impossible to see that any of the trees sprayed in the spring had been benefited to any marked degree. This we believe is due to the fact that the breeding period of the Gloomy Scale is quite protracted and while the weaker spray mixtures which can be used in the summer without injuring the leaves will kill the young unprotected scale, they are not strong enough to kill the old scale which later gives birth to more young.

Nothing in this report, however, is to be construed as having any bearing upon the value of the various mixtures tried as San José scale remedies.

The writer acknowledges his indebtedness to Mr. S. C. Clapp, field inspector of this office, for his assistance in inspecting the sprayed trees.

THE PYRALID (OMPHALOCERA DENTOSA GROTE), A PEST OF BARBERRY HEDGES

By W. E. BRITTON, *Agricultural Experiment Station, New Haven, Conn.*

On August 12th, 1908, Dr. F. P. Gulliver of Norwich, Conn., sent to the station some curious black and white caterpillars which were feeding upon the leaves of common barberry, *Berberis vulgaris* Linn. This plant, though introduced from Europe, has become naturalized in New England and is far more common in Connecticut than the native species *B. canadensis* Pursh. The writer was away on a vacation, and his assistant, Mr. Walden, who was in charge of the department, not recognizing the caterpillars, wrote to Doctor Gulliver asking him to send more material, which he kindly did. The writer examined the caterpillars on his return September 1st, but they were entirely unfamiliar to him. In his experience of fourteen years in the State he had not at that time ever seen the species before. A few specimens were inflated, and the others placed in the breeding cages for the purpose of rearing the adults, but none were obtained. The following season the insect was not observed by any one connected with this office.

In 1910, however, this insect was more abundant than previously, and a number of caterpillars were found feeding upon not only the common barberry, *B. vulgaris* and its purple-leaved form, but also on the Japanese barberry, *B. thunbergii* D. C. which is used rather extensively for hedges, though not as commonly as California privet and on another species of barberry. Enough material was secured in 1910 to enable us to rear the adults, and both sexes were obtained.

During the annual task of inspecting nurseries the work of this

insect was observed in 1910, especially about New Haven, and in 1911 its work was again noticed.

Habits and Injury

The adults emerged in the insectary from April 10th to 20th, but they do not appear in the open until about the first of July. On July 3d, 1911, specimens were collected by the writer on the screen door of his house, the moths having been attracted by the light in the hall. As there is a low hedge of Japanese barberry in front of the house and only a few feet away, they were doubtless there for the purpose of ovipositing, and later a few caterpillars were found on this hedge.

The writer and his assistants hunted for the eggs, but could not find them. Presumably they are laid on the leaves of the food plant. The writer's hedge was slightly attacked in both 1910 and 1911. In one instance a tall hedge of *B. vulgaris* near the writer's home was almost entirely stripped of leaves at the top for a distance of two or three rods, leaving only the old webs containing the excrement, and rendering the hedge very unsightly. Spraying with lead arsenate would, of course, be the remedy.

The larva spins a web in which is collected the excrement, giving to the web a brown or dark gray color. This forms a case in which the larva lives and feeds. It is usually about two inches long and from three-eighths to one-half inch in thickness, though varying greatly in size and sometimes being several inches long. The case is attached to the leaves or twigs of the barberry and often includes both, as well as the fruit. As the eggs are laid about July 1st, it is usually a month later before larvæ or nests are noticed, and often two months later before they are conspicuous. After the leaves drop the old nests or webs disfigure the plants throughout the winter unless removed. The larvæ do not pupate in the nests, but go into the ground and transform in a tough cell, oval or oblong in shape and made of particles of soil held together by silk threads.

Identity and Literature

On account of the appearance and characteristic position of this moth when at rest with wings folded, as well as the antennal tufts of the male, it was thought to be a Deltoid, and specimens were sent for identification to Prof. J. B. Smith, who kindly replied as follows:

"Yours of the 5th inst. came duly to hand, and so did the box of specimens. The latter proved to be not Deltoids or Noctuids at all! —they belong to one of the Pyralid families, and the species is *Omphalocera dentosa*. I am under the impression that this species was

Omphalocera dentosa: a. Adults nearly twice enlarged; male at left. b. Larva, dorsal and lateral views, about twice enlarged. Front view of head at left, greatly enlarged. c. Nest at left, natural size. Larvæ at right, twice enlarged.

described and figured in one of the Government publications, but have no note on the subject, and can't be sure at the present time. I know that nothing much has been written concerning the species."

