

CONTRIBUTION TO THE TAXONOMICAL STUDIES OF
NEUROPTERA (SUBORDER PLANIPENNIA) FROM EASTERN INDIA
III. FAMILY CHRYSOPIDAE

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INTRODUCTION

The Chrysopids, popularly known as green lacewings, are predators on various insect pests of agriculture and other plantations. The group thus attracted the attention of systematics for a long time.

The taxonomic study of the group has received so far less attention from the Indian subregion. No consolidated work on the fauna particularly from Eastern India has been published excepting for a few stray papers. Therefore, an attempt has been made to provide a comprehensive account of the fauna on the basis of named and also unnamed collections, collected by different Survey parties including the author, of Zoological Survey of India. The paper deals with a brief review on earlier investigations, general distribution, review on taxonomy, external morphology and terminology related to the group, taxonomic studies coupled with keys to taxa, redescription wherever necessary, description of a new species and biogeographical account. Besides, the description of an unknown female, morpho-variations and new locality records have been incorporated. Over and above, the text has been suitably illustrated and the literature review of those species, marked asterisk (*), has been made due to the lack of material for study. It may be mentioned here that five species placed under *Chrysopa* are doubtful concerning their generic identity. Because *C. virgestes* and *C. ignobilis* are represented only by females and relevant material for the study of *C. notata* Navas, *C. guttata* Navas and *C. madestes* Banks are not available. However, altogether 24 species in 11 genera and 2 subfamilies have been reported in this paper.

EARLIER INVESTIGATION

The Chrysopid fauna from India is not well known. The work, whatever known, is mainly based on the scattered account rendered by various workers including Walker (1853, 1859), Neeham (1909), Navas (1910, 1912 - 1914, 1928-1932,) Banks (1911, 1933 & 1939), Kimmins (1938 & 1955) and Ghosh (1976 a, 1976 b, 1977 a - d, 1980, 1981 & 1983). Amongst a total of 52 species reported by these workers only 16 are so far known to occur in the Eastern Peninsular and Himalayan sectors of India.

GEOGRAPHICAL DISTRIBUTION

The *distribution* of the Chrysopid fauna highlights certain important aspects.

Amongst a total of twentyfour species from Eastern India, *Anisochrysa boninensis* (Okamoto) is represented from the Ethiopian, Palaearctic and Oriental regions and other two species, namely, *Anisochrysa alcestes* (Banks) and also *Brinckochrysa scelestes* Banks are represented from both the Palaearctic and Oriental regions. Of the remaining species, all are endemic in India except *Ankylopteryx octopunctata* (Fabricius) which extends from Oriental region to the Papuan region of the globe.

The material from Eastern India constitute about 50% of the entire Indian fauna and they occur in the north-eastern Himalayas particularly Sikkim, Assam and Darjeeling of West Bengal and also in Peninsular India with special reference to Bihar, Orissa and West Bengal. It is interesting to note that five species constitute new locality records for the different states of India, one species and the female of another species are for the first time recorded from India.

REVIEW ON THE TAXONOMY

A lot of confusion exists in the taxonomy of the group specially on the placement of the species in proper genera. Quite a large number of species have been placed in the genus *Chrysopa* though they belong to different genera erected by the modern taxonomists. Tjeder (1966) on the basis of male genitalia considered eight subgenera of *Chrysopa*. Subsequent workers raised the status of some of the genera namely, *Chrysoperla*, *Anisochrysa* etc. to the generic level. In this context, it may be pointed out that several Indian species of *Chrysopa* viz., *C. orestes* Banks, *C. alcestes* Banks, *C. boninensis* Okamoto, *C. scelestes* Banks and *C. lacciperda* Kimmins also are not true *Chrysopa* but belong to different genera as substantiated by the study of wings and male genitalia of the species. Similarly, eight species of *Nothochrysa* described by different authors are not true *Nothochrysa* but some of them belong to the genus *Italochrysa*. Two type species namely, *N. indigena* Needham and *N. robusta* Needham examined by the author led him to conclude that species *indigena* is a true *Nothochrysa* but the species *robusta* belongs to the genus *Italochrysa*.

EXTERNAL MORPHOLOGY AND TERMINOLOGY

Adults medium-sized with a length of forewing 6.5-35 mm.; head: with prominent compound eyes; ocelli absent; antenna : multisegmented and filiform; maxillary palpi : 5-segmented and second segment always short; labial palpi : 3-segmented; mandibles well-developed; pronotum: either transverse or longer than wide at base and without lateral projection; meso - and metathorax: prescutum of mesothorax large, divided by a suture longitudinally into two halves; meso- and metascutum constricted at middle forming thereby narrowly separated lobes; legs : slender, hind pair longer than other two pairs; tarsi 5-segmented with a pair of curved claws; wings: large, usually subequal, pterostigma present but sometimes indistinct, microtrichiae only on a short area in anal

angle of forewing and margin with dense fringes but without trichosors; usually without wing-coupling apparatus; humeral veinlet not recurrent; subcostal area of forewing usually with a single basal crossvein and a few apical ones in the pterostigmatic region; Sc long reaching wing margin beyond pterostigma; radius (R) long, parallel and close to Sc; radial sector (Rs) single; media (M) usually forked; intramedian cell (im) of different shapes usually present; two cells (m_1 & m_2) between M and Cu_1 ; pseudomedia (psm) formed by the fusion of M beyond im with the branches of Rs usually straight; cubitus 1 and Cubitus 2 (Cu_1 & Cu_2) arising from a common stem; Cu_1 & Cu_2 enclosing three cells; beyond the cell m_2 , Cu_1 fused with the branches from median to form pseudocubitus (psc); abdomen: usually cylindrical or nearly so; 8 pairs of spiracles; cercal callus and trichobothria present; gonarcus and hypandrium internum in male genitalia and spermatheca in female always present.

