

AFTER FOURTH MOULT.—The body in colour is the same as in the preceding moult, and the caudal horn lacks the reddish-brown colour at the apex. The thoracic feet are now yellow, tipped with reddish-brown, and the abdominal legs have on the outer side of each a small patch of the same colour. The mandibles are pitchy black, and the labrum pink. Length, 34 mm. Duration of this stage, about seven days.

AFTER FIFTH MOULT.—No perceptible difference from the previous moult, except that the elevated granulations which cover the body are more distinct. The thoracic feet are reddish-brown with their bases yellow. Spiracles white with black margins. Length, about 55 mm.

FOOD PLANTS.*—Wisteria, cherry, spiræa, blackberry, apple, rose, plum, elm, oak, hazel, hornbeam, birch, willow and poplar.

The eggs were kindly sent to me from Cotuit, Mass., by Mr. Henry F. Crosby, of New York. Double brooded.

CORRESPONDENCE.

HYBERNIA DEFOLIARIA LINN., IN VANCOUVER ISLAND.

Sir,—In 1887 I took a specimen of *Hybernia defoliaria* at rest on an oak near Victoria. Mr. G. Hulst, who kindly looked over my Geometra in 1888, expressed a doubt as to the correctness of the locality, as *defoliaria*, though so common in England, had not been noticed by any American entomologists. Since the first capture I have several times seen larvæ which I am almost certain were of this species, for in the Old Country ten years ago I was familiar with the insect in all its stages. To-day, however (Nov. 18), I have satisfied myself by the capture of two males and one female of typical *defoliaria*. They were all at rest on fences in the City of Victoria, and two or three miles away from the locality where I first observed the species. Possibly this moth is an importation, and, if so, not a very desirable one, as in some parts of England it is considered quite a pest.

GEO. W. TAYLOR.

The specimen mentioned above by Mr. Taylor, as taken in 1887, is now in my collection, and is, I should say, certainly a typical *H. defoliaria*.

J. FLETCHER, Ottawa.

* See Food Plants of Lepidoptera, No. 2, Ent. Am., 1, p. 196.

CHIONOBAS BORE.

Sir,—We have in Colorado a butterfly identical, according to the determination of Dr. Staudinger (see C. E. XVIII., 15), with *Chionobas Bore* Lehn. and Hübner, and by the aid of Mr. David Bruce I have been able the past season to rear the larvae from egg to adult stage, soon after reaching which hibernation took place. This has led me to inquire into Sandberg's history of *Bore* of Lapland, referred to by Mr. Scudder (Butt. N. E., p. 126), and on writing Dr. Holland on the subject, he very kindly looked up Sandberg's paper, and has sent me a translation of it. So far as I know no translation into English has been published, and I suggest that you print it in full, so that when the history of the American form is published—as it will be after pupation is reached—the habits on the two continents can be compared. It is already clear that our form does not hibernate through two winters. The larval stages began on 16th July, and the fourth (and last) moult was reached 9th September, so that their duration to last moult was but about nine weeks. I hope to see pupæ soon after the winter passes, and shall then fully illustrate the species in "Butterflies of North America."

W. H. EDWARDS.

Sandberg's article is contained in the Berliner Entomologische Zeitschrift, Vol. XXIX., 1885, Part II., pp. 245–265. It is entitled "Beobachtungen ueber Metamorphosen der Arktischen Falter."—*Anglice*. Observations upon the Metamorphoses of Arctic Lepidoptera. I gather from the preliminary pages that the author was for twelve years an official residing in Norwegian Finmark, and that he there made the observations which he records in his paper.

I send you a translation hurriedly made of what he has to say concerning *Oeneis Bore* at p. 247 *et seq* as follows :

1. *Oeneis Bore* Schn.

Egg cylindrical, marble-white, longitudinally ribbed.

Caterpillar clothed with fine hairs, bright brownish-yellow, ornamented by a narrow dark dorsal line, which terminates abruptly, and two broader dark lines, one upon either side. The head is globular, small in proportion to the body, greenish-yellow, with six dark lateral stripes, and black

eyes. The spiracles are of the same colour as the body. The latter is round, tapering posteriorly and with the back arched. The anus is two-pointed. (Zweispitzig.) Length 35 mm.

The caterpillar feeds upon different grasses, and is of an exceedingly sluggish disposition. When disturbed it curls up and remains for a long time without motion. It hibernates twice, and pupates in the month of May in its winter quarters among the roots of grass just below the surface of the ground. It is greatly subject to the attacks of ichneumon-wasps.

The handsomely coloured chrysalis is short and thick, provided with long and broad wing-sheaths, which, as well as the thorax, are of a bright green colour. The abdomen is bright reddish-yellow, with dark spots and a bright green line upon the dorsal aspect, together with a darker line of the same colour upon either side; the spots in the vicinity of the middle line are arranged in pairs upon each segment; the cremaster is short and blunt; the region of the head is adorned on each side by a coal-black, shining streak, which is bent into the form of a half-moon.

