ART. XX.—*An Entomological Tour on the Table-land of Mount Arthur.*

By G. V. HUDSON, F.E.S.

[*Read before the Wellington Philosophical Society, 10th July, 1889.*]

DURING the past summer I spent a week on the Table-land of Mount Arthur for the purpose of investigating the insect fauna of the locality; and, as it presents some marked and interesting peculiarities, perhaps it may be desirable to place my observations on record, and also, for the benefit of future naturalists, a few practical hints as to the best way of reaching the locality, and what to do when there.

Mount Arthur, as most are aware, is the highest peak on the western side of Blind Bay, and is always a conspicuous object from the Town of Nelson. The Table-land is situated behind the mountain-range—that is, on the north-western side of it—and extends for about ten miles in the same direction till we reach Mount Peel. Its width is not so great, being, I should say, from five to eight miles; but, owing to the broken nature of the country, it is extremely hard to say, especially as there is so much high land all round. This plateau varies from 3,600ft. to 4,000ft. above the sea-level, and is covered with mountain-birch, traversed by many singular openings, which support a dense growth of tussock-grass and numerous alpine plants. The mountains easily accessible are Gordon's Pyramid (4,600ft.), Mount Arthur (5,800ft.), and Mount Peel (5,500ft.). The varying elevations which are traversed in ascending these give the naturalist a rare opportunity of observing and collecting an extremely interesting series of alpine plants and insects. Respecting the former I can give no information, but feel sure that a visit to the Table-land would amply repay any botanist who was not afraid of a little hard work. As to the best means of reaching the Table-land, it, of course, depends entirely upon whether we make Nelson or Motueka the base of operations. In either case a horse and trap are required; but, while a whole day's driving is necessary from Nelson, less than half the time is needed to reach the Graham River from Motueka. This is a small branch of the Motueka River, which rises in the Mount Arthur Range, and flows into the main stream about fifteen miles above the town. After crossing the Motueka a short distance above the mouth of the Graham, a fairly good road takes us to Heath's, where it is usually convenient to stop the night before continuing the journey. Arrangements can also be made with Mr. Heath to carry the bulk of one's impedimenta

by packhorse on to the Table-land, which is a great assistance, especially as it is necessary to take provisions for the whole time one intends to remain there, and an abundance of clothing to put on during the cold nights.

As soon as the usual hideous stratum of burnt logs, which surrounds almost all cultivation in New Zealand, is passed, the forest becomes extremely beautiful, and the views which one obtains from the track, as it passes up the side of the Graham River, are really very fine. About four hours' hard climbing from Heath's brings us to the saddle, at an altitude of about 3,000ft. above the sea-level. Here the source of the River Pearse is crossed, where several interesting *Neuroptera* can be captured, a delicate species allied to *Hemerobius* being one of the most conspicuous. Just before we cross this stream a fine view of Mount Arthur is to be seen through an opening in the trees. From this point the track gradually descends, following the bed of Flora Creek for a matter of ten miles, and passing through dense birch forest all the way. Here on favourable days in January and February may be seen the rare and beautiful *Dodonidia helmsii* flying quietly about in and out of the sunshine, and settling on the branches just out of reach. I may state that four specimens of this butterfly only have at present been taken, and that the British Museum is much in want of a type; so perhaps visitors to this locality may be good enough to look out for the insect and obtain them one. I think it will be found on most of the wooded hills in Nelson Province between 2,500ft. and 3,000ft., as I took a poor specimen on the Dun Mountain (1885), in quite a different neighbourhood. It is also said to have occurred on the hills the other side of Wellington Harbour, but I have not seen it.

About two miles after we leave the source of the Pearse a small clearing is reached, called "Flora Camp," which is a convenient halting-ground for those who wish to ascend Mount Arthur without visiting the Table-land, as a branch track can be followed up shortly after we leave the saddle, leading directly on to the mountain.

The track along Flora Creek in many places presents a most picturesque appearance, the numerous waterfalls and the gradual increase in the size of the stream being features of especial interest. To an entomologist with a tent and plenty of time no doubt a day would be well spent here, collecting *Neuroptera* over the stream, *Micro-Lepidoptera*, and sugaring the trees at night for moths. Mr. Meyrick mentions, in his article on the New Zealand *Noctuina* ("Trans. N.Z. Inst." for 1886), that he tried sugaring on the Table-land with no result; but I feel sure that, had he sugared in the forest (where there are not nearly so many flowers), his labours would have

been rewarded. I recollect sugaring one evening in the Botanical Gardens, Wellington, in a small gully, less than a quarter of a mile away from some most attractive flowers, and obtaining a large number of insects at the bait; while had I tried it nearer the flowers the results would have been unquestionably *nil*.

