

# Notes on *Cordulegaster* Leach, and *Neallogaster* Cowley, from China, and the identity of *Anotogaster annandalei* Fraser (Insecta: Odonata: Anisoptera: Cordulegastridae)

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Zool. Med. Leiden 70 (27), 31.xii.1996: 399-410, figs 1-5.— ISSN 0024-0672.

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Key words: Cordulegastridae; Anisoptera; Odonata; East Palaearctic; China; Fraser; Klots.

A translation of the Chinese description of a female of *Neallogaster annandalei* (Fraser, 1923), by Zhou (1988) is given and compared with the original description of *Anotogaster annandalei*. It is concluded that this species should be included in the genus *Cordulegaster*. A translation of the original Chinese descriptions of *Cordulegaster jinensis* Zhu & Han, 1992, and *Neallogaster choui* Yang & Li, 1994, is presented. It is suggested that the two species are conspecific. Material of "*Cordulegaster luniferous* var. *annandalei* Klots, 1947" from Yunnan is identified as *Neallogaster latifrons* Sélys, 1878 (?), by which the presence of *Neallogaster* in China is confirmed.

## Introduction

Recently, several papers on Chinese Cordulegastridae have been published, in which new species are described. Zhou (1988) described *Anotogaster sakaii* from Zhejiang and reported upon a female of *Neallogaster annandalei* (Fraser, 1923). Zhu & Han (1992) described *Cordulegaster jinensis* from Shanxi, and Yang & Li (1994) described *Neallogaster choui* from Shaanxi. As these papers are predominantly in Chinese with only a short English summary, these have been translated with the financial support of the Uyttenboogaart-Eliassen Stichting, Amsterdam. These texts, with the exclusion of those on *Anotogaster* Sélys, 1854, are reproduced here. The descriptions are compared with those of other East Palaearctic taxa. Specimens in the AMNH reported upon by Klots (1947) as "*Cordulegaster luniferous* var. *annandalei*" turned out to be *Neallogaster* Cowley, 1934, probably *Neallogaster latifrons* Sélys, 1878. The remaining two known specimens of *N. annandalei* have not been examined, since they are not accessible for study. On the basis of the descriptions, however, it is concluded that they do not belong to the genus *Neallogaster*, but to the *Cordulegaster luniferus* species-group.

## *Cordulegaster* Leach, 1815

*Cordulegaster* Leach, 1815: 136; Sélys, 1858: 327; van Pelt, 1993: 268, 1994: 89.

*Thecagaster* Sélys, 1854: 84; Lohmann, 1992: 10.

*Anotogaster*; Fraser, 1923: 451 [partim]; Needham, 1930: 103.

*Allogaster*; Fraser, 1929: 83.

*Neallogaster*; Asahina, 1988: 32; Lohmann, 1992: 11 [partim], 1993: 282.

Van Pelt (1993: 268, 275) suggested that Chinese *Cordulegaster* form a separate species-group, encompassing *C. lunifera* Sélys, 1878, *C. jinensis* Zhu & Han, 1992, and *C. pekinensis* Sélys, 1886. As the diagnostic features were assumed: the anal triangle present (normally with four cells), the frons shaped similarly as in *Anotogaster*, the yellow suffusion on bases of wings

present, especially in females, and their moderate size (males: length abdomen including appendages: 50.0-57.0 mm; females: length abdomen including ovipositor: 53.0-61.0 mm).

*Cordulegaster annandalei* (Fraser, 1923) **comb. nov.**

*Anotogaster annandalei* Fraser, 1923: 451, fig. 1-1a; Needham, 1930: 103.

*Allogaster annandalei*; Fraser, 1929: 83, fig. 6A, pl. xii, fig. 13.

*Neallogaster annandalei*; Zhou, 1988: 72; Yang & Li, 1994: 460.

Not: *Cordulegaster luniferous* var. *annandalei*; Klots, 1947: 4-6, figs 25-29.

