WESTERN LEPIDOPTERA. III.

NOTES ON LEPTARCTIA CALIFORNIAE WALKER.

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Some time ago while looking over the lepidopterological collection of Mr. J. G. Grundel, of Alma, Cal., I was struck by the great range of variation exhibited by *Leptarctia californiæ*, a rather common Arctian in the vicinity of San Francisco Bay. In one series of thirty-eight specimens, all from the same lot of eggs, hardly any two were at all alike, and no two exactly so, although *californiæ* is quite a plainly fashioned insect. The history of *Leptarctia californiæ* well illustrates the numerous troubles caused by a species much given to variation. The genus *Leptarctia* was established by Stretch, in his *Zygænidiæ* and *Bombycidiæ* of North America (p. 119), with *lena* Boisd. (= *adnata* Boisd.) and *decia* Boisd., both of which had been described in the genus *Lithosia*,¹ and a new species, which he called *dimidiata*. These forms he tabulated as follows:

Lower wings red.....	<i>L. decia</i>
Lower wings yellow.....	<i>L. lena</i>
Lower wings black.....	<i>L. dimidiata</i>

These three species we find depicted on plate 5, nine figures of *lena*, three of *decia*, and four of *dimidiata* being given. Stretch was evidently aware of the great amount of variation displayed in *Leptarctia*, as he remarks on page 121, under *L. lena*, "The wonderful variations of this species, show how necessary it is to have a long series of many insects before it is possible to determine the limits of the species. It is possible to select three or four types of the insect under consideration, so unlike each other, that in the absence of intermediate intergradations they might readily be considered specifically distinct; it was indeed a long time before I could satisfy myself of their identity, especially as the shape of the primaries is by no means constant, but the past summer has supplied so many intermediate links that there can be no longer any reasonable doubt." In 1855, however, Walker had described in the British Museum

¹ Five species of *Cithene* were also placed in the same genus by Boisduval. Subsequently he remarks that the three former (*lena*, *adnata* and *decia*) "should perhaps be placed in a new genus near *Nemeophila*."

Catalogue Lepidoptera Heterochroa, *Nemophila californiæ*, which, as Stretch showed in his addenda and corrigenda (p. 240), is the same as *lena* Boisd., of which *adnata* Boisd. was a synonym, and as it has priority, *lena* must itself drop into synomical rank. Packard, Synopsis of the Bombycidæ of the United States, 1864, does not record any of the forms of *Leptarctia*. Stretch, under *L. lena*, wrote, "I strongly suspect that *Pltaarctia modesta*, Packard, is one of the many varieties of this species, although a specimen forwarded to Doctor Packard was returned with this query, 'What is it?' That it is congeneric is, I think, beyond doubt, as the peculiar thoracic markings are minutely given in the diagnosis of *P. modesta*." *Pltaarctia modesta* has, however, turned out to be only a form of *Parasemia plantaginis* Linn., another very confusing and variable species. In 1882 Grote (New Check List of North American Moths) gives *decia*, *lena* and *dimidiata* specific rank, with *californiæ* as a synonym of *lena*. This arrangement concurs with that of the list of the Brooklyn Entomological Society (1881), except that there is no mention of *californiæ* in the Brooklyn list. In 1881 Butler (Ann. Mag. Nat. Hist., Vol. VIII.) describes four more varieties, namely: *Stretchii*, *Boisduvalii*, *latifasciata* and *fulvofasciata*, his descriptions being based on the specimens figured by Stretch. He also retains as valid, the four names already proposed. In 1889 Prof. G. H. French published in the Canadian Entomologist, Vol. XXI., a paper on the "Preparatory Stages of *Leptarctia californiæ* Walker, with Notes on the Genus." In this paper all of these eight names are retained and in addition three new varieties are described. His arrangement may be summarized as follows:

Leptarctia californiæ Walker.

- Var. 1, *stretchii* Butler.
- Var. 2, *boisduvalii* Butler.
- Var. 3, *dimidiata* Stretch.
- Var. 4, *albifascia* French.
- Var. 5, *occidentalis* French.
- Var. 6, *latifascia* Butler.
- Var. 7, *fulvofascia* Butler.
- Var. 8, *californiæ* Walker (Typical).
- Var. 9, *wrightii* French.
- Var. 10, *decia* Boisd.
- Var. 11, *lena* Boisd.

