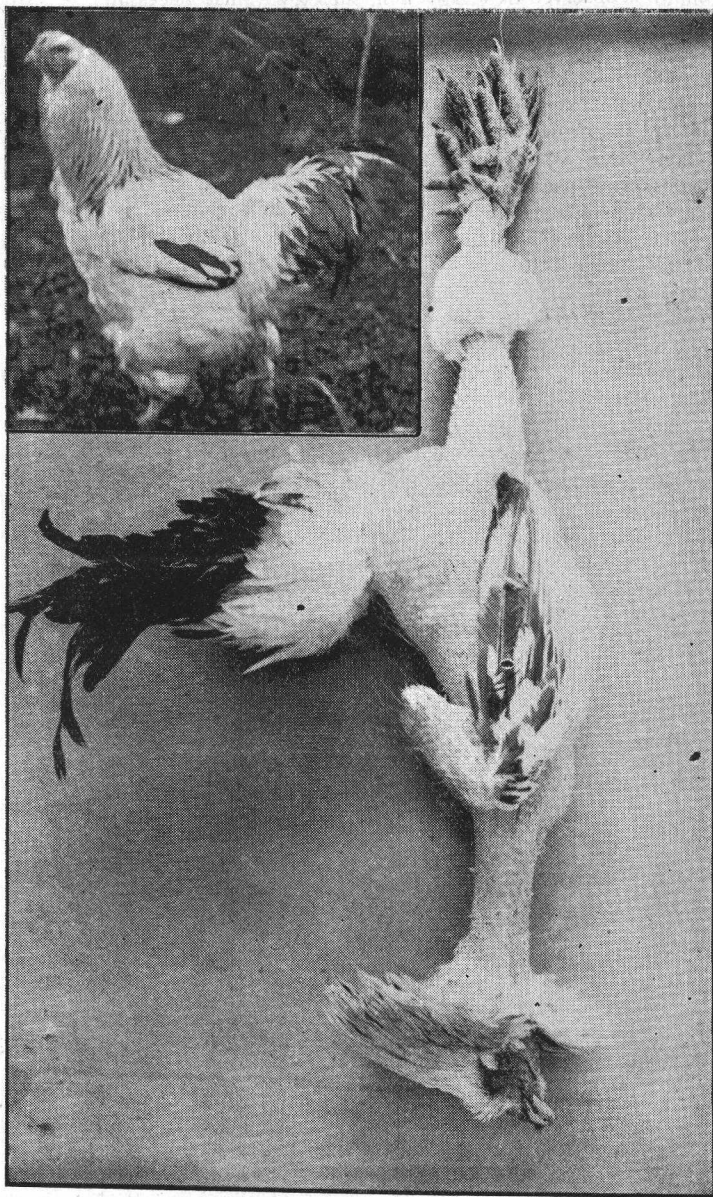


PLATE III.

As mentioned before we found fine silvered wire, Malin No. 32, preferable to horse-hair, yet much of our caponizing has been done on birds a little old for the operation. For very young birds a horse-hair, single or double might answer.

Of books published by dealers in caponizing instruments we have "Capon and Caponizing" by G. Q. Dow 1890 (25c) "Practical Caponizing" by W. H. Wigmore 1887 (25c) "Guide for Caponizing" by G. P. Pilling 1892 (free) "Capon Hand-book" by Greely Bros. 1892 (10c).

To Mr. Garrison of Forest Grove, dealer in fine poultry we are indebted for numerous favors and take this opportunity for acknowledging same. On the front page of this bulletin is a picture of two brothers Part-ridge Cochins, one a capon, the other a rooster. The difference in their heads is at once striking and characteristic. They are 11 months old, weight of rooster 7 lbs. 2 oz.; weight of capon 8 lbs. 2 oz.

We have been in the habit of wrapping a rag around the cross piece of the staple [see Fig. 4 E] thereby forming a cushion which rests against the wing of the bird during the operation.

EXPLANATION OF PLATE III.

The chief figure in this plate is a capon [No. 25] properly dressed for market, though professionals would have left more long feathers on the wing. Note the absence of comb and wattles, the full rounded breast, the presence of fat over the entire body, and the absence of sharp angles anywhere. In the upper left hand corner the same bird is shown as he appeared just before being killed.

