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SHORT COMMUNICATIONS

THE LARVAL STAGE OF THE HIMALAYAN *NEALLOGASTER HERMIONAE* (FRASER) (ANISOPTERA: CORDULEGASTERIDAE)

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The ultimate instar larva of both sexes is described and illustrated on the basis of material from Kameng (Assam, India) and Khumbu Himal (Nepal). Some field notes are provided, and 2 penultimate instar larvae from the Siwapuri Dara (Nepal) are brought on record. The larval characters of *Neallogaster* do not differ significantly from the typical cordulegasterid features, but they are essentially different from the Chlorogomphinae. Considering the close relationship between *Cordulegaster*, *Anotogaster* and *Neallogaster*, it is suggested that the Himalayan region may represent the centre of this group of genera.

INTRODUCTION

The immature stage of the cordulegasterid genus *Neallogaster* has never been described. Whilst preparing a taxonomic revision of Himalayan representatives of this genus (ASAHINA, 1982), I was able to check a pair of exuviae in the Erich Schmidt Collection at my hand. These were taken by Dr. Fernand Schmid from the mountains of Kameng, Assam. I was also fortunate enough to study another collection including a full-grown larva taken by Dr. Bastiaan Kiauta from the Khumbu Himal, Nepal. Finally, by the good offices of Mr Kiyoshi Inoue, I was able to examine two immature larvae in the collection of Osaka Museum of Natural History.

ERICH SCHMIDT COLLECTION

In the Erich Schmidt Collection of larval exuviae I found a small case containing two very small cordulegasterid skins. The note on the cover reads: "12.V.1961, Talung Dzong 7000 ft, Kameng (Assam), Allogaster 1♂ 1♀", which date is the same as that on the label of the 4♂ 5♀ teneral adult specimens in the same collection, as has been recorded in my taxonomic revision now in press (ASAHINA, 1982).

In this small case there was a note written by F. Schmid himself: "All specimens of the date: pris à l'éclosion près de ruisselets courant et boueux sous un couvert de buissons. Conservée vivants 3-4 jours."

On this evidence the exuviae in question are undoubtedly referable to *Neallogaster hermionae* (Fraser).

DESCRIPTION OF THE EXUVIAE

Male and female (exuviae). — Body length ca 30 mm, just a small cordulegasterid: the body surface rough, covered with bristles and long hairs, so that the appearance is a true cordulegasterine, never a cholorogomphine.

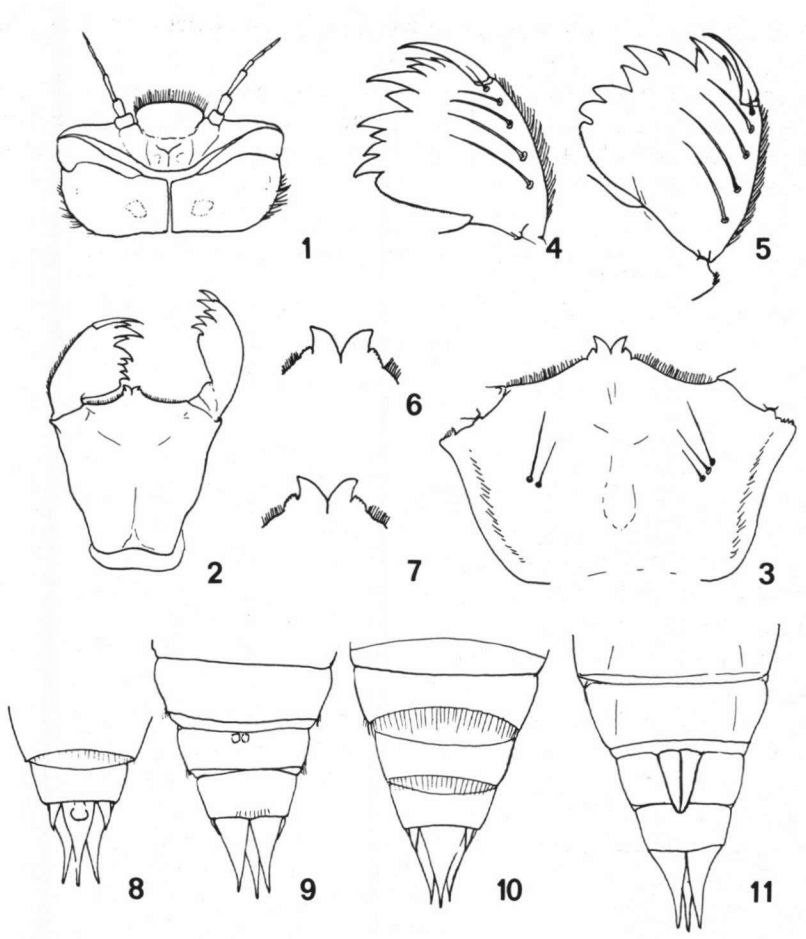
Head square (Fig. 1), frons produced roundly forward making a visor which is beset with long stiff bristles. However, this portion is not particularly developed against the enormously expanded postclypeo-antefrontal sclerite of the adult, of the usual cordulegasterid appearance. Labium of usual shape (Fig. 2), median lobe with an anterior projection as usual, but the details of its shape may be specific (Figs 6, 7). Lateral lobe of labium with 9-10 strong spines, the shape of which is typical of cordulegasterids (Figs 4, 5). Four large setae present on the lateral lobe with a small additional one at the base of the movable hook. There are only two (left) and three (right) setae on mentum in the male (Fig. 3), and three (left) and two (right) in the female.

