

FURTHER DISCOVERIES ON VICTORIAN PLECOPTERA

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SUMMARY.

Through an intensive search in the Victorian Alps more specimens of the rare stone-flies *Thaumatoperla alpina* Burns & Neboiss, and *Thaumatoperla flaveola* Burns & Neboiss were discovered by the author. As these species were known from three females in the first, and a unique male in the second case, the opposite sexes are here designated as allotypes and described. The nymph of *T. flaveola* is also described.

DESCRIPTIONS.

Thaumatoperla alpina Burns & Neboiss.

Thaumatoperla alpina Burns & Neboiss, 1957, Mem.Nat.Mus.Vict. 21 : 93.

It was surprising that a large stone-fly like *T. alpina* had not been captured until 1954, when the first specimen, a female, was brought to the National Museum of Victoria for identification. There was a long delay in publishing the description of this rare and scientifically interesting species, and during this period two more female specimens were brought to the National Museum. The authors were thus able to include additional information in their paper and designate the newly discovered specimens as paratypes.

As the 1957 collecting season, in the early part of which these last specimens were taken, was still favourable, the author undertook field study in the Victorian Alps to obtain more detailed information of the habitat, secure some information on life history, and search for the male sex which was still unknown.

The work was limited to an area of about 15-20 square miles on the Bogong high plains, of at least 4,000 feet above the sea level. The only accessible road was that built for S.E.C. use.

Typical to the Victorian Alps, this district is characterized by steep mountain slopes, narrow gullies, and small rushing streams. The original specimen was taken above the tree line some 50 yards from the nearest water, while the others came

from near a stream in forested country. This information suggested that the most suitable locality should be near the tree line.

Every accessible stream on this altitude was therefore carefully searched, and while a number of species of caddis-flies (*Trichoptera*) and an interesting osmylid (*Neuroptera*) species were collected, no signs of the large stone-fly were found. Eventually an uninteresting looking stream on grassy slopes of Mt. Mackay at an altitude of approximately 5,500 feet yielded a pair of the beautiful stone-flies. They were disturbed by beating the vegetation along the still pools, and fell into the water, separating quickly from each other.

Further investigation of the stream gave another three female specimens which were photographed in their natural surroundings (Plate 1, Figs. 1 and 2), and secured for the collection. Unfortunately only the one male was found. It is interesting to note that all specimens except the first pair were discovered resting on the leaves of silky daisy—*Celmisia sericophylla*, an alpine plant described by J. H. Willis from the Victorian Alps in 1954. Later it was observed that the stone-flies in captivity chewed the leaves of the silky daisy; whether this is due to interrupted natural life and shock of captivity, or whether it is natural behaviour, is not certain, and observations in the natural surroundings are to be desired.

Most specimens were found resting on the upper surface of the leaves in bright sunshine. When disturbed they partially opened their wings, slightly lifting them to an angle, at the same time curling their body upwards and moving the cerci upright. None of the specimens attempted to fly, but crawled slightly deeper between the foliage of the plants. The walking movements are smooth and can be rather fast, as it was later demonstrated in the laboratory. The insects appear to be more active in the dusk or even at night.

All attempts to discover the nymphs, in spite of careful examination of a large number of stones in the rapid parts of the stream as well as from the bottom of the still pools, proved to be unsuccessful.

DESCRIPTION OF THE MALE.

General appearance very similar to the female, but noticeably smaller. Measurements in mm. are given hereunder for comparison of the male with the female specimens available for study.

	♂ (allotype)	♀ ♀ (incl. holotype)
Prothorax—		
Width	6·5	8·0– 9·0
Length	5·0	8·0– 8·5
Anterior wing—		
Length	17·5	20·0–21·5
Width	7·0	9·5–11·0
Posterior wing—		
Length	15·0	18·0–19·0
Width	13·0	16·0
Antenna—		
Length	19·0	22·5–26·0
Cerci—		
Length	18·5	20·0–23·0

Head black, nitid, sculptured; the greyish spot on each side of the frontal suture near the base of the antennae absent (it is not quite so distinct also in the other female specimens, as it is in the holotype). Antennae black, 19 mm. long, with 57 segments. The number of antennal segments appear to be rather stable in all specimens and usually is between 52 and 57.

Prothorax slightly wider than long, but bears the same characteristic black oval central marking, and the bright orange colour of the prothorax which, in dried specimens, changes to a dull orange brown.

Abdomen cylindrical, somewhat flattened dorso-ventrally, pale yellowish grey, but the colouring is partly lost in dried specimens. On account of the softness of the body the length measurements are very variable, and often do not give the true impression of the actual size. Ventral surface yellowish grey in the first segments, further the colour gradually contracts to the posterior margin of the segment, whereas the anterior portion is black. Ninth and tenth segments black. Copulatory processes short. Cerci black, 18·5 mm. long, with 32 segments.

