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Sunflower Insects in California and South Africa

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FRANCIS MARION WEBSTER.

Canadian Entomologists had long regarded Mr. F. M. Webster as one of themselves, and the mutual warm friendship and sympathy grew with years. His sudden death in Columbus, Ohio, on January 2nd came, therefore, as a shock to those of us who enjoyed his friendship and benefited by his ripe experience. It was my good fortune to sit with him during the joint "smoker" of the Association of Economic Entomologists and the Entomological Society of America at Columbus, Ohio, after my address on the evening of December 29th, and he left me, laughing in his usual happy manner, to retire for the night. A few hours later pneumonia suddenly developed, and it ran a fatal course with astonishing rapidity.

Although he was born in 1849, in Lebanon, N. H., and had led a strenuous life, his mind was active, his zeal for the extension of his work was stimulating and his broad grasp of the details of his work was undiminished. He belonged to, and was one of, the most worthy of that splendid class of older workers in economic entomology to whom our science owes so much, both by their example and by the thorough character of much of the work they have bequeathed to us.

His first official position was that of Assistant State Entomologist of Illinois in 1882, and he brought with him the rich experience of a keen observer and a practical agriculturist, a mental equipment which always impressed itself upon the character of his subsequent work. From 1884 to 1892 he served as special field agent to the United States Department of Agriculture, and it was largely while working in this capacity that a large part of his best original work was effected. From 1886 to 1890 he was engaged on his well-known investigations in the valley of the lower Mississippi River on the buffalo gnats and their suppression. In 1888 he visited Australia in company with Kœble, who was seeking the natural enemies of the citrus fluted scale, and he also paid visits to Tasmania and New Zealand. His work on the

Flowers and insects
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Hessian Fly and other insects affecting field crops, which established so securely his reputation as an investigator and as an authority on this group of insect pests, was carried out mainly during the years 1891 to 1902, when he held the position of Entomologist to the Ohio State Experiment Station. During 1903-04 he was attached to the Biological Survey of Illinois.

After so many years of fruitful preparation he went to Washington and joined the Bureau of Entomology of the United States Department of Agriculture in 1904, and two years later the section of Cereal and Forage Insect Investigations was created and he was given charge of that important section of the activities of the Bureau. From a single assistant his staff increased to more than fifty trained men, and the last appropriation for his work (1915-16) amounted to \$114,500, figures that indicate the zeal with which he devoted himself to his work. He was one of the first to recognise the importance of the establishment of field stations, and at the time of his death he was directing the work of about eighteen such stations in the different States of the Union.

His connection with Canadian entomology was a long and valuable one. The October number of THE CANADIAN ENTOMOLOGIST of 1888 contained his first contribution—a very characteristic letter—his last appeared a week or two before his death. He was elected an Honorary Member of the Entomological Society of Ontario in 1899, and his connection with the Society was one of which he always spoke with pride and genuine comradeship, for it meant an additional bond with some of his best friends. We shall always remember the pleasure of his company and the practical address he gave at the Jubilee Meeting of our Society in 1912, his last visit to Canada. In our work we shall miss his counsel and co-operation, but we shall be stimulated by his example, and he will always be remembered as one who was ever ready to assist and whom we counted it as a privilege to number among ourselves.

C. GORDON HEWITT.

POPULAR AND PRACTICAL ENTOMOLOGY.

ERADICATION OF THE BEDBUG BY SUPERHEATING.

BY W. A. ROSS, FIELD OFFICER, DOMINION ENTOMOLOGICAL
LABORATORY, VINELAND STATION, ONT.

Our experience with superheating as an effective method of controlling the Mediterranean Flour Moth (*Ephestia kuehniella*)

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led us to believe that the same measure would prove to be a specific for the Bedbug (*Cimex lectularius*) and other household insects. In the month of July, 1914, we had an opportunity of testing this likely remedy in a boarding-house, badly infested with *Cimex*, and the results came up to our best expectations.

The house was an eight-roomed, two-storey frame building, situated near Vineland, Ontario, and was furnished with iron and wooden bedsteads, varnished dressing tables, plain and varnished tables, chairs and the usual bric-a-brac. The heating system consisted of a hot-air furnace in the basement, with shafts leading into all the rooms, and a kitchen stove and parlour heater on the first flat.