About three miles before we reach the first opening on the Table-land the track leaves the bed of Flora Creek and starts to ascend very rapidly, following the course of a small stream which rises in Salisbury's Opening, near the first hut that is reached. This hut, however, is now quite unfit to stop in; but there are several others in various parts of the Table-land that can be used, and are far warmer than a tent, which is not a sufficient protection against the cold at so great an elevation above the sea-level.

It is much to be regretted that the means cannot be found to construct a really serviceable hut, containing one or two rough bunks and a bench, for the use of naturalists and others, as I feel satisfied that directly this locality is better known it will be far more frequently visited, on account of the obvious beauties of the scenery and the excessive interest of its biological productions. When, moreover, we consider the comparative proximity of the Table-land to Wellington, I think it will be admitted that the accomplishment of this scheme would not be entirely outside the scope of our society, one of whose chief functions is, if I understand correctly, to assist naturalists in original researches.

Acting on Mr. Meyrick's suggestion ("Trans.," vol. xix., p. 4), I took a kerosene-lamp with me to the Table-land, and lit up at dusk on the first evening (22nd January). The night was slightly overcast, with a few drops of rain, and much warmer than usual, the result being that several good moths were captured at the lamp, including three specimens of *Leucania propria*, several *Mamestra rubescens*, and a rare *Bombyx*, besides several *Scoparia trivirgata*.

The next day (23rd January) I decided to ascend Mount Arthur, and left the hut at 7.30, the weather being everything that could be desired. A few minutes' walk brought us to the foot of Gordon's Pyramid, where the track was soon discovered, and followed up until the bush-line was passed, at about 4,000ft. I had better, perhaps, mention that this portion of the forest is very rough, and it is most necessary to exercise great care in keeping to the track, which, however, is now well marked by numerous blazes made during two successive visits. After leaving the forest the vegetation is very rank, consisting of a great variety of alpine plants, tussock, &c. Here in the hot sunshine occurred *Harmologa siræa* in great numbers, in the finest condition, flying with much agility,

besides large numbers of *Notoreas paradelpha*, *Harmologa latomana*, and *Tauroscopa gorgopis*. Two specimens of *Erebia pluto* were taken on a patch of shingle at about 4,200ft., but this must be regarded as an exceptionally low elevation for the species.

On arriving at the top of the Pyramid a long descent is made to reach the Mount Arthur Range proper, and it is here that probably the best collecting on the Table-land is to be found. *Metacrias erichrysa* was frequently seen dashing about in the hot sunshine, and was extremely difficult to catch. Two other *Bombyces* (?) were also obtained which are not yet identified, but any moths belonging to the group are of extreme interest, owing to the singular absence of its members from the fauna of the lowlands in New Zealand. High up, at about 4,800ft., *Stathmonyma anceps* was found, the dark-grey forewings harmonising admirably with the rocks on which it perches; besides specimens of *Orocrambus mylites* and *catacaustus*. These insects occurred up to the extreme top of the mountain, as well as *Erebia pluto*, which was very abundant on the shingle-flats above 5,000ft.

I must confess that the ascent of the last 800ft. of the mountain considerably alarmed me, although no doubt the dangers are nothing in the eyes of more experienced climbers.

On the top we discovered the names of previous visitors, and during the half-hour spent there I noticed numerous specimens of *Erebia pluto* and *Orocrambus*, so I am disposed to think that their range of elevation would be considerably more extended on a higher mountain; but of course this is a matter for future observation. Above 5,000ft. the only common plant is a fine wiry grass, which I conjecture is the food-plant of these insects. The discovery of the larva of *Erebia pluto* would be of excessive interest, and the insect might probably be reared by any one who was able to spend two or three months on the Table-land, as I think the females would readily lay their eggs in captivity, if the young larvæ could not be found. An accurate record of the times of appearance of these alpine insects would also be extremely valuable, which of course could only be obtained by a naturalist residing on the Table-land during the whole summer.

During the descent numerous stoppages were made to obtain insects, *Erebia pluto* continuing extremely abundant until we left the shingle and snow. Lower down a few *Coleoptera* were obtained by beating spear-grass blossoms; but the *Lepidoptera* absorbed most of our attention. It was curious to make the acquaintance here of *Dasyuris partheniata*, a species found on the cliffs above the Hermit's Cave, Wellington, but nowhere, as far as I know, on the sea-level in Nelson Province. When the top of Gordon's Pyramid was

again reached, at 6 o'clock, I was startled to see a conspicuous black insect flying about, which I felt sure was not *Erebia pluto*. On capturing it, I at first took it be *Erebia butleri*, but subsequent examination proved that it was not a butterfly at all, but *Stathmonyma hectori*. A rapid descent soon took us through the forest, which appeared extremely beautiful in the evening sunshine, and so terminated one of the pleasantest days I have ever spent.