This taxon is only known from the holotype specimen and a single female described by Zhou (1988). Material reported upon by Klots (1947) as "*Cordulegaster luniferous* var. *annandalei*" turned out to be *Neallogaster latifrons* Sélys, 1878 (?) (see under that species). The holotype from "West of Pungtzula", collected during the Percy Sladen Trust Expedition to Yunnan under the leadership of J.W. Gregory (1922), was originally preserved in the Indian Museum (Fraser, 1929: 83). Kimmins (1966: 223) listed it as not present in the BM(NH), and stated that "the entomological collections [of the Indian Museum] were subsequently transferred to Zoological Survey of India, but enquiry revealed that most of these types could not be traced, possibly lost by flood damage during wartime storage." As the material was originally preserved "in a raw native spirit", not containing "any great percentage of alcohol" (Fraser, 1923: 447), it is "in a poor and macerated condition" (Fraser, 1929: 83), and one must fear that it is indeed lost. This holds for the type material of *Anotogaster gregoryi* Fraser, 1923, as well. Fraser's figures, however, are generally considered accurate enough. Unfortunately, Zhou did not figure his specimen, and as I have not been able to examine it (attempts to loan it have been in vain until now), only a translation of the description by Zhou is reproduced here.

"Material.— China, Yunnan, Dali: one female, 1.v.1983, leg. Zhou Wenbao (Museum of Natural History Zhejiang).

Description.—Head with labium yellowish brown; labrum with two large bright citron yellow transverse markings, medially separated by a black vertical marking, lateral and posterior margins broadly black; anteclypeus brown; postclypeus brightly yellow, posterior margin with a pair of dull brown round markings; frons brown with a transverse yellow marking on dorsal part, occipital triangle anteriorly and posteriorly dark brown, packed with black long hair.

Thorax with prothorax black, anteriorly yellow, margins of posterior part with yellow line-shaped markings; synthorax black, antehumeral stripe yellow, broad dorsally, ventrally pointed, metepimeron largely yellow, metepisternum with spots on dorsal and ventral parts. Legs black.

Wings hyaline, golden yellow, darker from base to apex along costa forming a colourband, pterostigma yellow, covering 3 cells, triangle with one crossvein, subtriangle without crossvein, nodal index: fore wings 12-19/19-12, hind wings 12-14/13-13; anal loop with 6 cells.

Abdomen blackish brown with yellow markings; segment 1 with small subdorsal spot; segments 2-6 with large subbasal spots, subapical spots small; segments 7-8 with

subbasal spots; segments 9-10 with basal spot. Ovipositor developed and extending beyond tip of abdomen.

Dimensions (in mm).— Total length including ovipositor 84; length abdomen including ovipositor 61; length hind wing 50."

A comparison with the original description reveals various discrepancies: 1) Fraser's description of the labrum indicates that the yellow part is not divided into two separate markings (probably a matter of sexual dimorphism); 2) the postclypeus has a pale brown centre in the type (a matter of description, or due to the macerated condition of the type); 3) there is no indication of any yellow on the dorsal part of the frons in the type; 4) the type has the occipital triangle "raised, yellow", in the female it is dark brown; 5) Fraser does not mention any yellow on the anterior lobe of the prothorax; 6) the type has the antehumeral stripe "curved inwards to nearly meet its fellow below the ante-alar sinus" (Fraser, 1929: 83; see also Needham, 1930: 103) (obviously erroneous, it is normally shaped in the original description and figure (Fraser, 1923: 452, fig. 1); 7) wings entirely hyaline (possibly a matter of age (van Pelt, 1994: 88), and sexual dimorphism (van Pelt, 1994: 89); 8) the pterostigma is dark brown, in the female it is yellow; 9) the type has abdominal segment 1 entirely black (possibly a matter of sexual dimorphism); 10) Zhou does not mention a second spot below the subdorsal one on segment 2; 11) the type has tiny baso-lateral spots on segments 7-8; 12) Fraser (1929: plate xii, fig. 13) figures apical lunules on segment 7 (but not mentioned in the text, the figure is obviously erroneous for in the original description it is noted that these spots are absent); 13) the spot on segment 8 is reniform in the type; 14) Zhou describes the spot on segment 10 as "basal", while the type has a large oval oblique subdorsal spot (possibly a matter of sexual dimorphism?); 15) the type is smaller: length abdomen 55 mm, length hind wing 44 mm [erroneously indicated as 51 mm by Needham, 1930: 103] (a difference in size of 6 mm between sexes is common in Cordulegastridae).

Remarks.— I am not sure whether this specimen is really conspecific with the holotype. Some of the discrepancies can be attributed to sexual dimorphism, to the macerated condition of the type, or to errors in the description. But especially the coloration of the frons, the occipital triangle, the pterostigma, and the markings on abdominal segments 2 and 8 might indicate specific distinctness rather than intraspecific variability.