The chrysalis, which, as in the case of all Satyrids, is stiff and incapable of motion, and when moved gives no evidence of life, is attacked by parasites of a larger species of ichneumon than attacks the caterpillar. The imago is disclosed after the lapse of from three to six weeks from the date of pupation. The transformations have been hitherto unknown.

This thoroughly Arctic species, which hitherto has not been found south of Lat. 68-69 N., was first detected by Dr. Staudinger upon Norwegian territory in the year 1860, by a pair of specimens coming from Kautokeine in Finmark. Later, in the year 1875, the butterfly was taken by me in numbers upon the sandy meadows near Jacobsely, close to the margin of the Arctic Ocean, in profusion in the interior at Nejden, at Skogerönes ten Kilm, nearer to the sea, and in scattering examples upon the crags at Kirkenes. In Russian Lapland, upon the stretch of country lying between Jacobsely and Kola, this species of butterfly is of very common occurrence. Upon the Norwegian coast, west of Warangerfjord, it has, nevertheless, not been as yet observed.

The caterpillar was found for the first time upon May 15th, 1880.

A single hibernating example, about 10 mm. (about four-tenths of an inch, which would be after second moult), was detected in withered grass upon the barren sand-banks near Jacobsely, and here later in the year a second almost thoroughly matured specimen of the same species was captured. As was to be surmised from the abundance of the butterfly in grassy spots, the larva feeds upon different species of grasses, especially *Festuca ovina*, with which the level reaches about Jacobsely are everywhere overgrown. The theory broached by W. M. Schøyen in his "Oversigt over de i Norges arktiske Region hidtil fundne Lepidoptere, Kristiania, 1879," and which is founded upon the observations made by Prof. C. Berg, of Buenos Ayres, in the case of another species of the genus, viz., *Oen. Gutta* Hb., viz., that the larva feeds upon lichens, has, in consequence, not been established.

The caterpillars which had been collected attained their full development about the end of August, and ceased then to feed, and sank into a lethargic condition. As they gave no evidence of a disposition to pupate, I buried them toward winter, at the end of September, in the ground. On the 15th May of the following year their winter quarters were opened, and one of the caterpillars was found to be dead, the other, on the contrary, appeared to be in a very healthy condition, and crept around lustily without, however, taking any nourishment. Its good health was unfortunately only apparent, for the little creature in a former stage of its larval existence had been stung by an ichneumon-wasp, the larvae of which were ready to pupate upon May 23rd, and in the end, as they broke through the outer integuments of their host and emerged into freedom, gave the deathblow to the unfortunate victim of misplaced hospitality. These little larvae transformed speedily, and presently the caterpillar was enveloped by about fifty greyish-white cocoons, which, after the lapse of five weeks in the latter days of June, disclosed the imagines. Thus all the hopes I had built upon these larvae were brought to an end, and it was not my good fortune until in the spring of the following year, when I again visited Jacobsely, to find fresh specimens. The caterpillars at this time appeared in numbers scattered throughout the grass, so that in the course of a few hours I succeeded in collecting about fifty full-grown examples, among them, unfortunately, not a single example which could be used, inasmuch as they all appeared to have harbored guests during the winter, and were all decorated with forty-

six to fifty-four parasitic cocoons of the same species as that before observed. Some of the hosts had died during the process, others were still alive; but all further development was at an end in the case of the latter, and at the end of eight days the last one died. Inasmuch as not a single uninjured specimen was to be found among so many caterpillars, I reached the conclusion that the place to look for the chrysalids was under the ground, and that only these caterpillars which were forced by the pressure of the circumstances which I have related, made excursions to the upper world.

The parasitic cocoons which I had collected disclosed the first wasps on the 20th day of June, and pupation, therefore, must have occurred about the middle of May. Their hosts must, therefore, have awakened from their winter's sleep at the beginning of May, and, therefore, their pupation, if everything had progressed favorably, would have taken place probably in the course of the two following weeks. My diligent search for pupæ was for a long while fruitless, until at last on the 25th of May I succeeded in digging up one. It was lying free in the sand concealed under the roots of grass. The transformation had just taken place, as was shown by the skin of the caterpillar, which was quite fresh and still clinging to the anal extremity. The chrysalis on the 24th of June disclosed the butterfly of *Œneis Bore* in a beautiful male example. From four to six days before the butterfly emerged from the chrysalis the wing-sheaths had assumed a dark yellowish-grey, and at last quite bluish-black colour. On the 31st day of May I found still another chrysalis of the same species lying in the grass, but brown in colour. This produced no butterfly, but, upon the 17th and 18th of June following, three specimens of ichneumon-wasps of another much larger species than that which had infested the caterpillar.

In the spring of the year 1883, which, for our high latitudes, was unusually early and warm, this butterfly was observed as early as the middle of June upon the crag at Südwaranger Prestegaarde. At Jacobsely I found on the 15th and 20th of May, under moss in barren spots, concealed among the roots of grass, two caterpillars, which both transformed five days later, and on the 10th and 13th of June following disclosed the imagines (two ♂♂). The duration of the chrysalis stage of existence was, therefore, scarcely three weeks.

W. J. HOLLAND.