Tuesday, 24th January, was occupied in collecting about Salisbury's Opening, round the base of Gordon's Pyramid. The sun was very hot, and nearly every tussock was enlivened by the presence of *Argyrophenga antipodum*, which is pre-eminently the butterfly of the Table-land. It will be seen how widely the specimens of this insect taken here differ from those from Christchurch and the Dun Mountain, and individuals from other localities would probably exhibit further aberrations. The number of ocelli on the wings varies exceedingly—one specimen in my collection has them almost completely suppressed.

Of the large *Crambi*, *Crambus crenæus* is the commonest species, but it is with difficulty distinguished from *C. isochytus* on the wing. *Crambus siriellus* is a finely-marked species, and a good series can be obtained with a little perseverance; but I understand from Mr. Meyrick that it is by no means confined to the alpine or subalpine regions, being found extensively on the lowlands. The brilliant little *Crambus heliotes* may be seen flying about, like swarms of small flies, in wet places, and is usually very common. Near the track, where it leaves the forest, a fine species of *Hepialus* occurred, of which I managed to secure four specimens in all. It is said to be only a variety of *Hepialus variolaris*, a lowland insect, but I feel almost sure that it is an abundantly distinct species. Other species taken were *Arcteuthes chrysopeda*, *Notoreas paradelpha*, and a curious light form of *Chrysophanus boldenarum*, which was abundant on the shingle round the stream.

The morning of Friday, the 25th, was devoted to the Limestone Caves, which are often rather difficult to find; but directions can be easily obtained from Mr. Heath or the miners. In one of these a very remarkable orthopterous insect occurred. I regret to say that I was only able to obtain three male specimens. They are extremely active, and can leap 2ft. or 3ft. at a time; their capture is consequently attended with much difficulty in a dark cave, where one can only look about with a single candle. I much wanted to ascertain the food of the insects, but the caves seem devoid of any kind of fungoid vegetation which I should imagine that they would be likely to eat. No *Coleoptera* were observed; and, in fact, the only other insect was

the luminous dipterous larva, which on examination proved identical with those found on the banks of streams in the forest round Wellington. In the afternoon we visited a singular gorge, chiefly remarkable for its steep sides, and a large rock at the entrance, in the middle of the stream, somewhat resembling a sphynx in shape. This place is well worth visiting, and can be easily found by following down the first large stream which crosses the southern end of Salisbury's Opening. A peculiar species of ranunculus was abundant on the steep sides, and many other rare-looking plants. The insects taken were numerous, comprising, amongst the *Geometrina, Larentia bryopis, Cidaria purpurifera, Epyaxa semifissata, Larentia clarata,* and *Boarmia productata.* Of *Pyralidina* the genus *Scoparia* was, as might be expected, strongly represented, the following species being taken flying about the rocks: *Scoparia philerga, S. cymatias, S. trivirgata, Xeroscopa niphospora, X. cyameuta, X. rotuella, Diptychophora interrupta, Œcophora griseata,* and many other *Micro-Lepidoptera.* In fact, the locality is so productive that I devoted two other afternoons to collecting there, and should strongly recommend any entomologist visiting the Table-land to give it his close attention. On Sunday, the 27th January, I decided to work Mount Peel and the neighbourhood, and made an early start in the morning, arriving on the top of the mountain at about 11 o'clock. On our ascent, *Notoreas paradelpha* was common at about 4,000ft., where a black species of *Pyronata* also occurred. The first snow was met with at about 5,000ft., and shortly afterwards we again fell in with *Erebia pluto,* but not so commonly as on Mount Arthur. As, however, Mount Peel is so much better suited to collecting, a larger and finer series was taken here than on the former. I was also astonished to meet with the odd little *Chrysophanus boldenarum* up here. The butterfly is said to frequent riverbeds in the South Island; but I am inclined to think that it is far more widely distributed, and have seen large numbers in Wellington Province. A fine species of *Locustidæ* was also abundant on the rocks, and completely protective in its colouring. The same species occurred on Mount Arthur, and in both localities the insects were quite invisible when motionless. On returning, a visit was made to Lake Peel, where several specimens of the alpine cicada (*Cicada cassiope,* Hud., MS. name) were secured, as well as *Stathmonyma hectori* and other interesting insects.

Monday, the 28th, was devoted to setting specimens and collecting in the gorge, and on Tuesday we left the Table-land, meeting with three specimens of *Dodonidia helmsii* on the track, all of which were unfortunately out of reach.