In both descriptions Fraser (1923: 451; 1929: 83) figures the anal appendages. The position of the posterior teeth is quite remarkable, apparently more posteriorly as in any other cordulegastrid. The characters of *N. annandalei* given by Yang & Li (1994: 460) are based on the descriptions of Fraser and Zhou. However, Yang & Li noted that the spots on abdominal segments 7-10 are connected dorsally, which is obviously erroneous for this feature cannot be taken from either of the descriptions.

Distribution.— I have not been able to find any reference to the type locality, "Pungtzula" (or "Pung Tzu-La"). It is mentioned only once in Fraser (1923). Since all other dragonflies from the Percy Sladen Expedition came from W Yunnan, it is assumed that the type locality is situated somewhere in that region. Dali (= Ta-li: 25°42'N, 100°11'E) is situated at the S border of the Er Hai lake, some 250 km W of Kunming, West Yunnan.

Discussion.— These specimens differ from 'true' *Neallogaster* (see under that

genus) with regards to the shape of the frons. Fraser (1929: 83) mentions the "great height" of the frons, but only after the 'discovery' of the anal triangle in the hind wing. In the original description Fraser does neither note nor figure any difference between *A. annandalei* and *A. gregoryi* in this respect. Also Zhou, while describing his specimen together with a number of *Anotogaster* specimens, does not mention any differences between the genera with regards to the shape of the frons. This similarity, as well as the markings on labrum and postclypeus (yellow instead of concolorous), the absence of wrinkles on the frons, and the dimensions, are in accordance with the assumed characteristics of the *C. lunifera* species-group. The absence of any yellow on the wings in the type is not, but this might be a matter of age. With regards to its distribution, *C. annandalei* might be vicarious with *C. lunifera* from Szechwan, which would be consistent with the idea of essentially vicarious species within a species-group. Therefore this taxon is included here in the genus *Cordulegaster*.

*Cordulegaster jinensis* Zhu & Han, 1992

*Cordulegaster jinensis* Zhu & Han, 1992: 18-21, figs 1-7; van Pelt, 1993: 274-276, figs 16-18, 43-44, 46, 1994: 89.

*Thecagaster jinensis*; Lohmann, 1992: 12.

*Neallogaster lieftincki* Lohmann, 1993: 282-284, figs 18, 20.

This species was described by Zhu & Han (1992) after a series of three males and three females collected in Shanxi, Central China, and deposited in the collection of the Department of Biology, University of Shanxi. Van Pelt (1993: 274) associated a single female in the RMNH from South Shaanxi with this taxon, and subsequently synonymized *Neallogaster lieftincki* Lohmann, 1993, with it (van Pelt, 1994: 89). Unfortunately, I have not been able to examine its type as yet. A translation of the original Chinese description is reproduced below (the numbers in brackets refer to the original figures).

"Description of male.— Head (figs 1-2) black and yellow; face covered with thin black hairs, hairs on crest of frons and upper part more closely set and longer; protruding part of labium yellow; greenish yellow labrum surrounded by thin black margin; anteclypeus brown; postclypeus yellowish green with black posterior margin; anterior part of frons with black part dorsally, basal  $\frac{2}{3}$  of dorsal part of frons brown, posterior  $\frac{1}{3}$  with fan-shaped yellow band near the crest, baso-medially with a short 'handle', anteriorly protruding for about  $\frac{5}{6}$  of the width of the brownish part; occipital triangle yellow, posterior side yellow, vertical black hairs on crest long and dense, back of head swollen, yellow with broad black markings along compound eyes.

Thorax with prothorax black, posterior lobe with a pair of wedge-shaped markings ["ba" = inverted 'V']; synthorax covered with long thin woolly grey-black hair; antehumeral stripes dorsally thick wedge-shaped, diverging ventrally; yellow markings on mesepimeron and metepimeron obliquely situated; yellow marking on metepisternum shaped as an interrupted line, consisting of 4 irregularly shaped small yellow spots, of which one spot above stigma sometimes absent. Legs black.