The fires were started at 9.30 a.m., thermometers were placed in different parts of the house and the temperatures were noted every hour. The following table shows a record of the temperatures in three of the bedrooms on the upper storey:

Time	No. 3	No. 4	No. 5
9.30	78 F.	77 F.	78 F.
10.30	94	82	92
11.30	104	95	102
12.30	114	99	117
1.30	130	109	126
2.30	138	115	136
3.30	146	122	142
4.30	148	127	148
5.30	152	138	149
6.30	162	140	158
7.00	160	140	154
7.30	159	140	153

Outside temperatures: Maximum, 73 F. Minimum 64 F.

Thermometers: No. 3—On wall in 1st infested bedroom.

No. 4—On bed in 2nd infested bedroom.

No. 5—On wall in 3rd infested bedroom.

At 1.30 p.m. many of the adults and nymphs had succumbed, and by 4.30 p.m. they were all dead. However, the heating was not discontinued at this point, but was prolonged until 7.30 p.m. because it was considered probable that it would take a longer

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exposure to destroy the eggs. The results obtained from this treatment were very gratifying—the bedbugs in all stages were wholly eradicated and the house furniture was not damaged in the slightest degree.

It is more than probable that the above noted temperatures were unnecessarily high, and that the superheating would have been equally effective if the temperature had been maintained between 120 F. and 130 F.

SUNFLOWER INSECTS IN CALIFORNIA AND SOUTH AFRICA.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

On August 16th, 1915, I had an opportunity to collect and study the insects on *Helianthus lenticularis*, the common wild sunflower, at Orange, California. The plants grow commonly by the roadside, where, at this season of the year, they are practically the only wild flowers to be seen. I was unable to find any characters on which to separate the Californian Sunflower from that of Colorado. There was a good deal of variability, thus three plants growing close together showed:

(a). Rays 20, short and broad, obtuse, 34 mm. long, 14 broad, light orange, suffusedly deeper basally.

(b). Rays 21, acute, 29 mm. long, 7.5 broad, coloured nearly as in a.

(c). Rays 18, long, length 40 mm., width 9.5, entirely uniform deep orange. No wild *H. lenticularis* was noticed between San Francisco and Santa Barbara, but the plant was abundant by roadsides in the region round Los Angeles, and also about cultivated fields in the San Diego region.

The object of my investigations was in part to determine, if possible, whether *H. lenticularis* was really a native of California. On reviewing the insect fauna, it appears to show less special adaptation than that on the Rocky Mountain sunflowers, and tends to support the view that the species has been introduced.

The sunflower fauna at Orange, as obtained on August 16th was as follows:

Hymenoptera

Halictus armaticeps Cresson. Six females, collecting pollen.

Halictus nevadensis Crawford. Three females.

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[*Halictus*
Agapostemon
Meliriodes
Pseudonelecta
Diadasia

Halictus helianthi, n. sp. One female.

Length about 4 mm., anterior wing 3 mm.; head and thorax dark green, abdomen and legs piceous; hind margins of abdominal segments obscurely reddish; pubescence dull white; wings hyaline, iridescent, nervures and stigma testaceous. Head ordinary; eyes converging below; mandibles dark ferruginous, black at base; antennae dark, flagellum obscurely reddened beneath apically; tegulae piceous, strongly punctured; mesothorax dullish, finely and distinctly punctured; area of metathorax delicately sculptured.

Microscopic characters: Front densely punctured; a delicate keel between antennae; tegulae well punctured; mesothorax reticulated between the punctures, which are well separated on disc; area of metathorax with few, delicately wrinkled plicae, on a minutely reticulate surface, and with no sharp or shining edge posteriorly; scutellum rather sparsely punctured; abdomen with very minute scattered punctures, close to *H. perparvus* Ellis from Arizona, but *perparvus* differs thus: Mesonotum yellow-green, contrasting with the dark blue-green of rest of thorax (in *helianthi* no marked contrast; mesothorax is an obscure olive green); second and third abdominal segments not, or not noticeably, punctured (in *helianthi* very distinctly punctured in the sub-basal region, where the pigmentation is strongest); plicae of area of metathorax of same general type, but larger and more numerous, and the minute reticulation is stronger and yet more minute, producing the appearance of a very finely malleate surface (in *helianthi*, especially apically, there are very delicate mainly transverse lines); plumose hairs on posterior face of metathorax shorter. (The nearest relative in Southern California is *H. tegulariformis* Crawl., which I took at La Jolla in August; this is larger than *helianthi* and has the mesothorax brighter, yellowish green.)