Perhaps a few notes on the lowland insects observed in

this locality may be of some interest, as showing the range of altitude exhibited by many species. Amongst the butterflies, *Vanessa gonerilla* and *Chrysophanus salustius* were occasionally met with at about 3,200ft. They did not exhibit any noticeable divergence from the type. *Agrotis nullifera* was once taken at light, also *Scoparia diphtheralis*, both being normal forms. *Crambus flexuosellus*, *Boarmia productata*, and *B. melinata* occurred occasionally from 2,000ft. to 3,500ft., but were not very common. In all the specimens the markings were somewhat darker than usual.

Petalura carovei, the great dragon-fly of New Zealand, was very abundant in swampy localities round Salisbury's Opening. I did not see any specimens above 4,000ft., while the smaller *Libellula smithi*, *Agrion colensonis*, and *A. zealandica* were swarming almost everywhere, extending up to the top of the mountain. The ordinary flesh-flies (*Calliphora quadrimaculata*, *Sarcophaga læmica*, &c.) were, as usual, everywhere. I noticed many specimens on the top of Mount Arthur while eating my lunch. I am quite at a loss to understand what supports such large numbers of these insects in such remote localities, and can only conjecture that they are endowed with an extremely keen sense of smell, and travel great distances in search of food.

Among *Coleoptera*, *Pyronota festiva* was everywhere abundant, and was perhaps slightly larger and more brilliant in colouring than the ordinary form, although I think specifically identical. *Ceratognathus foveolatus* occurred under the bark of the mountain-birch; but, as I have before mentioned, I did not devote sufficient time to this order to judge at all accurately of its prevalence.

An inspection of the insects taken, arranged according to the elevation at which they occurred, will, I think, at once show that as the mountains are ascended the *Lepidoptera* become decidedly darker in colour. This has long been observed in other countries, but I think it is interesting to be able to contribute further evidence from New Zealand. Respecting the cause of this peculiar phenomenon, there seems to be little doubt that it is owing to the low temperature existing at high altitudes, as the same effect has been produced artificially by retarding, by means of an icehouse, the development of three species of European moths (*Selenia illustraria*, *illunaria*, and *alniaria*), of which Mr. Merrifield gives a most interesting account in the "Transactions" of the Entomological Society for 1889. Lord Walsingham has long ago suggested that a darker colouring, or melanism, is advantageous to alpine and arctic insects, as it enables them to absorb the sun's rays much more rapidly than if they were of a lighter hue; and he instances, as an example, the simultaneous emergence of a

white and a black insect from the pupa in a stormy and cold climate, such as we have in the alpine regions. A passing gleam of sunshine would enable the black insect to dry its wings, fly away, and propagate its species before the white one was nearly developed, and consequently there would be a continual selection in favour of the darkest varieties. This theory, I believe, is the true explanation of the singular prevalence of melanic species at high elevations, and may, of course, be equally well applied to those dark varieties and species of insects which have hitherto been almost invariably taken in the arctic regions. That there is a marked tendency to a darker coloration in the *Lepidoptera* from the Mount Arthur district as we ascend in altitude, I do not think any one can for a moment dispute who examines the representative collection now before the Society.

I must refer those wishing to learn further particulars in connection with this most interesting subject to the abstract of Lord Walsingham's paper contained in the "Entomologist," vol. xviii., page 81.

In conclusion, I should like to give a very striking instance of protective colouring which I observed when on a previous visit to the Table-land in 1888. While gathering some small branches from a birch-tree I discovered a beautifully-variegated larva, imitating exactly the delicate hues of the lichen-covered twigs. After feeding on the birch-leaves for a few days it spun up, and emerged as a very grey form of *Declana floccosa* on the 7th June. I have often seen the larva of this insect, as before mentioned ("Trans. N.Z. Inst.," 1888, p. 190), round Wellington, where, however, it does not in the least resemble the curious caterpillar found on the Table-land. This circumstance, I think, gives us a hint as to the means by which alpine insects may have assumed some of their peculiarities.

In connection with my previous visit to the Table-land in 1888 I should also mention that it was three weeks later in the year than in 1889, and I noticed great differences in the insects observed: for instance, in February, 1888, *Stathmonyma anceps* was very abundant, *Erebia pluto* scarce, *Rhyssa antipodum* one taken and three or four seen, *Cladopais mirus* very common. In January, 1889, I found *S. anceps* was rare, *E. pluto* very abundant, and of *R. antipodum* and *Cladopais mirus* I neither saw nor captured a single specimen. This shows that there is a rapid succession of insect-life on the mountains, which can only be properly studied by numerous and prolonged visits of entomologists.