Wings hyaline and somewhat infusate; costa with yellow, base of all wings with yellow spots; veins black, black pterostigma 3.5-4 mm, covering 3-4 cells, sometimes 5 mm and covering 5 cells; membranula white, long and narrow; nodal index: fore

wings 17-21/20-15, hind wings 16-16/16-17; or: fore wings 15-20/19-14, hind wings 14-14/13-16; or: fore wings 13-16/17-12, hind wings 13-11/12-12; anal triangle with 3-5 cells, Cux 1-2; 2 triangular cells; anal loop with 5-6 or 3-5 cells.

Abdomen (fig. 3) black with greenish yellow markings; a pair of lateral spots on segment 1; segment 2 with a pair of medio-dorsal, posterior and antero-ventral spots, auriculae protruding into the antero-ventral spot, and a horizontally situated antero-medial spot dorsally; segments 3-8 all with a pair of medio-dorsal, posterior and antero-ventral spots, on segments 7-8 the medio-dorsal and antero-ventral spots clearly broader, dorsal spot on segment 8 connected with antero-ventral spots by thin line along jugal suture forming an irregular block of markings, situated perpendicularly to the yellow ventral margin, lunules small; first pairs of spots on segment 9 horizontally situated, vestigial lunules situated dorso-laterally; basal spots on segment 10 vestigial, round, lunules more clearly visible and obliquely situated, diverging anteriorly and sometimes connected with the basal spots laterally.

Appendages (figs 4-5) black; superiors parallel or slightly diverging, apex flat and rectangular and rather thick and blunt, ventrally with both a thick basal and medial tooth pointing downwards, in dorsal view invisible; hind margin of inferior appendage medially emarginate, apices of both sides round and protruding, on each upper edge a small tooth; length of inferior appendages more than  $\frac{2}{3}$  of that of superior appendages.

Dimensions (in mm).— Total length including appendages 75; length abdomen including appendages 57; length hind wing 43.

Description of female.— Marked similar to male, but differs in labrum with wider black margin; anterior part of frons with broad transverse marking; occipital triangle medially brown, its surrounding hairs yellow basally, greyish brown apically; antehumeral stripes with an additional pair of humeral spots (fig. 6); wing with membranula blackish brown, darker than male; nodal index: fore wings 14-19/20-13, hind wings 16-16/15-14; or: fore wings 13-19/19-12, hind wings 14-16/13-14; anal loop with 6-10 cells; abdominal segment 2 (fig. 7) with elongate baso-median marking, dorsal markings narrow and transverse; segments 3-7 with a pair of small transverse baso-median spots; segments 8-10 without apical markings; ovipositor black, basally yellowish brown, length 8 mm, longer than 9th and 10th segment combined.

Dimensions (in mm).— Total length including ovipositor 78; abdomen including ovipositor 61; length hind wing 48."

#### *Neallogaster* Cowley, 1934

*Allogaster* Sélys, 1878: 684; Kirby, 1890: 79; Fraser, 1929: 77-78; Sui & Sun, 1992: 48.

*Neallogaster* Cowley, 1934: 201; Asahina, 1982: 153-171; Lohmann, 1992: 11 [partim].

Asahina (1982: 154) characterized this genus as small-sized cordulegastrids with strong pubescence all over the body, the frons expanded with remarkable wrinkles on the anterior part, and the anterior part of the head concolorous pale brown. The best known species of this genus are *N. latifrons* (Sélys, 1878) [type species], *N. herminiae* (Fraser, 1927), and *N. ornata* Asahina, 1982. Asahina (1982) indicated as size of these species (combined): length abdomen including appendages 44-50 mm, hind wing 34-40 mm (males), and length abdomen including ovipositor 49-54 mm, hind

wing 37-45 mm (females). The other species are larger but known from only one specimen. It remains uncertain whether these are 'true' *Neallogaster*. Van Pelt (1993: 268) suggested that the genus might consist of more than one species-group. Yang & Li (1994: 458) describe the genus as consisting "of small species, which are predominantly distributed throughout the Himalayas. It is closely allied to *Cordulegaster*". As characteristics are mentioned: 1) the shape of the frons, which is "definitely higher than horizon behind it", and 2) the shape of the head, which is "larger in breadth than in length".

*Neallogaster choui* Yang & Li, 1994

*Neallogaster choui* Yang & Li, 1994: 458-460, figs 1-9.

The description of this species is based on two males and one female from Yuanba community, Zheng county, Shaanxi. It has been named *N. choui* after the Chinese entomologist Yao Zhou. The English summary is fair. A translation of the original description (Yang & Li, 1994: 458-460) is reproduced here (the numbers in brackets refer to the original figures).

