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THE OLEANDER CATERPILLAR, SYNTOMEDIA EPILAIS, WALKER

HOMER E. BRATLEY

This insect is a pest of one of our important ornamentals, the oleander, *Nerium oleander;* hence its name. The author has not observed the insect feeding on any other plant. At times it is sufficiently numerous to cause great damage by the defoliation of the plants. Its native host plant, according to Grossbeck (4), is *Echites umbellata.* This plant is found in the southern part of Florida, in the West Indies, and possibly in other parts of tropical America. It belongs to the same family as the oleander *(Apocynaceae).* The adult, a purplish moth with greenish wings dotted with white, is known as the Polka-dot wasp moth. (Fig. 22, Plate I.)

DISTRIBUTION

Dyar (1) who first described the larvae, obtained them in 1889 from the East Coast of Florida at Lake Worth about four miles south of Palm Beach. Riley (6) mentions what the writer supposes is the adult in a collection made by Mr. Schwarz at Cocoanut Grove, Florida, sometime prior to March 13th, 1888. By June of 1930 this insect had advanced up the coast of Florida to a point about fifteen miles north of Vero Beach. During the summer of 1930 specimens of its larvae were received at the Florida Experiment Station from several points south of a line from Vero Beach, on the East Coast, to Clearwater on the West Coast of Florida, and in 1931 from Haines City and Davenport. In "Biologia Centrali Americana", Mexico and several points in northern South America are named as localities where this moth has been collected. From this it appears that this species is native of the tropics.

LIFE HISTORY

The egg is light lemon yellow in color and very smooth and even in outline and surface. Seen from above it appears to be

a perfect sphere, but the side next to the attachment with the leaf is much flattened. The equatorial diameter is 1 mm. and the polar diameter .7 mm. The exposed surface, while smooth, gives (under magnification) the appearance of being under-

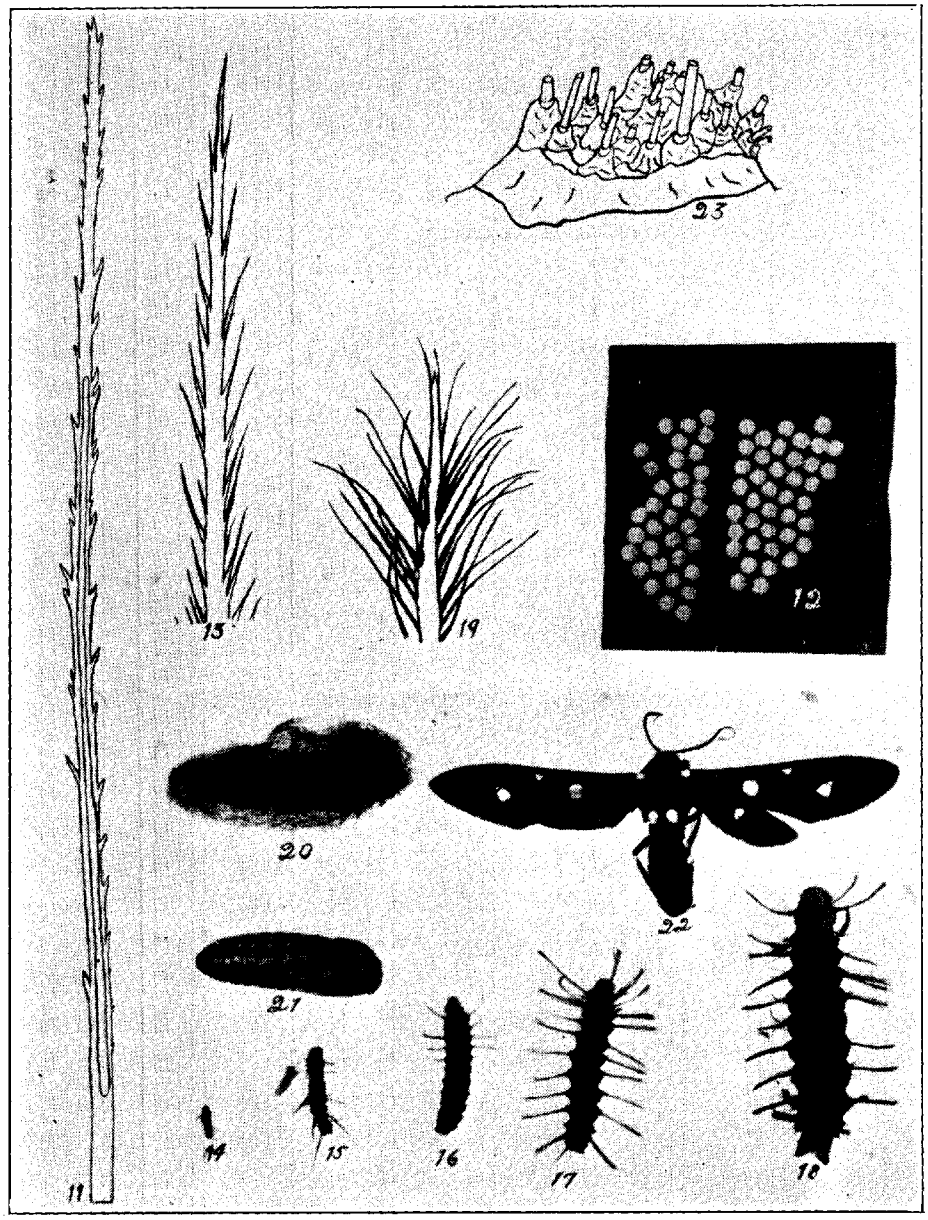

PLATE I

laid with a hexagonal netting. As the egg approaches to within a few hours of hatching, the color changes to a slate or lead color, due probably to the separation of the larvae from the shell and entrance of air.

The duration of the egg stage depends upon the prevailing temperature, as do also the lengths of the larval instars. (Plate II.) During June, July, August and September, two days were required for the eggs to hatch. This was extended up to a maximum of six days for other months of the year. The moth places from a dozen to seventy-five eggs in a group on the underside of the leaf. (Plate I, Fig. 12.) They are uniformly separated from each other in the group. In some groups they appear in even check rows, while in others no straight rows were noted.

The young larva, in hatching, eats a circular portion of the shell comprising about three-fourths the diameter of the egg. When this operation is completed, the larva rests for about thirty minutes, during which time it passes thru its first molt. In crawling from the shell the larva leaves behind the shed skin of this first molt. After extracting itself from the egg it rests for about an hour, after which it eats the remaining portion of the egg shell and the cast skin. All that remains to indicate where there had been a group of eggs are the small glistening spots on the leaf where each was attached.