Anterior wings anilin black, dull; costal area with numerous irregular veins. Posterior wings black, with dark blue iridescence; most of the cross-veins in the anal area are bordered with a whitish translucent border, so giving a netted appearance.

Legs black; median and posterior tibiae covered with very fine decumbent yellowish pubescence.

MATERIAL EXAMINED.

Allotype ♂ and 4 ♀ ♀ Mt. Mackay, 5,500 feet, Vic., 23rd March, 1957, A. Neboiss; deposited in the collection of the National Museum of Victoria.

Thaumatoperla flaveola Burns & Neboiss.

Thaumatoperla flaveola Burns & Neboiss, 1957, Mem.Nat.Mus.
Vict. 21 : 95.

Following the successful 1956-57 season, and the discovery of more specimens of *T. alpina*, the author concentrated the search during 1957-58 season to obtain additional information and more specimens of *T. flaveola*, up to the present known from a unique male specimen.

While visiting the type locality early in November, 1957, two small nymphs were found, and the typical form of prothorax and its sculpture clearly indicated them as being *T. flaveola*. On the second occasion, towards the end of March, 1958, final instar nymphs as well as adult specimens were found. Based on these discoveries and the nymphs collected by I. F. Edwards in January, 1958, the descriptions of nymph and adult female are given hereunder. The adult specimens were captured in late afternoon some 12-15 feet above the stream on tree fern fronds.

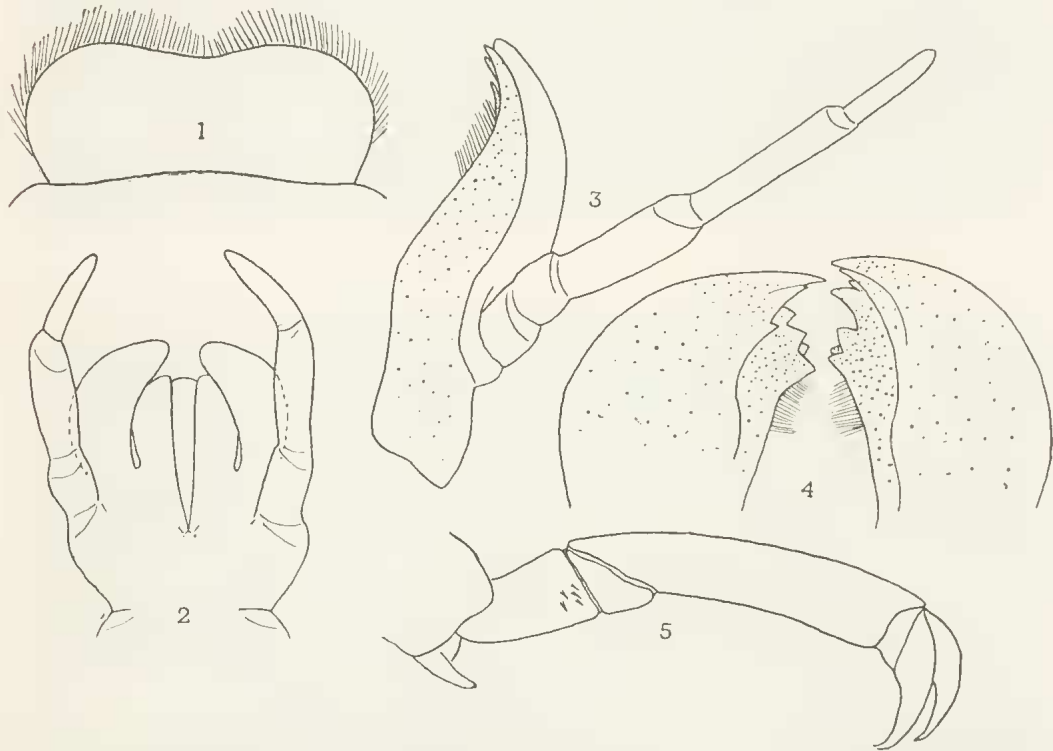
DESCRIPTION OF THE NYMPH.

General colour olive, legs paler olive, cerci and antennae yellowish brown, ventral side yellowish to orange brown, about 26-30 mm. long. Body irregularly clothed with finer and stouter bristles, which are arranged in a single row along the posterior margin of each abdominal segment, more densely along the lateral line, finer and more hairlike on the ventral surface.