"Description of male.— Head with labium yellow; labrum yellow, margins narrowly but distinctly bordered with brownish black; anteclypeus black, medially light brownish extending laterally along posterior and anterior margins in the shape of a "gong" [lying capital H]; postclypeus greenish yellow; frons greenish yellow, anterior part below the crest broadly brownish black, dorsal part at base of vertex with a black 'V'-shaped spot; vertex black; around black base of antennae yellow; part of compound eyes hidden by inflated frons [?, technical terms used unclear]; posterior side of head yellowish green, crest of occipital triangle set with a row of black thick hairs; posterior side of occipital triangle medially with a large yellow spot (figs 1, 2).

Thorax with prothorax black, anterior margin with thin irregular yellow line, posterior margin medially and laterally with large yellow spots shaped as long triangles; synthorax black, yellowish green antehumeral stripes long, wedge-shaped, a small wedge-shaped spot on mesinfraepisternum, greenish yellow marking on mesepimeron and metepimeron narrow, metepisternum with four not connected yellow spots, dorsal one round, middle ones shaped as stripes and obliquely placed, ventral spot below the stigma oval (fig. 3). Legs black, short and thick, spines on femora and tibiae short and thick, all pairs of legs with large yellow spot at ventrum of coxae.

Wings hyaline, base with small amount of dull yellow, in each triangle and sub-triangle cell 1 horizontal crossvein; anal loop with 4-5 cells; membranula white and very small; pterostigma blackish brown, with four cells below; anal triangle with 4 cells; nodal index: fore wings 18-20/12-14 [this notation is probably differing from the usual one], hind wings 13-15/14-16; costa and costal crossveins in all wings basally of nodus yellowish.

Abdomen black with yellow markings; segment 1 with laterally a large rectangular spot, dorsal part with ground colour lighter, dark brown, not forming a spot with a distinct margin, on it light yellowish hairs; segment 2 with dorsally 5 spots: an irregular oval baso-dorsal spot, a pair of semicircular medial spots, a pair of semicircular posterior spots, in lateral view a spot anteriorly and posteriorly, anterior one covering the auricula; segments 3-8 with paired medio-dorsal spots and apical

lunules, all semicircular anteriorly, medial spots gradually developing into round spots, on segment 8 oval and more anteriorly situated, apical lunules on subsequent segments becoming smaller and vestigial, apical lunules on segments 7 and 8 absent in male paratype; segment 9 with a pair of baso-lateral spots and a pair of indistinct postero-lateral spots, absent in male paratype, segment 10 with elongate, elliptical medial spots laterally; baso-lateral spot on segment 3 very large, segments 4-8 with a pair of darker baso-ventral spots, most distinct on 6-8; ventral margin of tergites of every abdominal segment yellowish (fig. 4).

Genitalia with penis in lateral view shaped like the head of a dragon (fig. 5), anterior lamina [?, technical term used unclear] thickly set with fine spines, vesica spermalis horse-shoe shaped; accessory genitalia on abdominal segment 2 after removal of penis shown in figs 6-7. Anal appendages black, superiors as long as segment 10, baso-lateral and interior teeth pointed downwards (figs 8-9).

Dimensions (in mm).— Length abdomen including appendages 52-54; hind wing 43.

Description of female.— Marked as male, differing as follows: along entire anterior margin of both fore and hind wings with bright yellow coloration in all costal and subcostal cells; triangle in right fore wing with 2 horizontal veins; more nodal veins as in male; anal loop with 8-9 cells; abdominal segment 2 with baso-dorsal spot oval (fig. 4); 7-8 without apical lunules; 9 with a pair of long oval medio-dorsal spots; 10 brown without spots; 4-7 with baso-ventral spots; ovipositor brownish black, length about 3 times segment 10.

Dimensions (in mm).— Length abdomen including ovipositor 61; length hind wing 49.

Material.— Holotype male, found in Yuanba (Xi'ang [= community]), Zheng (Xian [= county]), Shaanxi, 1200 m asl, 1990.vi.25, collected by students of the class of 1988. Female alloparatype as male. Paratype one male, as male holotype. The types are preserved in the collection of the Department of Entomology, Hanzhong Teacher's College."