The description of the larval stages is well given by Mr. Dyar (1), except for a few variations or corrections and additions here noted.

The first instar is spent in the egg shell as mentioned above. The duration of this instar was about three quarters of an hour. The hairs in this stage are short and very few in number, the more noticeable ones being located on the larger tubercles where, later in life, the more dense tufts occur. The head measures .4 mm. in width. The author wishes to note here with all due respect to Mr. Dyar, for entomologists are indebted to him for a great fund of insect information, that this instar was evidently overlooked by him. Therefore his descriptions apply to instars later by one than the one he designates. His description of the "first larval stage" is of the second and likewise his description of the "second" applies to the third, etc. Thus instead of five larval stages or instars there are six.

The second instar, which has a head breadth of .5 mm., corresponds in other measurements to those given by Mr. Dyar when he describes larval "stage one". In figures (Plate II) I-III, will be found seta maps of the thoracic segments and in figures 1-10 of the abdominal segments, thus eliminating the necessity of lengthy descriptions. The lettering system used by Fracker

(3) has been followed. These maps resemble most closely Fracker's maps of *Syntomis phegea,* showing family relationship. Figure 11, Plate I, shows one entire hair of this stage larva.

The duration of the second instar during the first third of March was from three to thirteen days, and during the last part of May, three to four days.

The duration of the third instar in summer, last part of May, was three and four days, and during the first half of March, three to eight days. Figure (13) illustrates the tip of a hair of this stage, and figure 23, Plate I, presents a tubercled area bearing hairs. This and the figures of the hairs are greatly magnified. Figure (14) shows the larva.

The fourth instar occupied from four to ten days during the middle portion of March, and four and five days in early June. Figure (15) illustrates the larva of this instar, and figure (16) shows the larva molting.

From six to twelve days during the last half of March, and from four to six during the first part of June were consumed in the fifth instar (Figure 17).

INSTAR DURATION SUMMARY

Instar	Spring	Summer	Average
1st	½-1 hour	½-1 hour	¾ hour
2nd	3-13 days	3 and 4 days	4.35 days
3rd	3- 8 days	3 and 4 days	4.33 days
4th	4-10 days	4 and 5 days	5.60 days
5th	6-12 days	4, 5, and 6 days	6.37 days
6th	4-16 days	4-8 days	6.95 days
Total	20-59 days	18-28 days	27.60 days

The sixth instar required from four to sixteen days during the last of March and early April, and from four to eight days during the middle third of June. The measurements agree with those given by Dyar in his description of the "fifth larval stage". Figure (18) shows a larva and figure (19) illustrates the tip of a hair of this instar (same magnification as other figures of

hairs). In comparing these illustrations of the hairs one would surmise that their length and the character of their side projections could be used as a means of determining the instar.

RETARDATION DUE TO SOLITARY CONFINEMENT

During the larval instars it was noted that larvae kept in individual cages remained in the instar longer than those of the same age allowed to remain in the colony. Where three or four larvae were confined together no particular increase of the instar period was noted. When kept together those of the same age passed thru their changes at the same time. Only one exception to this was noted and that for a single molt. When succeeding molts occurred this individual molted along with the rest. Since the work was completed, Mr. W. C. Allee's book "Animal Aggregations", published by the University of Chicago Press, has appeared. This work contains some similar observations along this line.

The prepupal period was marked by the non-feeding of the insect and the evacuation of the alimentary canal. The time required for this period was from three to ten days; from three to seven during the latter third of June, and from four to ten during first half of April. During this time the larva hunts a location for pupation, completes its loosely woven cocoon of hair and silken threads (Plate I, Fig. 20) and sheds its last larval skin. The pupa (Fig. 21) when first formed is a very light brownish yellow in color and requires a day to become a dark brown.

The pupal period, seven to fourteen days during the last of June and first of July and sixteen to twenty during April, lasted on an average thirteen and eighty-three hundredths days.

The adult stage (Fig. 22, female), wasp-like in form, lasts an average of nine days, although it varies from four to twelve days during the last of April and the first of May, and from two to thirteen during mid-July. The adult measures across the expanded wings from 44.6 to 51.4 mm., and from the anterior border of the head to the tip of the abdomen from 16.5 to 18.3 mm. The color according to "Dictionary of Color", by Maerz and Paul (Plate 46, F 12), for the body generally, is marine purple navy. The wings' ground color corresponds most nearly to jungle green (L 12 of Plate 32). The antennae for two thirds their length are the same color as the wings, with the apical third

feathered in white. The primary wings are decorated with two large white spots centrally located in the basal and apical halves. Near the middle of the anterior margin is a third white spot; two very small white spots are anterior to the large spot in apical half; and a sixth spot occurs on the costal margin at the junction of wing and body. The secondaries, much smaller than the primaries, have one white spot in each center and one on the anal margin. The legs are of the same color as the wings, with pairs one and two having white tipped joints except those of the tarsi. The third pair are white at conjunction of femur and tibia and the tarsal joints are all white.

The metathoracic segment dorsally displays three white spots, a very small triangular one on the anterior dorsum and one nearly discal spot on each side of the dorsum. Each thoracic segment bears one oval white spot on each lateral area.

The abdomen's ground color as mentioned above has the last two visible segments "sungod" (Maerz and Paul, Plate 2, H. 12); the lateral surfaces of segments two and three have one rather large white spot and the ventral surfaces of segments one and two have two white spots each, one on each side of the medium venter.

LIFE CYCLE SUMMARY

Stages	Egg	Larval	Prepupal	Pupal	Adult	Complete
Minimum time ..	2 days	16 days	3 days	7 days	2 days	30.5 days
Maximum time..	6 days	59 days	10 days	20 days	13 days	108 days
Average time	4 days	27.6 days	5.06 days	13.83 days	9.05 days	59.54 days

The life periods are graphically shown in the "Life Cycle Chart". This and the "Temperature During Studies" graph should be studied together, thus comparing the various periods of each stage under different temperatures. The shortest period required to pass a complete life cycle was thirty-three days, which was during June and the first part of July. The maximum or longest period required was a hundred and eight days, during February, March, April and part of May. The general average period for completion was fifty-nine days.

The temperatures prevailing during the growth of this insect may be had from the graph "Temperature During Studies".

