

golden yellow and is found at a low altitude having a southern exposure on the banks of Kaslo Creek. They congregate in millions, and when at the height of their emergence completely cover several square yards of snow, turning it to a golden patch. They exist only a few days, and, unlike their black brothers, die in the rivulets of water running off the melted snow. How and when they breed is unknown, and how they contrive to reach the surface of the snow from a depth of 2 or more feet is also wrapped in mystery. I have been unable to devise any suggestion of the whys and wherefores of their presence. I have in my collection specimens of four species of this genus, the golden one only being named, a black species found on melting snow, a smaller black species which breed in hotbeds, a white species found under a flower-pot in the house. None of these are yet identified.

We next come to a larger insect of the genus *Podura*. These may be also collected on the winter snows when the temperature is near freezing. They are very active, and when disturbed spring away several inches and wriggle themselves into any crevasses in the snow. They are about 0.05 mm. in length and dark grey to black in colour.

But possibly the most interesting find of a snow collecting trip are the snowfleas proper of the family *Boreus*. They may be seen on freshly fallen snow, usually singly, and resemble minute grasshoppers. They are presumed to share the characteristics of the order to which they belong and to be carnivorous in their habits. The late Dr. James Fletcher suggested that they probably fed on the genus *Aphorura* and *Podura*, but of this we have no evidence. Their leaping-powers are great, and I have often observed one jump 6 inches. Their usual mode of locomotion, however, is by walking. The most curious fact about them is that they are so little affected by cold. They will walk around when the temperature is several degrees below freezing, although they are most active when the mercury rises to 35-40 degrees.

In the *Canadian Entomologist* for March, 1908, I published a short paper on the peculiar mating habits of this insect, and more recently I prepared another article which more fully describes the extraordinary method of copulation, which I now take pleasure of presenting to this meeting of our Society. I have in my collection two species of these insects, *B. californicus* and another species which can only be identified from fresh specimens. The latter has a brown stigmatal fold, the wing-coverts black, and the species generally is more hairy. The difference in the colour of the stigmatal fold disappears after drying, so that the disparity cannot be cited as applicable to cabinet specimens.

I have many specimens of Diptera and other orders of flies which I have collected during the winter and have recorded. The capture of Tortricids, Tineids, and Chrysopa found under the bark of dry standing trees during the winter months, and as a systematic collector I am inclined to treasure my winter captures rather than the profusion of forms which are to be found everywhere in the summer.

THE MATING OF BOREUS CALIFORNICUS.

BY J. W. COCKLE, KASLO, B.C.

Whilst on the hunt for snow-insects to-day, February 9th, and having been successful in securing several specimens of *Boreus*, I was returning home when I discovered a pair in copulation. The temperature, which had been below freezing all day, had just risen, and at the time was about 33° Fahr. It is well to state here that I have found these curious insects hopping about on the snow when the thermometer showed several degrees of frost, but they are usually most active just after a snow-storm, when the temperature is from 35-40 degrees. Wishing to know how copulation was possible with these curiously formed insects, I lay down on the snow in order to be able to use the small pocket-lens for observation. The female was perched on the back of the male, her front legs folded up so that she

knelt on his back; the second pair rested on the male's back, whilst the longer back pair hung down beside the body of the male.

Then the most curious fact presented itself, that the male was holding the female with its wings, which were hooked over the femora of the front legs. What appeared to be the ovipositor of the female was thrust down perpendicularly into the organ of the male. In this latter observation I subsequently discovered I was at fault, as on February 23rd I again had an opportunity of studying these insects, and instead of being the ovipositor I found that it was the lower half of the ovipositor-shield; the upper portion of the shield remained in a normal position.

The fact of the male using his aborted wings to hold the female during copulation was new to me, as it had never occurred to me to imagine that wings could be placed to such use. My recumbent position on the snow being very unpleasant, I removed the pair to a box, but as they immediately separated I was unable to make any further observation. On February 27th I again had the good fortune to find a second pair mating, and in order to verify the observations I had made on the previous pair of these insects, I proceeded to lift them on a sheet of snow with the aid of a piece of bark. Having done this successfully without disturbing them, I was able to observe them more leisurely. The female in this case had the front pair of legs crossed underneath the body, whilst the other two pairs were folded close against her sides. None of the legs were touching the male at any point. She was held by the male in the same way as in the first pair observed, by the wings of the male being clasped over the femur of the front legs. Both the large bill and antennae of the female were folded back between the wings of the male. In the case of the first pair observed, I thought that the ovipositor was thrust down into the male organs; this was incorrect. The lower half of the ovipositor-shield is thrust down and is firmly held by the claspers of the male, and the reason I overlooked the male organ is that it is transparent, and viewed against a background of snow is invisible. I pushed the female away from the clasp of the male's wings, but he immediately snapped them together, catching one antenna; upon my releasing this, he commenced to run off, the female being unheld except by the claspers, and such is the strength of this hold that he was able to run around holding the female in an upright position by this support alone. Whenever the legs of the female touched his back, his wings shut like a rat-trap over them; this movement of the wings was repeated at short intervals whenever the legs were removed from this clasp.