Remarks.— Yang & Li give as distinguishing characters: 1) five spots on abdominal segment 2 and four spots on metepisternum, other species have at most four spots on abdominal segment 2. The main differences with *N. annandalei* from Yunnan are given in a table.

Distribution.— The type locality, Yuanba (= Yüan-pa, or Yüan-pa-tzu) is situated at 32°51'N, 106°34'E, in the extreme SW of the Shaanxi province.

Discussion.— With regards to the (yellow) markings on postclypeus and frons this taxon is dissimilar to *Neallogaster*. Yang & Li might have misinterpreted Asahina's description as far as the shape of the head and the frons are concerned in their genus description: "larger in breadth than in length", and "definitely higher than the horizon behind it". The shape of the frons is also mentioned in the description of the head, but the technical terms used cannot be translated with certainty (Dr Xuexin Chen, pers. comm.). The figure, however, indicates that the frons is less inflated than in 'true' *Neallogaster*. *N. choui* is also larger, in fact, it is of the same size as *C. annandalei* and *C. jinensis*. The markings of the frons, the additional spot on abdominal segment 2, the baso-lateral spots on segment 3, and the baso-ventral spots on 4-8, are very reminiscent to those in the latter species, although the abdominal

markings in general appear to be somewhat smaller in *N. choui*. Other difference are: 1) anteclypeus brown in *C. jinensis*, in *N. choui* black with a "gong"-shaped light brownish marking (in *C. jinensis* the anteclypeus has at least the posterior margin yellowish (van Pelt, 1993: 274, fig. 16), and it might even be lighter coloured medially (Zhu & Han, 1992: 19, fig. 1)); 2) there is no indication of a black posterior margin of the postclypeus in *N. choui* (probably a matter of description, the adjacent anterior margin of the anteclypeus is also black); 3) there is no indication of yellow on the anterior margin of the prothorax in *C. jinensis* (absent in the RMNH female from S Shaanxi); 4) there is no indication of yellow on the mesinfraepisternum of *C. jinensis* (present in the RMNH female); 5) there is no indication of yellow on the coxae of *C. jinensis* (present in the RMNH female); 6) there is no indication of an indistinct lighter marking on abdominal segment 1 of *C. jinensis* (in the RMNH female the ground colour here is indeed somewhat lighter); 7) the length of the abdomen of male *C. jinensis* is 57 mm, 52-54 mm in male *N. choui* (all other dimensions of males and females of both taxa indicate they are of the same size); 8) in *C. jinensis* females there is an additional humeral spot (possibly a variable character (cf. van Pelt, 1993: 278, fig. 18); 9) there is no indication of a light base of the ovipositor in *N. choui*.

On the basis of this comparison, and since *N. choui* was collected in S Shaanxi, from which area *C. jinensis* was already known (van Pelt, 1993: 274), the two taxa might well be conspecific. Yang & Li submitted their paper for publication in 1991, but it was published only in 1994, so the absence of any reference to Zhu & Han (1992) is clear.

*Neallogaster latifrons* Sélys, 1878 (?)  
(figs 1-5)

*Allogaster latifrons* Sélys, 1878: 684; Sui & Sun, 1992: 48.

*Cordulegaster luniferous* var. *annandalei*; Klots, 1947: 4-6, figs 25-29.

*Neallogaster latifrons*; Asahina, 1982: 158, figs 5-6, 17-18, 23-33, 1991: 23, fig. 1-3.