The author wishes to call the reader's attention to the temperatures during March, which were the lowest of any. The development of the larvae was on an average extremely slow. The eggs from which these caterpillars hatched were sent to the Station from Vero Beach. So they were reared away from their nativity as well as being in a colder region. In June the author went to Vero Beach to collect data on them in a more congenial

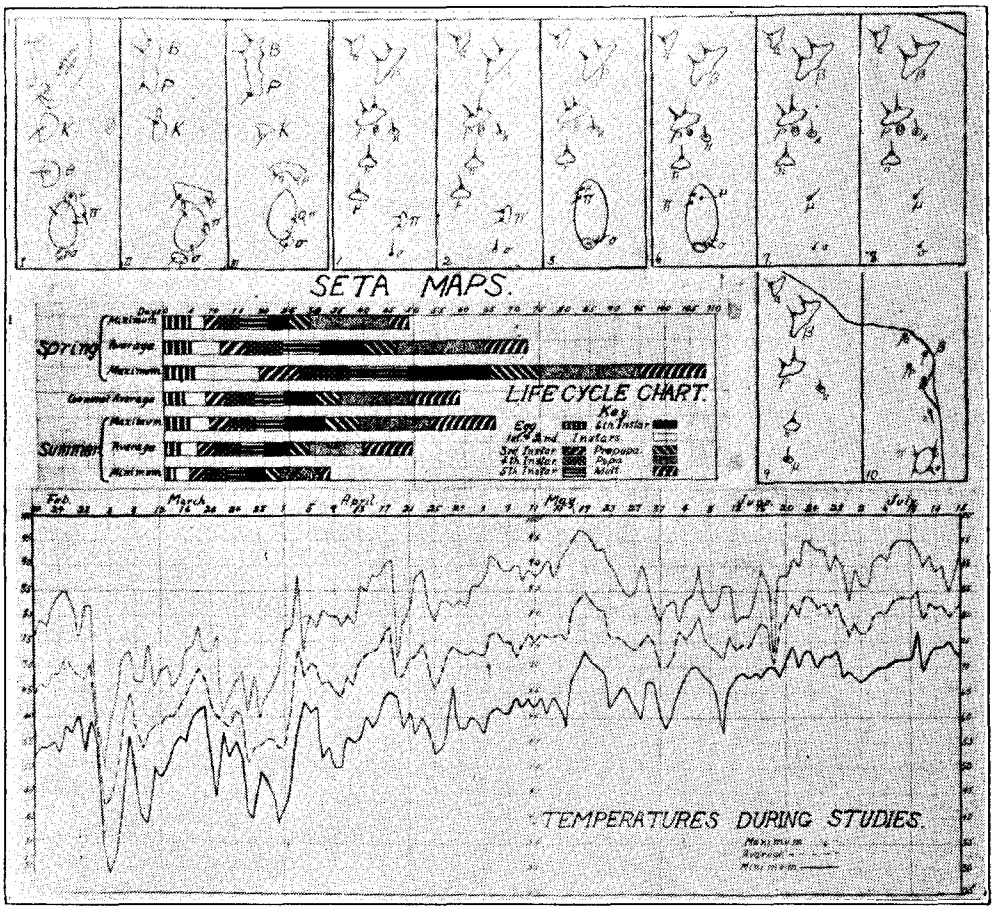

PLATE II

climate. He was able to observe the laying of the eggs, also to collect several groups to bring back and continue the studies. The growth of these last was much more rapid and the temperatures were higher and more constant. The minimum during the latter period continues at about the same temperature level as the maximum in the earlier period. One female, observed laying, spent thirty minutes in the deposition of thirty-five eggs. The depositing of the eggs was not observed to occur

before three P.M., nor after five-thirty P.M. Likewise the adults do not emerge from the pupae during any part of the day except from one-thirty to four-thirty P.M. No emergence of adults nor laying of eggs was observed at any other times of the day.

CONTROL

Natural controls have proven inadequate. During very moist weather some entomogenous fungi and bacterial diseases have a tendency to decrease their numbers, but to such a small extent that it is unnoticed and cannot be depended upon to hold these insects in check. No insect parasites were found.

Liquid sprays, too, have been discarded on account of their inability to spread and stick to the waxy foliage of the oleander. People combatting this insect have found best control by dusting. The dust is best applied when the foliage is dry, and a liberal covering is necessary, especially when the larvae are present. Calcium arsenate is a good dust to use. Another dust, composed of one pound of lead arsenate to about four to seven pounds of hydrated lime, also gives good results. The life history studies would indicate that during the summer these dustings should be repeated about every thirty days; during the winter every ninety days should suffice. Paris green has also been used with good results. This should be mixed with hydrated lime in the same proportions and applied under the same conditions as the lead arsenate.