I brought them home and was then able to observe the genital organ of the male, which, as I previously stated, is transparent and is directed upward in the inside shell of the ovipositor-shield. This shield opens laterally nearly at its centre; the upper half is stationary, whilst the lower half is capable of being deflected at an acute right angle downward; the tip of this portion which is held by the claspers is armed with short spines and hairs.

The wings of the male, which are less than half the length of the abdomen, are curved downward and are armed on the costal edge with a row of sharp horny spines; there are a few spines on the lower margin. These no doubt add materially to the holding-power and prevent the femora of the female from slipping along the wings. The suggestion is made that, the male being capable of supporting and carrying the female by the hold of its claspers, an examination of these might add to the knowledge of the structure of these insects and the reason why such a support is possible. Upon reaching home I placed the specimens under a glass for further observation; the female, being unheld and having regained her feet, was able to tow the male around on his back; this she continued to do for two hours, but during the first portion of the time the male made frantic efforts to regain his feet, and also to snap his wings over some appendage to the female, but in this he was unsuccessful; it was all to no purpose; she dragged him to death, or very near it, and it was only when I pinched her with my forceps and rendered her partially paralysed that separation from the male took place. When this

occurred I was able to fully observe the transparent male organ. I am not aware how far the mode of holding the female may be practised by other insects having a like structure to this, but this record can stand as to what extraordinary use the wings may be put and their adaptability for the purpose for which they were created.

February 27th. I went out to-day on a special hunt for *Borcus*, armed with vials of ether and alcohol. The first pair I discovered I dropped into the vial of ether, but they separated instantly. The second pair I decided to try to freeze, so lifted them and transferred them to a box of snow. The male released his wing-hold and ran around with the female in an upright position, holding only by the claspers. The female made no effort to extend her legs, but kept them in the previously described position, folded close to the body. The male made repeated efforts to regain his wing-hold by jerking the abdomen upward, thus throwing the female forward within reach of his wings, which snapped together at every such effort. I left them quiet in the box of snow and the male soon regained his wing-hold. Upon my pouring a little ether on the snow and closing the box in the hope of reducing the temperature to a sufficiently low degree to render them comatose, the male again released his wing-hold. It seemed thus impossible to kill them in the desired position. I transferred them to the vial of ether. I think the female can release herself even at the instant of death, and it remains yet to be seen if I can succeed in freezing them in the desired position by the aid of a freezing mixture applied outside to the box in which they are enclosed.

INSECTS COLLECTED IN THE OKANAGAN VALLEY, 1913.

BY E. M. ANDERSON, PROVINCIAL MUSEUM, VICTORIA.

Early in April, accompanied by an assistant, Mr. C. B. Garrett, I was detailed by the Department to collect birds and mammals for the Provincial Museum, Victoria, B.C. Although my work was chiefly confined to collecting and preserving birds and mammals, we managed to secure about 4,000 entomological specimens. A large number of very interesting forms of insect-life fell to the net, many specimens still awaiting identification, mostly in Coleoptera, Hymenoptera, and Diptera.

From my point of view, the Okanagan Valley offers to the entomologist one of the best collecting-grounds in British Columbia, and I feel certain that, with a season's systematic research, an enthusiastic student would add many species to the British Columbia list, which is far from being complete.

The weather during the early part of April was very unsettled, still keeping cold and wet, and nothing much in the insect line could be found save a few beetles, crickets, and a small scorpion under bark. After collecting a week at Penticton, we moved camp south sixteen miles to Shuttleworth Creek, a distance of about two miles from Okanagan Falls. On arrival at the creek things began to look brighter, the sun was shining, and we observed a number of insects on the wing. Here we camped from April 15th to 20th, taking at intervals a series of the early blue *Cyaniris nigrescens*, *Incisalia cryphon* and *I. iroides*, *Pontia sisymbri*, *P. occidentalis*, *Synchlæ creusa*, *Ausonides*, and *Sara*, the beautiful orange-tip. A few *Noctua* were collected at light, the nights still keeping cool; nothing but an occasional *Xylomiges simplex*, or common Geometer, made their appearance. *Drasteria crassiuscula* and *Leptarctia californiata* were common about the camp on sunny days.

On April 20th we moved camp to Schoonover Cabin, an old trapper's home in the mountains at an elevation of about 3,500 feet. With an early start, accompanied by Charlie Shuttleworth and two pack-horses, we started on our way up the mountain-side through a drizzling rain, which shortly afterwards turned into sleet and snow, this making travel slow over the slippery mountain-trail. We travelled about five hours, arriving at the cabin about 1 p.m. The horses, tired out, were immediately unpacked, a camp-fire made, and after a meal of hot coffee