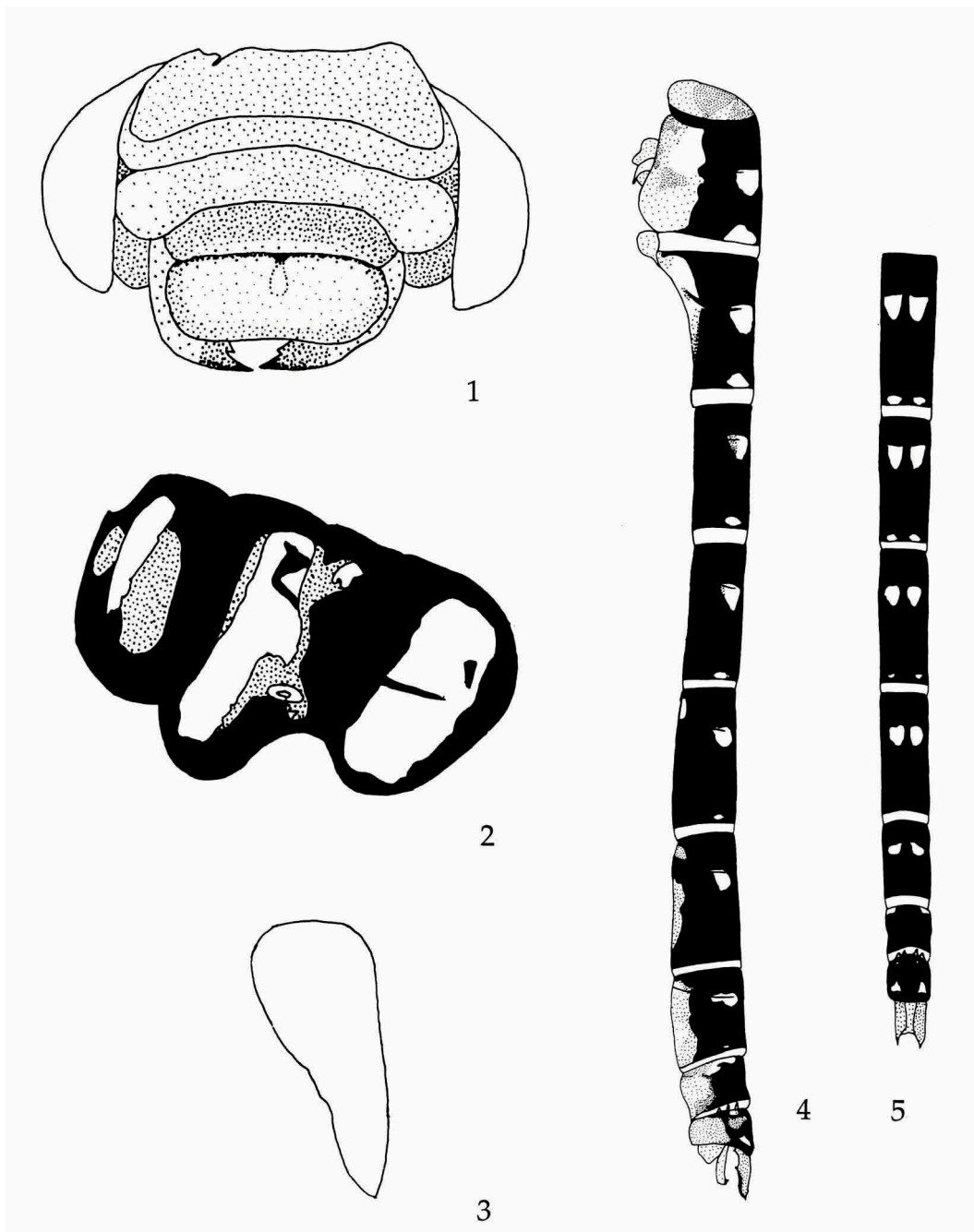
Material.— China, Yunnan: "Loutes-chiang", two males (one with abdominal segments 4-10 missing), leg. Father A. Genestier (AMNH).

Description of complete male.— Head (fig. 1) with labium ochreous-brown; labrum ochreous-brown broadly bordered with reddish brown, bordered with black only at anterior margin; anteclypeus dark brown, posterior part reddish brown; postclypeus reddish brown with lighter lateral portions (incomplete male with larger lateral lighter portions); frons wrinkled, anteriorly and dorsally reddish brown; occipital triangle not raised, yellowish brown, fringed with black hairs.

Thorax (fig. 2) with prothorax reddish brown, posterior lobe black with a lateral yellow triangular spots; synthorax reddish brown to black with a rather short yellow antehumeral stripe (fig. 3), broad dorsally, ventrally pointed; stripe on mesepimeron damaged, dorsally broader than ventrally, posterior margin sharply curved medially, metepisternum with a dorsal spot and a small one ventrally of the spiracle, the incomplete specimen has an additional medial spot. Legs entirely reddish brown to black.