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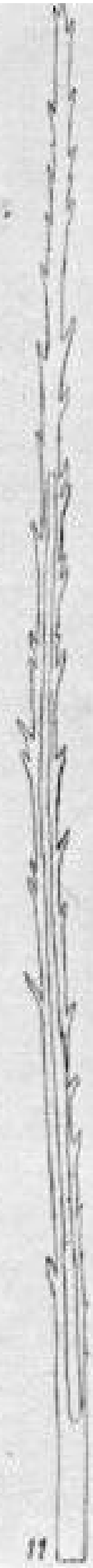
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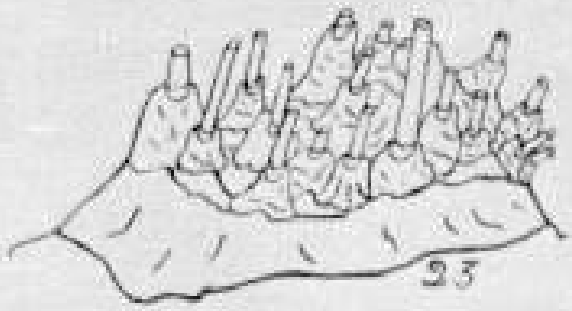
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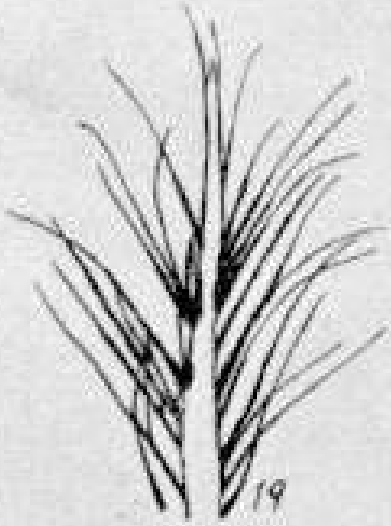
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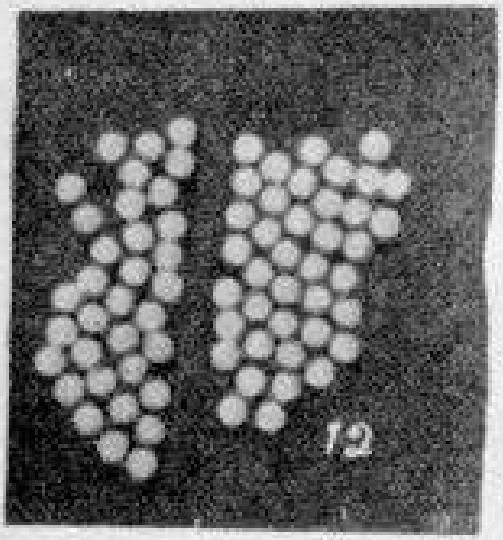
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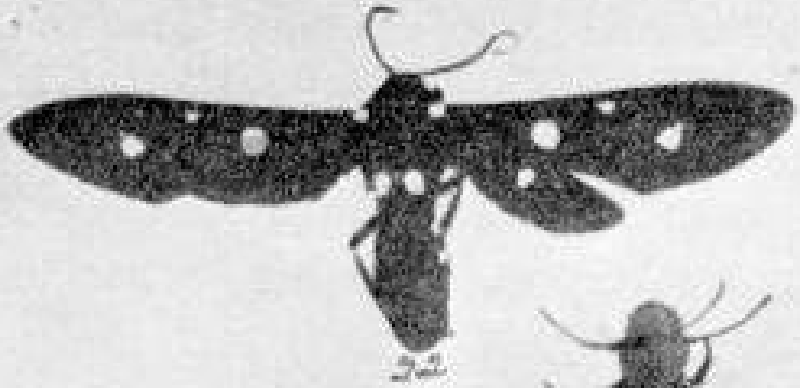
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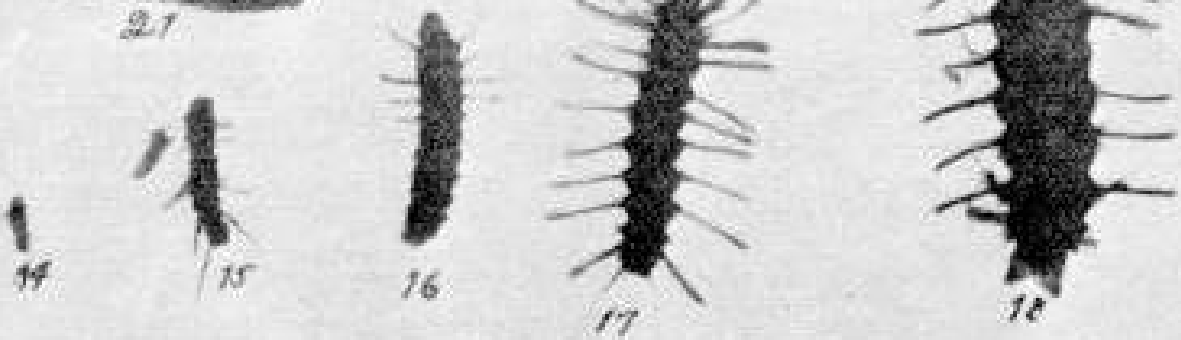
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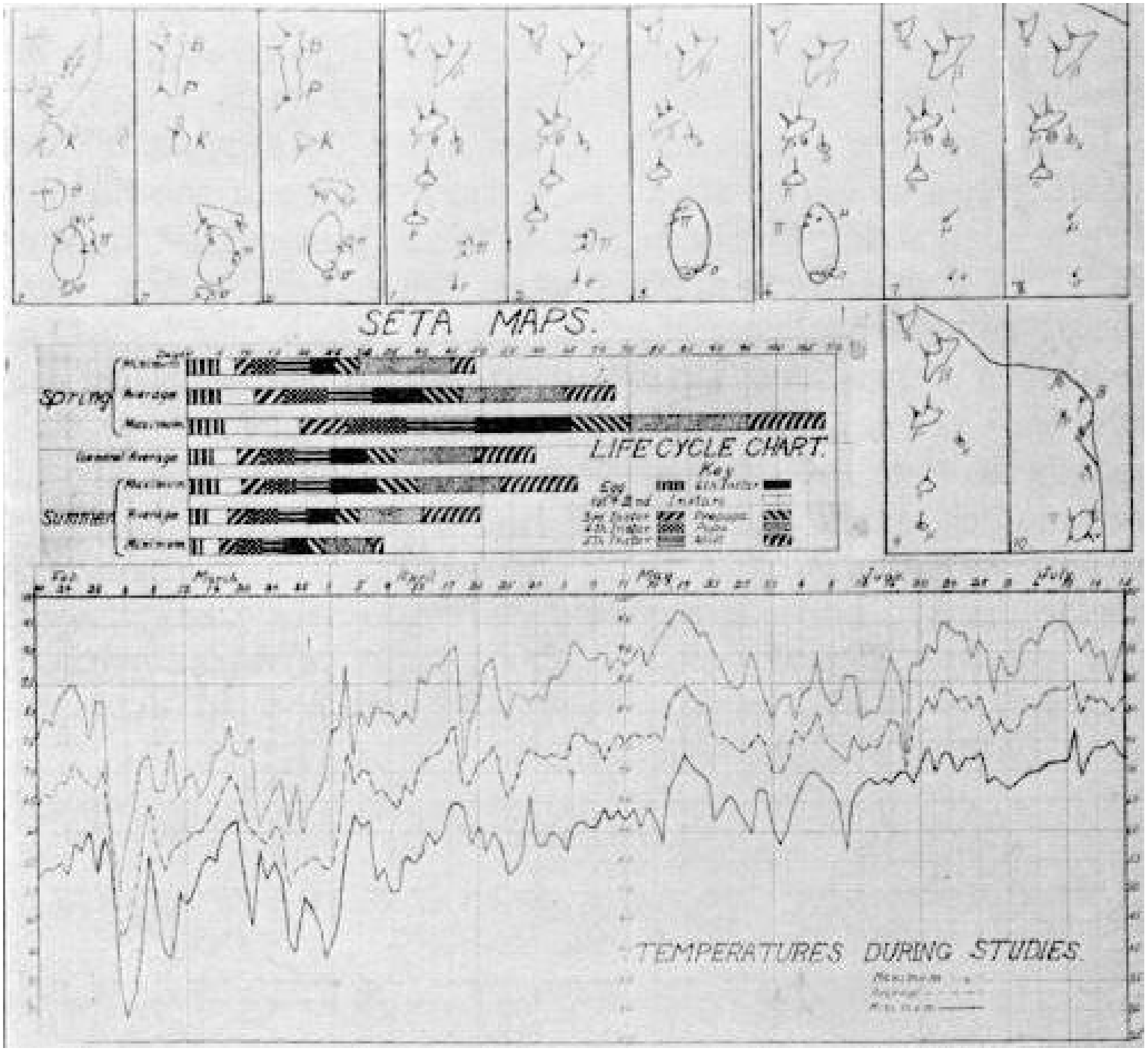
SETA MAPS.
LIFE CYCLE CHART.
Spring
Summer
General Average
Key
Egg
Larva
Pupa
Adult
TEMPERATURES DURING STUDIES.