Thorax small, the wing-sheaths lie parallel in these two dried exuviae. It is not known if the wing-sheats are divergent while alive. Legs short and robust.

Abdomen rather cylindrical, gradually attenuated to the end, and provided with three sharply pointed caudal appendages (Figs 8-11). In the male the cercus is short, only 1/3 the length of the epiproct, at the base of the epiproct the vestige of the future inferior appendage is seen (Fig. 8). In the female the cercus is smaller than in the male, only 1/4 the length of the epiproct. The process of the female ovipositor is strong, extending beyond the sternal end of the 9th segment (Fig. 11).

B. KIAUTA COLLECTION

I studied a male cast skin and a full-grown female larva, the latter preserved in alcohol. These are: 1♂ (exuviae) Phunki 3250 m, Khumbu Himal, Nepal, 8.V.1973; 1♀ (ulitmate instar larva) the same locality and date, both taken by B. & M. Kiauta.



Figs 1-11. *Neallogaster hermionae*, larval exuviae, Kameng, Assam; F. Schmid leg.: (1) Head, dorsal view; — (2) Labium, ventral view; — (3) Median lobe of labium, inner view; — (4) Right lateral lobe of labium, ♂; — (5) The same, ♀; — (6) Process of median lobe of labium, ♂; — (7) The same, ♀; — (8) ♂ abdominal end, dorsal view; — (9) The same, ventral view; — (10) ♀ abdominal end, dorsal view; — (11) The same, ventral view.