Wood engravings are given of all these, together with a brief description of each form. Later writers have considerably cut down this list. Dyar (Cat. N. Amer. Lepid., 1902) lists but three forms as valid, these being *californiæ* Walker, *decia* Boisd. and *dimidiata* Stretch, the last two being placed as varieties. Holland, in his Moth Book (p. 121, 1903) places *lena*, *decia* and *dimidiata* as forms of *californiæ*. Thus, according to Dyar's list, we find again the three forms originally listed by Stretch, viz.: *californiæ* Walker (*lena* Boisd.), *decia* Boisd. and *dimidiata* Stretch.

The principal variation in the coloration of *Leptarctia californiæ* is in the secondaries, and the amount of black on the same wings is also very variable, from a few black points to uniformity. The variation even extends to the shape of the wings, the primaries being by no means constant. But it is the color variations that have brought *L. californiæ* to grief. The numerous varieties described were but individual variations of a single species as I can find all of the forms now recognized, with all intergradations, and in addition some which would certainly be worthy of being described as new if we were to go by some former standards, in this series of thirty-eight specimens, all from the same female. There is no doubt that we have but a single species of the genus *Leptarctia*, and the synonymy must stand as follows:

Leptarctia californiæ Walker.

- L. lena* Boisd. 1868-'69.
- L. adnata* Boisd. 1868-'69.
- L. dimidiata* Stretch. 1872.
- L. stretchii* Butler. 1881.
- L. boisduvalii* Butler. 1881.
- L. latifascia* Butler. 1881.
- L. fulvofascia* Butler. 1881.
- L. albifascia* French. 1889.
- L. occidentalis* French. 1889.
- L. wrightii* French. 1889.

Stretch's remarks as to how necessary it is to have a long series of specimens before it is possible to determine the limits of a species, are particularly applicable to the protean members of the family *Arctiidae*, of which the present species is a member, and the test of breeding will also be found to be an essential in such forms. *Leptarctia californiæ* is a rather common and wide-spread, though

somewhat local, species in California. It flies in the hot sunshine and seems to have a preference for open plots in wooded localities and along the roadsides. Professor French, in his paper already alluded to, has fully described the preparatory stages, there being but one brood a year. The food-plant is *Pentestemon* and Professor French has also fed the larvæ on *Ribes aureum* (Missouri Currant). In fact, the larvæ, like other *Arctians*, should prove to be quite general feeders. About San Francisco Bay, the adult insect emerges in late April and May. I have taken specimens in the Sierra Nevadas in Placer County, early in April.

REVIEWS.

Meunier, F. Monographie der Leptiden und der Phoriden des Bernsteins. Jahrb. d. königl. Preuss. Geolog. Landenanstalt, Vol. 30, pp. 64-90, pls. 3-7. Berlin, 1909.

Meunier has given in the present paper descriptions of a number of species of Leptidæ and Phoridæ (principally the latter) occurring in Baltic Amber. Of Leptidæ, he recognizes two genera, *Leptis* and *Atheris*, seven species of the former and three of the latter, while in the Phoridæ three genera are recorded, *Phora*, *Aphiochæta* and *Conicera* with fourteen, five and one species respectively. A comparison of the Phorids with recent species is rather difficult as their describer fails to mention many of the characters used for the separation of living forms, and lays great stress upon the comparative length of the tarsal joints which have not been hitherto extensively used in the classification of recent species.

There are several species, however, which are of especial interest. One, *Phora vineta* Meun. resembles greatly in the armature of the legs, species of the section *Dorniphora* Dahl, represented in both the American and the Malayan regions and the antiquity of this very minor group may explain its present wide distribution. Another, *Phora concinna*¹ has a peculiar flattened space on the hind tibia resembling a structure seen in certain Platypozidæ and Dolichopodidæ, but known among the Phoridæ only in three species of *Aphiochæta* (*A. smithii* Brues from America and *A. hirtiventris* Wood, and *A. derasa* Wood from Europe). Five tolerably well executed plates accompany the paper.

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Banks, Nathan. Catalogue of Nearctic Spiders. Bull. U. S. National Museum, No. 72, pp. 80. Washington, 1910.

The little attention which systematic zoölogists have bestowed upon spiders in this country has undoubtedly been due in great measure to the

¹ Not the *Phora concinna* of Meigen (1830) which is a common European species, and entirely different from this one to which Meunier inadvertently gives the same name.