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ON THE BIOLOGY OF LIMONIA (DICRANOMYIA) FLORIDANA (OSTEN SACKEN)

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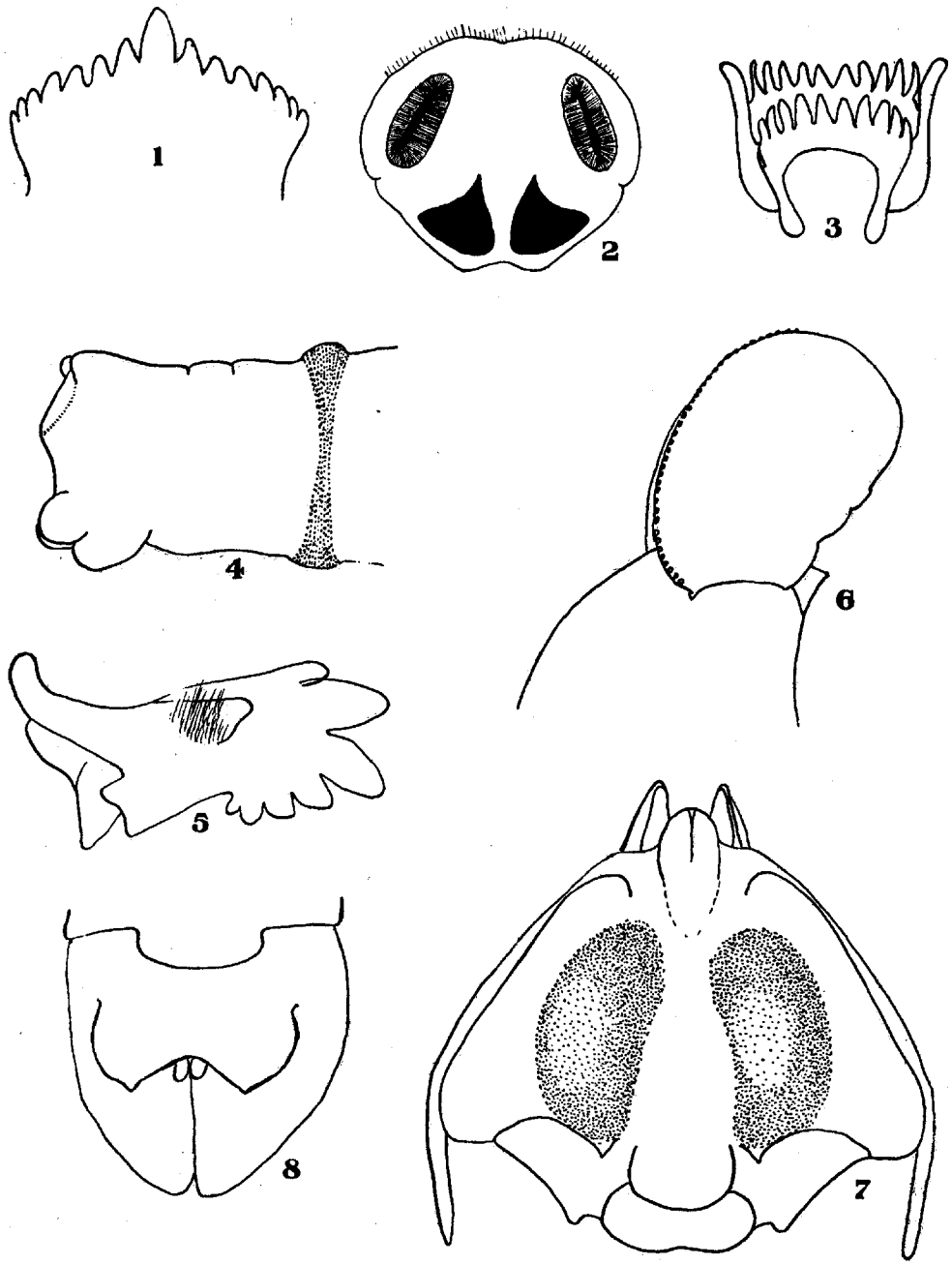
Limonia (Dicranomyia) floridana was described by Osten Sacken[1] from specimens taken by him in Florida, probably in the vicinity of Jacksonville, in 1858. Subsequent records appear to restrict the range of this species to the southern Atlantic and eastern Gulf coasts of the United States with specimens reported from Maryland, District of Columbia, Virginia and South Carolina. In Florida, Johnson[2] records the species from Jacksonville and I have specimens from Dade County and from Manatee, Sarasota and Levy counties on the West Coast.

This is the only Florida crane-fly known to have a marine or semi-marine habitat. All the adults that I have taken were swept from the Juncus *(Juncus Roemerianus)* marshes of brackish tidal flats. Here they are often abundant in late December and January and may be flushed in midge-like swarms as one walks or wades across the tidal flats. Although occasional specimens have been collected in June and August and,

[1]Osten Sacken, C. R., Monographs of the North American Diptera: Part IV; Smithsonian Miscellaneous Collections 219, 1869: 67, as *Dicranomyia floridana.*

Recently, Alexander (Alexander, C. P., Philippine Journal of Science, 40, 1929: 239-248) has made *Dicranomyia* Stephens a subgenus of *Limonia* Meigen.

[2]Johnson, C. W., Insects of Florida. I. Diptera; Bulletin American Museum of Natural History, 32, 1913: 41.