Wings hyaline, saffronated from base to arculus in hind wing, halfway to Arc in fore wing, lighter saffronation along subcosta to nodus; pterostigma light reddish





Figs 1-5. *Neallogaster latifrons* Sélys, 1878 (?); 1, head in anterior view; 2, thorax in left lateral view; 3, left antehumeral stripe in antero-dorsal view; 4, abdomen in left lateral view; 5 abdominal segments 4-10 in dorsal view.

brown, 3-4 mm long; all discoidal cells with one crossvein; subtriangle entire; nodal index: fore wings 13-17/17-13, hind wings 14-12/12-14; anal loop with 5 cells; anal triangle with 4 cells (3 in right hind wing of complete male).

Abdomen (fig. 4-5) black and yellow; segment 1 dark reddish brown, ventral half reddish brown to yellowish brown; segment 2 with subdorsal spot just behind the jugum on either side and a lateral spot below it (at auriculae to anterior margin); apically a pair of subtriangular subdorsal spots, ventral portion of segment reddish brown to yellowish brown; segment 3 with dorsally separated anterior spots, apical lunules almost round, antero-ventral spot reddish brown, extending posteriorly to about  $\frac{2}{3}$  of segment; segments 4-5 as 3, with somewhat smaller markings, without lighter portions on ventral part; segment 6 as 4-5, with smaller spots, lunules vestigial, small longitudinal antero-ventral spot present; segment 7 with subbasal spots and antero-ventral spots small, postero-ventral part reddish brown; segment 8 as 7, with vestigial lunules and ventral part reddish brown; segment 9 with only baso-lateral spot, ventral part reddish brown; segment 10 with oblique postero-dorsal spot, largely reddish brown.

Appendages brownish to black; superiors generally shaped as in *N. latifrons* (Asahina, 1982: 161, figs 30-31), but with the posterior teeth somewhat more visible in lateral view; inferior appendage normally shaped, apically narrowed.

Dimensions (in mm).— Total length including appendages 68; length abdomen including appendages 52; length fore wing 40; length hind wing 39. The incomplete specimen is of about the same size.

Remarks.— A third specimen of this series has not been examined, which was also reported upon by Klots, whose figures of this material are excellent. The specimens agree well with the description of *Neallogaster latifrons* in Asahina (1982: 158), but differ in: 1) anal triangle with 4 cells; 2) metepisternum with yellow markings; 3) markings on the abdomen generally larger. It is also slightly larger. Unfortunately, I have not seen other material of *N. latifrons*, and it remains uncertain whether the present material is really conspecific with that species.

Distribution.— Wagener (1961: 91) was not able to trace "Lou-tse-kiang", but stated "vermutlich ist damit der Lu Kiang (Lu-ch'iang), wie der Salween im Oberlauf genannt wird, gemeint; Prov. Yunnan)." [probably is meant the Lu Kiang, as the Salween is called in its upper course]. Chao (1992: 3) did not list *Neallogaster* from Yunnan, but Sui & Sun (1992: 48) reported upon 2 males collected by the Comprehensive Scientific Expedition to the Qinghai-Xizang plateau, Hengduan mountains, Yunnan (Mang kang hai tong, 3250 asl, 8-9.viii.1982). This is probably Mainkung [= Menk'ung], 28°30'N, 98°20'E, in the valley of the Salween [= Nu Jiang]. These specimens are not described, but it is assumed here that this material is conspecific with the present material. According to Asahina (1982: 162), *N. latifrons* is known from India (Sikkim and Darjeeling district) and Nepal (East and Central). If the present material is indeed conspecific with *N. latifrons*, the known range of this species is extended with some 900 kms in an eastward direction. The presence of *Neallogaster* in China is in any case confirmed, but the genus appears to be restricted to habitats at higher altitudes in the Himalayas. It therefore remains uncertain whether its distribution overlaps that of the *Cordulegaster lunifera* species-group, as it does overlap that of *C. brevistigma* in NW India.

### Acknowledgements and abbreviations

I wish to thank Dr B. Kiauta for kindly presenting me literature, Dr Sule Oygur (AMNH) for sending me material on loan, P.N. Kuiper (Sinology, University Leiden, The Netherlands) for the translation of the Chinese texts, and Dr Xuexin Chen (currently RMNH) for the interpretation of various Chinese technical terms. I am very grateful for the financial support of the Uyttenboogaart-Eliassen Stichting, Amsterdam. Abbreviations: RMNH: Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands; AMNH: American Museum of Natural History, New York, USA; BM(NH): British Museum (Natural History).

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Received: 16.x.1996

Accepted: 17.x.1996

Edited: C. v. Achterberg