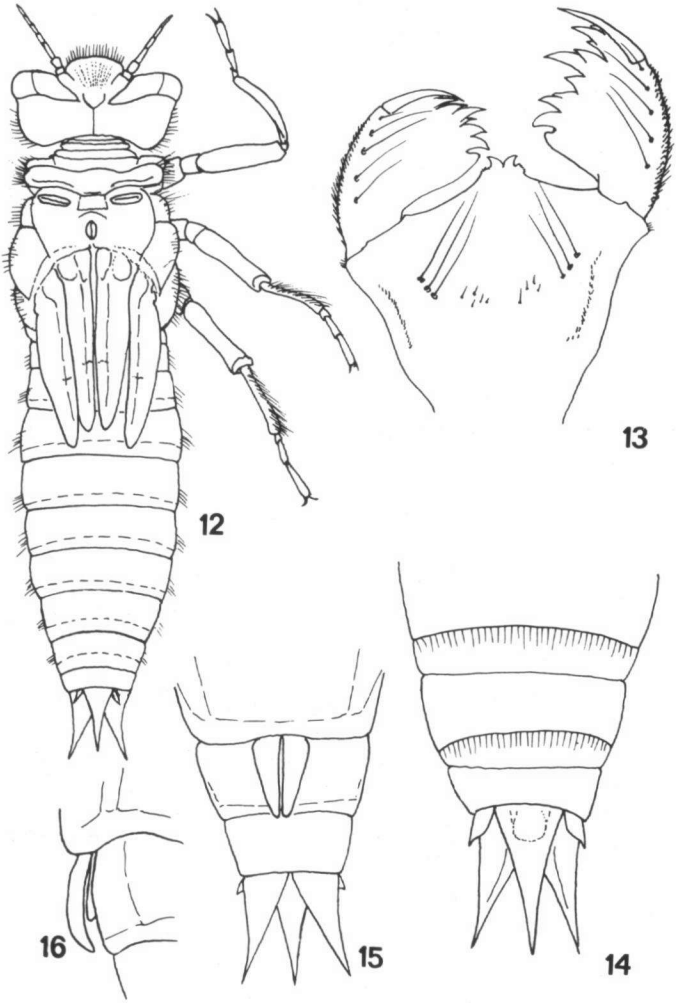
DESCRIPTION OF ULTIMATE INSTAR LARVA

Male (exuviae, lacking dorsal part of the head). — The structure of labium agrees with that of the Assamese specimens described above. The anterior process of the median lobe is not differing from that of the previous specimens. Mental setae 3:3, with additional 4 or 5 minute setae inside them. Strong spines

of lateral lobe 8:9, with a single posterior projection. Lateral setae 4:4, each with one additional anterior minute one.

The abdominal structure is similar to that of the Assamese material (Fig. 14).

Female (full-grown ultimate instar larva). — Body length ca 35 mm due to expansion in alcohol, real size may be less than that, covered with stiff hairs over whole body (Fig.12).



Figs 12-16. *Neallogaster hermionae*, larva, Phunki, Khumbu Himal, Nepal; B. Kiauta leg.: (12) ♀ total insect; — (13) ♀ labium, inner view; — (14) ♂ (exuviae) abdominal end, dorsal view; — (15) ♀ abdominal end, ventral view; — (16) Larval ovipositor processes, lateral view.

The largest width of head 8 mm; the labium as Fig. 13, there is no difference in the shape of the median process of the median lobe. Mental setae 3:4, inner minute ones 5:4; spines of lateral lobe 8+1:1+9; lateral setae 1+4:4+1.

The wing-sheaths are inflated due to maturity, but they are parallel (Fig. 12) unlike those of a *Cordulegaster,* or *Anotogaster,* or *Chlorogomphus* species.

Abdomen spindle-shaped, lanceolate in outline. Neither dorsal nor lateral spine. Caudal appendages (epiproct and paraprocts) sharply pointed, accompanied by very small cerci (Fig. 12). The ovipositor processes are huge (Fig. 16), produced from the base of the 9th sternite, but are well separated in lateral view (Fig. 16).

It is supposed that these two larval specimens belong to *Neallogaster hermionae* when compared with the specimens in the Schmidt Collection. This supposition is supported by the observation made by Dr and Mrs Kiauta at the collection site.

OSAKA MUSEUM OF NATURAL HISTORY COLLECTION

Through a kind arrangement of Mr Kiyoshi Inoue I could examine a collection of dragonfly larvae brought by the survey group from the Kathmandu Valley in 1979. Among the collection the following two specimens were identified to be *Neallogaster hermionae:* 1♀ penultimate instar: Upper stream in Siwapuri, Dara 2520 m, 3.V.1979, Y. Miyatake leg. 1♀ penultimate instar: The same site, 3.V.1979, Katsura & Mano leg.

FIELD NOTES

The following are some field notes supplied by Dr B. Kiauta in his correspondence of March 2 and May 28, 1982, referring to the Khumbu Himal material. For the general topographic situation of the locality cf. Figure 17.