EXPLANATION OF FIGURES

1. Mentum of larval head capsule, ventral view.
2. Spiracular disk of larvae, caudal view
3. Hypopharynx of larval head capsule, dorsal view.
4. Caudal end of larva, side view, showing anal gills.
5. Left mandible of larval head capsule, mesal surface.
6. Pronotal breathing-horns of pupa, side view.
7. Head of pupa, ventral view. The apices of the pronotal breathing-horns are shown on either side of the median cephalic crest.
8. Cauda of male pupa, dorsal view.

at times of greatest abundance, specimens have been taken a few hundred yards inland, the species is largely confined to the Juncus flats and the typical season for the adult stage is the mid-winter months.

The larvae and pupae occur in the coarse, matted algal tufts that grow on the exposed roots and lower stems of the Juncus and in the carpet of the same algae that forms a tough, tenacious film over much of the surface of the flats within the Juncus zone. This algae is submerged for several hours (3-5, or more) at high tide by brackish, or, in some cases, nearly pure sea water. I have no measurement of the degree of the salinity but have noted jelly fish and ctenophorans in large numbers immediately above the spots from which larvae and pupae of *L. floridana* were taken. At low tide, these flats abound with fidlar crabs and many polychaete worms, close to *Neries,* burrow among and beneath the Juncus roots. In the algal tufts that harbor the crane-fly larvae and pupae are also found many amphipods and several species of other dipterous larvae including *Psychoda* and one or two representatives of Chironomidae.

The adults are largely diurnal and may be found mating and ovipositing during most of the daylight hours. Their flight is among or just above the slender, waist-high, erect spikes of the rushes and is of short duration, the flies soon alighting, head up, on the vertical stems. Mating often takes place on these stems without preliminary flight but copulating pairs are easily flushed and often seen on the wing. Mating was noted at all periods of the day but at low tide the males were often found on the lower stems and many pairs that included very teneral females were seen on or just above the algal tufts at the bases of the stems. Oviposition takes place at low tide when the algae are exposed. In all the cases observed, the eggs were placed, apparently one at a time, a few millimeters apart in the algal tufts that sheathed the bases of Juncus stems; however, very young larvae have been taken from the algal carpet on the soil between the stems, and females, apparently searching for sites for oviposition, are frequently found walking over this algal carpet. The oviposition is quite like that of other members of the genus, and a succession of 5-12 eggs is laid in one small area before the fly walks or flies to another, nearby site.

During the period of great adult abundance, many individuals are to be found dead in spider webs that extend in loose

straggling fashion between the tips of the Juncus stems, and many others fall a prey to the numerous individuals of Zygoptera that hunt about the tidal flats and rest on the tips of the Juncus stems.

Most of the larvae and pupae were obtained by gathering algae at low tide, washing it clean of silt and examining small tufts in clear water. With this treatment all of the larvae were found immovable within their tubes and deep within the algal tufts. When, at high tide, small tufts or films of algae were gently freed beneath the water and transferred into small dishes of water, the larvae were frequently found at the surface of the algae, and feeding upon the distal end of a filament. These larvae usually had a small bubble of air in contact with their spiracular disks and such air bubbles were retained for several hours by larvae that were submerged in a dish of brackish water where they fed upon the green terminal filaments of algae.

Mats of algae, wet but not saturated with brackish water, were taken from the tidal flats of the Manatee River on January 6, 1929 and carried to Gainesville. There tufts of the algae were strewn on sand saturated with the brackish water and kept wet but not submerged. Several of the larvae pupated between January 29 and February 1; of these pupae a female emerged February 7 and a male February 8, giving a pupal duration at out-of-door temperature of 7-10 days. Rearing was repeated in 1932 when larvae obtained Dec. 27, 1931 was brought to Gainesville and pupated January 19. Two females emerged January 25. On both occasions some of the larvae were placed in the original algae and partially submerged in *fresh tap water*. Here, although the algae was soon killed, several nearly mature larvae pupated and later emerged as normal adults.

Limonia floridana is of interest as the only Floridian representative of the small but rapidly growing list of crane-flies whose habitats are known to be conditioned by marine associations. Until 1924 no member of the Tipuloidea had been reported from such a habitat; then Pierre took two pupa of *Psiloconopa marina* from the tidal zone on the northern coast of France. Next, Saunders[3] published on the life history of *Limonia (Dicranomyia) signipennis* (Coquillet) taken from the

[3]Saunders, L. G., Some Marine Insects from the Pacific Coast of Canada, Annals Entomological Society of America, 21, 1928: 521-545.

tidal zone of the rocky shore line of Vancouver Island and again[4] on the early stages of *Limonia (Geranomyia) unicolor* (Halliday), whose larvae and pupae were found in the filamentous algae on a stone breakwater on the coast of Wales. Then Masaaki Tokunaga[5] reported the immature stages of three species of crane-flies: *Limonia (Dicranomyia) monostroma* Tokunaga, *Limonia (Idioglochino) tokunagai* Alexander, and *Limonia (Dicranomyia) trifilamentosa* Alexander, as occurring in and feeding upon the algae, *Monostroma* sp., of the tidal zone of both rocky and sandy coast line of Seta, Japan. Lastly, Mr. F. W. Edwards has found the immature stages of a cranefly occurring in the tidal zone of the coast of southern Chile. None of these larvae or pupae appear to show any structural modification to marine or tidal zone life and differ in no significant way from those of related species whose larvae and pupae have fresh-water or moist terrestrial habitats. Certainly the larvae and pupa of *Limonia floridana* differ no more from the corresponding stages of the species of the subgenus *Dicranomyia* that inhabit fresh-water algae or terrestrial mosses than these differ from each other.

DESCRIPTION OF THE IMMATURE STAGES

Last Larval Instar

Length, 11-13 mm.; diameter, 0.8-1.0 mm. Form terete, thickest at mid-length, tapering slightly before anterior and posterior ends; caudal end truncate, cephalic end broadly rounded. Color in life, translucent pale green, head capsule and creeping welts brown, spiracles and marks of spiracular disk black. Preserved specimens wholly opaque; greyish white save for markings of disk. Spiracular disk (fig. 2) comparatively large for genus, its greatest diameter about one third of the eighth abdominal segment, indistinctly 4-lobed, faces of the ventral lobes each with a large triangular, jet-black spot, dorso-mesal angles of these spots prolonged. Anal gills (fig. 4) short, bluntly rounded, their diameter nearly as great as total length. Creeping welts as in this genus; those on abdominal somites 1-7 well developed, conspicuous; the rings of points on thoracic somites 2-3 and abdominal somite 8, reduced, scarcely apparent without magnification.