Head olive, as broad as pronotum, widest at the posterior end, narrowed anteriorly. A row of short, stiff bristles just behind the eyes. Antennae about 15 mm. long, filiform, tapering, first segment large, second smaller with a row of bristles covering the anterior margin, the following six or seven segments very short, inseparable, becoming progressively narrower and longer towards the apex. The number of segments exceeds 100 (in the adult specimens it is reduced to about 60). Labrum short and broad, shape as in Fig. 1. Labium, Fig. 2, with glossae shorter than paraglossae, the latter covered with rather long hairs on the

external margin. Labial palpus three segmented; first segment short, second about twice as long as first, third about $\frac{2}{3}$ the length of second. Maxilla Fig. 3, well developed, lacinia with a pair of pointed teeth near the apex, and a row of bristles on the inner margin. Maxillary palpus five segmented, first and second segments very short, about equal in length, third slightly longer than the first and second together, fourth the longest, fifth shorter than third and about equal of the first and second together. Mandibles very strong, Fig. 4, with a number of pointed teeth at the apex, and orally of them a row of bristles on the inner margin.

Pronotum olive, with paler olive ornamentation, anterior margin brownish olive. A row of short and stiff bristles all round the margin of the pronotum except the anterior median portion where the bristles are less dense or almost absent.



FIGS. 1-5. *Thaumatoperla flaveola* B. & N. Nymphal structures. 1. Labrum. 2. Labium. 3. Maxilla. 4. Mandibles. 5. Posterior tarsus.

Legs pale olive, moderately long, femur shorter than tibia in the prothoracic legs, about equal in length in meso—and metathoracic legs. First tarsal segment short, second incomplete, shorter than first, third more than twice as long as the first and second together, touches the first dorsally; claws simple. (Fig. 5).

Abdomen somewhat cylindrical, depressed dorso-ventrally. Ninth segment the longest, tenth shorter about equal in length to the seventh. First six segments each with a pair of lateral gills in the form of somewhat knotted filaments, bluish green. Cerci yellowish brown 12—15 mm. long, with 23—28 segments. First few segments very short, the following ones becoming longer and narrower towards the apex. Each segment bears an encircling row of spines around the posterior margin.

The nymphs were found on submerged logs and stones in a small stream on Mt. Buller, Victoria (type locality) 8th November, 1957, A. Neboiss; 17th January, 1958, I. F. Edwards, and 25th March, 1958, A. Neboiss; the fully grown nymphs were collected on the two latter dates.

Description of the female.

The females of this species, similar to the other two species in this genus, are distinctly larger than the males, but the colouring in both sexes is identical. Measurements in mm. are given hereunder for comparison of the two sexes.

	♂ ♂ (incl. holotype)	♀ ♀ (incl. allotype)
Prothorax—		
Width	.. 6.5– 7.0	.. 8.5– 8.8
Length	.. 4.5– 4.8	.. 6.0– 6.8
Anterior wing—		
Length	.. 16.0–17.0	.. 21.0–22.0
Width	.. 7.0– 8.0	.. 10.0–10.5
Posterior wing—		
Length	.. 16.0–16.5	.. 20.0–21.0
Width	.. 13.0–14.0	.. 18.5–19.5
Antennae—		
Length	.. 17.0–20.0	.. 23.0–24.0
Cerci—		
Length	.. 15.0–17.0	.. 16.0–18.0

Head about as wide as the pronotum, dark yellowish brown, eyes black, a pair of pale yellowish brown oval markings on either side of the median line, the distance between the markings is about the same as between the markings and eyes. Antennae black 23–24 mm. long, with 56–64 segments.

Pronotum brownish olive, shiny, covered with very fine pubescence except for the median line and irregular pattern lines; somewhat circular sculptured depressions on either side of the median line. Legs brownish black, with the exception of meso- and metathoracic femora which are yellowish brown.



Abdomen cylindrical, somewhat flattened dorso-ventrally, olive black, not quite as shiny as in the males; ninth and tenth tergites dark yellowish olive, shiny. Subgenital plate broader than long, apical margin straight, dark yellowish olive. Sub-anal plates somewhat triangular, black. Cerci black, 16–18 mm. long, with 28–30 segments.

Anterior wings olive brown with dark grey area in the centre which reaches the posterior margin, the veins in this area are bordered with olive brown, so that each cellule is dark, surrounded by an olive brown line. Posterior wings dark grey, costal margin and apex, as far as the cubital veins, olive brown. Cross veins in the anal area bordered with whitish translucent line.

MATERIAL EXAMINED.

Allotype ♀; 1 ♀ and 3 ♂♂ White falls, Mt. Buller, Vic., 25th March, 1958, A. Neboiss; deposited in the collection of the National Museum of Victoria.

ACKNOWLEDGMENTS.

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EXPLANATION OF PLATES.

(Photographs by the Author.)

FIG. 1. General view of the locality near Mt. Mackay. Clumps of silky daisy are on the edge of the stream.

FIG. 2. Close view of a clump of silky daisy with a specimen of *Thaumatoperla alpina* B. & N. on a leaf.