"Very close to the point shown in fig. 2 of LAMBECK & KIAUTA (1973) [where, in May, the adult *Neallogaster* are abundant over the waterfalls and cascades though, due to the difficult terrain, they were never collected], there is a small nameless stream flowing into Phunki Dranka from NW direction. On the stream there are several Tibetan prayer-mills, constructed across the water in such a way that the stream is flowing through the building, powering the rotation of the prayer-mill. The stream has a fine, sandy bottom, in the dry season (when the dragonflies emerge) it is hardly more than 20 cm deep and some 60-80 cm wide. The *Neallogaster* larvae climb out of the water up the prayer-mill walls, and the ecdysis takes place there, some 120-180 cm up on the wall.

The larvae were collected there, at an altitude of 3250 m, on September 17, 1972, and larvae and exuviae (in large numbers) on May 8, 1973.

Neither the monsoon-, nor the winter conditions of the area are known to me. There is considerable snowfall higher up at the Tengpoche Monastery close by. The presence of spruce *(Picea),* which is known to germinate only after the seeds have been exposed to subzero temperatures, indicates that winter temperatures in the locality certainly drop below the 0° C mark.

The water temperature has not been measured. It is a "cold" stream, but due to the shallow water and southward exposition, its temperature certainly is subject to considerable daily fluctuations.

The oviposition of *Neallogaster* has never been observed, and none of the numerous individuals seen on wing seem to be territorial".

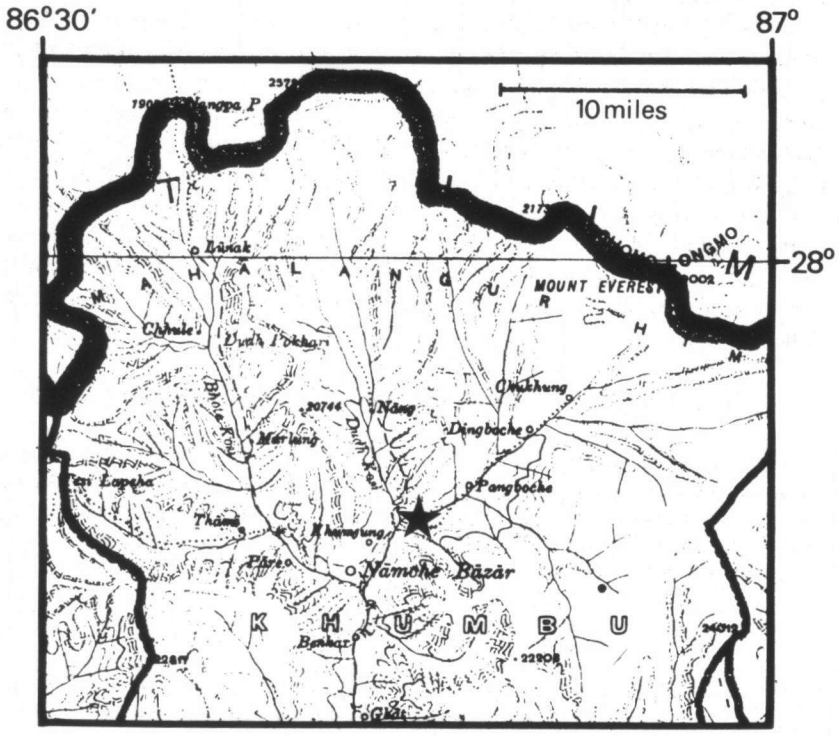


Fig. 17. Topographic position of the Phunki locality (alt. 3250 m) in the Mount Everest area of Khumbu Himal, Nepal (Map U462 East Sheet, Edition 3-GSGS; original scale 1:506.880).

CONCLUDING REMARKS

In spite of my expectation the larval characters of *Neallogaster* do not differ sufficiently from that of typical cordulegasterids, though they are rather different from chlorogomphine larvae. Anyway, if the three genera *Cordulegaster, Anotogaster* and *Neallogaster* are really very closely related, the Himalayan area may be the centre of this group of genera, where all three are found abundantly throughout a long season, today.

ACKNOWLEDGEMENTS

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