Head capsule: length, 0.6 mm.; width, 0.4 mm. Form as in genus. Mandible (fig. 5) with 5 ventral teeth; mentum (fig. 1) with 15 teeth; tips

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[4]Saunders. L. G., The Early Stages of *Geranomyia unicolor* Haliday, A Marine Tipulid, Entomologist's Monthly Magazine, 46, 1930: 185-187.

[5]Tokunaga, Masaaki, The Morphological and Biological Studies on a New Marine Crane-Fly, *Limonia (Dicranomyia) monostromia*, from Japan, Memoirs of the College of Agriculture, Kyoto Imperial University, 10, 1930: 1-93, plates 1-27.

of lateral teeth evenly receding to lateral margins of mentum. Hypopharynx (fig. 3) with 10 teeth on each plate, teeth of posterio-ventral plate nearly as long as those of anterio-dorsal plate.

Earlier Stages

All early stage larvae that have been taken resemble the last instar larvae in all respects save size. What instars they represented is unknown. Measurements of four of these younger larvae are as follows: a, length, 4.2 mm.; diameter, 0.4-0.5 mm.; b, length 6.4 mm.; diameter 0.6 mm.; c, length, 7.5 mm.; diameter, 0.7 mm.; d, length, 9.5 mm., diameter, 7.5 mm.

Pupa (Figs. 6, 7, 8)

Total length, 7.3 mm.; width (dextro-sinistral), 1.0 mm.; depth (dorso-ventral), 1.0 mm.; length of pronotal breathing horn, 0.5 mm. Color in life greenish white, the tarsi, tibia, wing pads, cauda and breathing horns changing from yellow brown to dark brown with age, face and dorsum of thorax yellowish brown in older pupae, eyes black. In preserved specimens the greenish white areas become an opaque yellowish white.

Head slightly longer than broad; distinct, median, smooth, rounded cephalic crest between antennal bases. Antennal sheaths smooth, extending slightly cephalad of bases of wing pads; flattened meso-ventral angles of genae rounded. Labial sheaths with slight median notch on ventral margin; maxillary sheaths with distinct notch on bases of ventral margins.

Pronotal breathing horns (fig. 6) strongly compressed; lateral faces convex, mesal faces concave; in lateral view subreniform, broadest near apex; pores along dorsal margin distinct with low magnification. Mesonotum of thorax smooth, rounded; low median ridge on prothorax. Wing pads extending to about midlength of 2nd abdominal somite, venation not distinct; tarsal tips coterminal at caudal margin of 3rd abdominal somite.

Abdomen with dorsum and sternum concolorous with pleura; abdominal welts on terga 3-7, sterna 4-7, not protuberant. Cauda chitinized, brownish to dark brown. Male cauda as shown (fig. 8).

A ROSE CHAFER ATTACKS CITRUS

Occasionally a comparatively rare insect suddenly appears in large numbers, usually very locally, and may temporarily become a pest of some importance on a cultivated crop. Such an instance occurred in February of this year, the culprit in this case being a Scarabaeid, *Macrodactylus angustatus* (Beauv.), and the victim citrus trees.

This beetle appeared in immense numbers in a grove in Manatee County and fed seriously on the young and tender foliage, buds and blossoms. The insect is uncommon in Florida. There were previously no specimens in the collection of the Agric. Experiment Station and Dr. W. S. Blatchley, who has collected Coleoptera in Florida more extensively than any one else, reports that he has never taken it. He lists it in his Scarabaeidae of Florida (Florida Entomologist, Vol. XIII, No. 4, p. 71) as having been reported from Florida by Schaupp (1878), and at Enterprise by Dietz. J. R. W.

of lateral teeth evenly receding to lateral margins of mentum. Hypopharynx (fig. 3) with 10 teeth on each plate, teeth of posterio-ventral plate nearly as long as those of anterio-dorsal plate.

Earlier Stages

All early stage larvae that have been taken resemble the last instar larvae in all respects save size. What instars they represented is unknown. Measurements of four of these younger larvae are as follows: a, length, 4.2 mm.; diameter, 0.4-0.5 mm.; b, length 6.4 mm.; diameter 0.6 mm.; c, length, 7.5 mm.; diameter, 0.7 mm.; d, length, 9.5 mm., diameter, 7.5 mm.

Pupa (Figs. 6, 7, 8)

Total length, 7.3 mm.; width (dextro-sinistral), 1.0 mm.; depth (dorso-ventral), 1.0 mm.; length of pronotal breathing horn, 0.5 mm. Color in life greenish white, the tarsi, tibia, wing pads, cauda and breathing horns changing from yellow brown to dark brown with age, face and dorsum of thorax yellowish brown in older pupae, eyes black. In preserved specimens the greenish white areas become an opaque yellowish white.

Head slightly longer than broad; distinct, median, smooth, rounded cephalic crest between antennal bases. Antennal sheaths smooth, extending slightly cephalad of bases of wing pads; flattened meso-ventral angles of genae rounded. Labial sheaths with slight median notch on ventral margin; maxillary sheaths with distinct notch on bases of ventral margins.

Pronotal breathing horns (fig. 6) strongly compressed; lateral faces convex, mesal faces concave; in lateral view subreniform, broadest near apex; pores along dorsal margin distinct with low magnification. Mesonotum of thorax smooth, rounded; low median ridge on prothorax. Wing pads extending to about midlength of 2nd abdominal somite, venation not distinct; tarsal tips coterminal at caudal margin of 3rd abdominal somite.

Abdomen with dorsum and sternum concolorous with pleura; abdominal welts on terga 3-7, sterna 4-7, not protuberant. Cauda chitinized, brownish to dark brown. Male cauda as shown (fig. 8).

A ROSE CHAFER ATTACKS CITRUS

Occasionally a comparatively rare insect suddenly appears in large numbers, usually very locally, and may temporarily become a pest of some importance on a cultivated crop. Such an instance occurred in February of this year, the culprit in this case being a Scarabaeid, *Macrodactylus angustatus* (Beauv.), and the victim citrus trees.

This beetle appeared in immense numbers in a grove in Manatee County and fed seriously on the young and tender foliage, buds and blossoms. The insect is uncommon in Florida. There were previously no specimens in the collection of the Agric. Experiment Station and Dr. W. S. Blatchley, who has collected Coleoptera in Florida more extensively than any one else, reports that he has never taken it. He lists it in his Scarabaeidae of Florida (Florida Entomologist, Vol. XIII, No. 4, p. 71) as having been reported from Florida by Schaupp (1878), and at Enterprise by Dietz. J. R. W.