Agapostemon texanus Cresson. Two females.

Melissodes aurigena Cresson. One female, collecting pollen; 7 males, three of them denuded.

Pseudomelecta californica Cresson. One female.

Diadasia enavata Cresson. One female, collecting pollen.

The absence of any species of *Andrena* and *Megachile* is noteworthy. A single *Bombus* was seen on the flowers, but not captured. No honey-bees were on the flowers, though they were in the vicinity.

Small Tormids were present; one had been captured by a Thomisid spider.

COLEOPTERA.

Desmoris constrictus Say. Grey sunflower weevils were in some numbers; I did not feel sure on casual inspection that they were identical with our Colorado *D. constrictus*, but Mr. H. C. Fall kindly informs me that they belong to that species.

A single *Diabrotica* was seen.

LEPIDOPTERA.

Eupithecia sp. Small yellow geometrid larvæ were common on the flower heads, feeding on the rays, which they resembled in colour. I bred from one of them a small *Eupithecia*, not yet determined. This is the best example of a specially adapted insect apparently peculiar to the Pacific Coast region, in the series. It may however, have lived originally on one of the native yellow-rayed compositæ.

A single *Pyrameis* was seen on the flowers, but no other butterflies.

HEMIPTERA.

Acholla tabida Stal. Common; one had captured a small *Halictus*.

Determined with the aid of advice from Dr. Van Duzee.

Lygus pratensis L. One.

The absence of *Phymata* was noteworthy.

An aphid of the genus *Macrosiphum* was abundant on the sunflowers in one place. I referred specimens to the University of California, and Mr. Swain, who examined them, considers them "nearest to *M. sonchi* L." They are, however, certainly not *M. sonchi*. *Chrysopa* eggs were found on the aphid-infested plants.

ARACHNIDA.

Spiders, which were numerous on the flowers, included the following, kindly determined by Dr. N. Banks:

Icius vitis Cockerell (Attidæ). Common.

Chiracanthium inclusum Hentz (Clubionidæ).

Tetragnatha laboriosa Hentz. (Tetragnathidæ.)

Runcinia aleatoria Hentz (Thomisidæ.)

Misumana diegoi Keyserling (Thomisidæ.)

The last is a special Californian form, represented, however, by a similar species in Colorado. The first is very widely dis-

tributed in the west; the others are common species of wide range over North America.

In addition to the above, I obtained some small Hymenoptera, etc., which I have not yet tried to determine.

SUNFLOWER INSECTS IN THE TRANSVAAL.

Mr. J. Burt-Davy has been growing the red sunflowers (*H. annuus coronatus*) at Burttholm, Vereeniging, Transvaal, and has found the following lepidopterous visitors to the flower-heads, the first three being the most frequent. I give in brackets the nomenclature of recent revisions:

Plusia orichalcea (*Phytometra orichalcea* Fabricius).

Plusia chalcites (*Phytometra chalcites* Esper.).

Melicleptria armigera (*Chloridea obsoleta* Fabricius).

Plusia exquisita (*Phytometra exquisita* Felder).

Plusia oxygramma (possibly *Phytometra albostrata* Brem. & Gr.; true *oxygramma* is American).

Zinckenia fascialis (*Hymenia fascialis* Cramer).

Audea catocala (*Ulothrionopus catocala* Felder).

Empusada chrysota Hampson.

Coradrena sp.

Thus it appears that in S. Africa sunflowers attract *Plusiines* exactly as they do in this country.

TWO LOCALITY CORRECTIONS.

In the Canadian Entomologist, October, 1915, pp. 329 and 331, Dr. Dietz described two new species of Tipulidæ, which we had sent to him, viz., *Limnobia gracilis* and *Dicranomyia aquita*, the localities given being "Tsolinoi Lake—about five miles north of Athabaska Lake—July 5th, 1914 (F. Harper) and "Fort Resolution, August 24th, 1914 (F. Harper.)" I have been recently informed by Mr. Harper, who collected the specimens, that the localities should be changed to read as follows:

Limnobia gracilis—Tsal-Wor Lake, Saskatchewan, about eight miles from the north shore of Lake Athabaska, at a point midway of its length.

Dicranomyia aquita—District of Mackenzie, along the south shore of Great Slave Lake.

ARTHUR GIBSON,
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