In searching the more accessible works for the literature of the species, only two references could be found. One of these was the original description which is included in this article, and the other a brief note by Dr. H. G. Dyar in an article entitled,—“A Review of the North American Pyralinæ” (Proceedings Entomological Society of Washington, Vol. X, p. 101, 1908), giving records as follows:

Omphalocera dentosa Grote.

“New Haven, Conn. (A. H. Verrill); Plummer's Island, Maryland, June 6, 1902 (H. S. Barber); Ames, Iowa, June 6, 1896 (C. P. Gillette); Black Jack Springs, Texas (Wm. Barnes); Dallas, Texas, May 31, 1896 (Dept. Agr. No. 6351), larvæ on *Berberis*. I have also a female from Durango, Colorado, that is less vinous in tone and more darkly colored, perhaps a distinct species, but with the present material I do not venture to separate it.”

“Larvæ received from Mr. A. H. Verrill, which I think belong to this species, are black with many white dots, without the red lines of *cariosa*.”

Dr. H. T. Fernald has also kindly examined the card index in his office and consulted his father's catalogue, and assures me that no other references occur there.

As the literature seems to be scanty, this brief article is submitted for publication in the hope that it may be of help to other workers who may collect or observe the caterpillars on barberry.

Description

Adult. The species was described from a female specimen by Grote, in Bull. U. S. Geological and Geographical Survey of the Territories Vol. VI, No. 2., p. 272, as follows:

Omphalocera dentosa, n. sp. *Female.* A little larger than *cariosa*, with quite a different color, being dusty olive brown, without any reddish brown tinges. The median space is dark blackish brown. The pattern of ornamentation is the same, but the outer line is composed of well-defined and rather broad, open teeth. The line is double, filled in by a pale shade, and is brought a little nearer the margin over the median nervules than in *cariosa*. The interspaces beyond the t. p. line show dentiform shadings of the lighter and darker colors of the wing. The fringes are dark. The terminal dots do not contrast as much as in *cariosa*. The veins are darker marked. *O. dentosa* has the under surface fuscous with a common external double line near the border, which seems a little less strongly dentate than in *cariosa*. The abdomen is furnished with brown tufts on the dorsum in both forms. In place of the discal mark (?) there is a pale dot on the subcostal vein and one below it on median vein, quite distinct in *cariosa*, hardly evident in *dentosa*, which expands 40 mil.”

I have not been able to find any description of the male, and take it to be undescribed, but in the specimens reared it closely resembles

the female in color and markings. The median space is smaller and less well-defined, the markings are slightly less distinct, and it is smaller in size. Both sexes have the dark brown or black tufts on the dorsum of the abdomen, and the male has the brown antennal tufts and the longer anal tuft which are sexual characters.

The specimens reared are somewhat more of a reddish brown tint than one would expect from Grote's description, yet there is a distinct olive tint on the basal two thirds of the secondaries.

Larva. Length, about one and one-half inches, thickness about three sixteenths of an inch; somewhat flattened and thicker laterally than vertically. Ground color black dorsally, brown ventrally. Marked dorsally and laterally by small white irregular shaped spots arranged rather irregularly as follows: Two transverse rows on each segment as seen dorsally; three longitudinal rows as seen in lateral view, one nearly in line with the spiracles, one above and one below, these being in addition to the transverse dorsal rows of spots. Sometimes a fourth longitudinal row may be made out below the other three and at the base of the legs and pro-legs. Head dark brown or black, sculptured or pitted and shining; marked with white patches more or less irregular in shape, the arrangement not entirely symmetrical. Legs black and shining, with white patches on the first and second basal joints. Head and body sparsely covered with nearly straight light and dark hairs of medium length.

The larvæ, adults and nests are shown in Plate 20. Credit is due to my assistants, Messrs. B. H. Walden and A. B. Champlain, to the former for making the photographs and to the latter for the drawing of the larva. Also to Professors J. B. Smith and H. T. Fernald for the courtesies already mentioned.

INSECTS OF THE YEAR 1911 IN IOWA.

By R. L. WEBSTER

The year 1911 in Iowa was characterized by an early spring and a long, dry summer. These weather conditions had much to do with the oscillations of insect life in the state during the year. The following notes deal with some of the more important insects on which observations were made this year in Iowa.

Lepidosaphes ulmi Linn. Not until this year did I realize what an important enemy to the apple tree was the oyster-shell scale. In the northern part of the state a large number of orchards are infested with this insect, many trees being very badly injured and some even killed by the scale. In March of this year I made a 40 mile auto trip in Worth county, in the northernmost tier of counties in the state, and found that scarcely an orchard in the county was not infested. Most of them were seriously injured. From observations made elsewhere