INSECTS OF THE WINTER, 1931-32*

As you all know, this has been a very unusual winter, very warm and very dry, but with an unusually large number of foggy mornings. As to how warm and how dry, the following table will show. The data here given are for Gainesville, but will serve to illustrate conditions which have been state wide.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Mean Temperature '31-32	.....	.....	67.8	68.7	65.0	67.3
Normal	.....	.....	62.4	58.1	57.8	58.4
Departure	.....	.....	+5.4	+10.6	+7.2	+8.9
Precipitation '31-32	1.41	.16	.49	.84	1.41	1.90**
Normal	5.65	2.84	2.04	3.22	3.31	2.87
Departure	—4.24	—2.68	—1.55	—2.38	—1.90	—.97

Comparing these temperatures with those normal for March (63.7), and April (69.3), it will be seen that each of the months from November to February inclusive were but a few degrees (4.3 to .6) cooler than the average April and distinctly warmer than the average March. Under these circumstances it is to be expected that many insects which commonly do not make their appearance until April should have appeared much earlier this year. The following notes record several such insects.

Orthaea spp.—The Strawberry Pameras, which seldom give any trouble until about April, have been very troublesome. Complaints were received from the Plant City section in early January, and in late February they became very numerous in the Alachua and Bradford County strawberry section. The most common species was *O. vincta* but *O. longulus* was also noted.

Red Spiders were abundant, especially *Tetranychus yothersi,* the Camphor Red Spider. Never has the writer seen the camphor trees so severely and generally russeted as now. Practically every tree shows the yellowish brown color characteristic of the attacks of this spider mite.

The Six-spotted mite became rather common on grapefruit

*Given before Fla. Ent. Soc. J. R. Watson.

**All but .02 of this fell after the 19th of the month, on which date the drought can be considered as being ended.

trees in many sections of the state as early as February. During the same month Mr. F. W. Walker reported the Purple Mite, *Paratetranychus citri,* as common on satsumas as far north as Monticello.

As usual during warm winters, the Celery Leaf Tyer, *Phlyctaenia ferrugalis,* became very abundant in the Sanford area from December on. The Semi-tropical Army-worm, *Xylomyges eridania,* was also abundant on the celery at Sanford and on golf courses and other grassy places south of there. It was not noted about Gainesville.

Cabbage worms were unusually troublesome all winter. They were mostly the Cabbage Looper, *Autographa brassicae,* the Cabbage Plutella *(P. maculipennis),* and the larvae of the Gulf White *(Pontia monuste),* tho some *Pontia rapae* were seen. The first two are usually rather common during a normal winter but the *Pontias* are usually not noted before April.

The adults of the Pecan Twig Girdler *(Oncideres cingulata)* were taken as late as early January.

Perhaps the most unusual of all was the discovery of newly emerged moths of the Velvet Bean Caterpillar *(Anticarsia gemmatilis).* The earliest previous date of the taking of this moth in Florida was April 28 on the shores of Lake Okeechobee. This year they were seen at Gainesville and Citra on March 4. During most winters this insect is exterminated over most of Florida, starved out by the killing of its host plants, velvet beans, kudzu, *Cannavalia,* Soy Beans, and peanuts, which are all very sensitive to frost.† This is the first winter that this insect has been definitely known to survive anywhere in Florida, tho doubtless it frequently, if not usually, overwinters in extreme south Florida. That it was able to survive this winter as far north as Gainesville is doubtless due to the fact that no killing frost has occurred and volunteer plants of its hosts have been available for food.

Entomogenous fungi have been more active than during any previous winter we have known. The Red Aschersonia *(A. aleyrodis* Webber) and the Brown Whitefly Fungus, *Aegerita webberi* Fawcett, have been producing spores. The scale-infesting fungi, especially the Red-Headed Scale-Fungus, *Sphaerostilbe aurantiicola* (B. et Br.) Petch, the White-Headed Scale-Fungus, *Podonectria coccicola* (E. et E.) Petch, and the Black Scale-Fun-

†Bull. 130, Fla. Agric. Exp. Sta.

gus, *Myriangium duriae* Mont., have also been unusually active. It is not so uncommon for these fungi to undergo considerable development during the winter.

Especially active has been the common fungus *(Empusa fresenii* Now.) of the Green Citrus Aphid *(Aphis spiraecola* Patch). Our experience has heretofore been that a warm January, which induces considerable new growth on citrus trees, has usually caused a heavy infestation of aphids the following spring. But this year it has not done so. This is partly due to drought, as is shown by the fact that there are more aphids in irrigated groves and in localities that received somewhat more rain, but the main factor has been the prevalence of this fungus. This *Empusa* is normally active during the summer and is one of the main factors in controlling the aphid during the summer but is usually of little consequence in the early spring. In the spring of 1926 it brought the aphid under control in April but this has been the earliest date recorded heretofore.

The unusual development of these entomogenous fungi is undoubtedly due to the unusual number of warm foggy mornings which has characterized this winter.

MINUTES OF THE FLORIDA ENTOMOLOGICAL SOCIETY

February 26, 1932

The meeting was called to order by President Byers at 4 o'clock P.M. The following members of the Society were present: Dr. Berger, Professor Watson, Professor Dickey, Mr. Bratley, Dr. Tissot, Mr. Merrill, Mr. Calhoun, Dr. Byers, and Professor Creighton. There were three visitors present: Mr. Chester, Mr. Mulrennan, and Mr. Holland.

Dr. Byers read a letter from Dr. Johanssen, of Cornell, who asked that Dr. Byers attempt to arouse the interest of the members of this Society in the trip to Europe for the meeting of The International Congress, to be held in Paris, during the summer of 1932. Anyone desiring information concerning this matter may obtain same by writing to the Secretary of the Society.

President Byers then called for the report of the Business Manager.

As is customary, the officers for the ensuing year were elected: President, Dr. Tissot; Vice-President, Dr. Berger; Business Manager, Mr. Bratley; Member of the Executive Commit-

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tee, Dr. Byers; Editor of THE FLORIDA ENTOMOLOGIST, Professor Watson; Assistant Editor of THE FLORIDA ENTOMOLOGIST, Dr. Berger.

The paper of the evening was by Professor Watson on the influence of the present abnormal winter on insect life.

JOHN T. CREIGHTON, Sec'y.