SYSTEMATIC ACCOUNT

Key to the Subfamilies of the family CHRYSOPIDAE

- psm of forewing merged with inner gradate series; jugal lobe of forewing large and tympanal organ absent; frenulum on hindwing present.....
 Nothochrysinæ Navas
- psm of forewing merges with outer gradate series; jugal lobe of forewing absent; frenulum of hindwing if present, reduced

 Chrysopinæ Esben-Petersen

Subfamily A. CHRYSOPINAE Esben-Petersen

Forewing : Tympanum absent; R dilated underside near base; one crossvein near base of subcostal area; M forked; an intra-median cell (of different shapes) usually present; Rs arising distally to furcation of M; second medio-cubital crossvein located distally or near to the furcation of M; psm straight and usually merging with outer gradate; psc never merges with outer gradate series; jugal lobe of forewing lacking; hindwing: frenulum if present, reduced.

Key to the genera of Subfamily CHRYSOPINAE

1. Costal area at first narrow, then gradually widening 2
 Costa steep at base..... *Ankylopteryx* Brauer
2. Forewing with only two rows of gradate..... 3
 Forewing with more than two rows or irregular gradates..... 9
3. Small to medium-sized insects; cell im usually subtriangular; basal subcostal crossvein beyond first medio-cubital crossvein..... 4

- Robust species, usually large to very large; cell im usually subquadrangular; basal subcostal crossvein located about midway between first medio-cubital crossvein and furcation of M..... 7
4. Sternite 8 & 9 completely fused..... 5
 Sternite 8 & 9 separated by intersegmental membrane.....

*Chrysopa* Leach
5. Genitalia in male with tignum..... 6
 Genitalia in male without tignum*Glenochrysa* Esben-Petersen
6. Genitalia in male with gonapsis.....*Anisochrysa* Nakahara
 Genitalia in male without gonapsis*Chrysoperla* Steinmann
7. Gonarcus in male with entoprocessus..... 8
 Gonarcus without entoprocessus*Italochrysa* Principi
8. Male with pseudopennis.....*Ceratochrysa* Tjeder
 Male without pseudopennis.....*Brinckochrysa* Tjeder
9. Forewing with three rows of gradate veinlets.....*Chrysopidia* Navas
 Forewing with irregularly distributed gradate veinlets over the disc

*Tumeochrysa* Needham

Genus I. *Italochrysa* Principi

1946. *Italochrysa* Principi, *Boll. Lst. Ent. Univ. Bologna*, 15 : 86.

Diagnostic characters : Usually large-sized robust species; antenna : stout and flagellum with four concentric rings of short setae; forewing : jugal lobe lacking; cell im usually subquadrangular; basal crossvein in subcostal area located about midway between first mediocubital crossvein and furcation of M; Cell m_2 longer than m_1 ; psm merges with outer gradate series; abdomen: sternite 8 and 9 fused; male genitalia: gonarcus without entoprocessus; arcessus large and toothed at apex; paramere long and united at base; hypandrium internum with large comes; female genitalia: subgenital long, weak tube with a pair of apical lobes and ventral ridge; spermatheca large with large vela and usually deep ventral impression.

Type species : *Hemerobius italicus* Rossi.

Distribution : Abyssinia, Central and South Africa, Japan, Palestine, Iran, India, the Sunda Islands, China and Australia.

Remarks : Principi (1946) erected this genus. Ghosh (1981) described a species in this genus. So, only two species including the present one are so far reported from India.

1. *Italochrysa robusta* (Needham), comb. nov.1909. *Nothochrysa robusta* Needham, *Rec. Indian Mus.*, 3 : 202.

Redescription : Head (Fig. 1) without spot, brownish; clypeus and frons: brownish; palpi and labrum: dark brown; antenna: flagellum brown with four concentric rings of short setae; other parts discoloured; pronotum : (Fig. 1) broader than long with front angles broadly eroded and hind angles squared; brown in colour with both fore- and hind borders darker; with dorso-median longitudinal groove; meso- and metanotum: brown; wings: hyaline, without spot; pterostigma elongated, pale-yellowish; longitudinal veins yellow; forewing (fig. 2): cell im long, sub-rectangular; costal crossveins pale yellow with several basal crossveins with black ends; crossveins between R & Rs, two radio-medial crossveins, 1st crossvein between psm & m₂ and psc & m₂, three cubital crossveins and both inner and outer gradates black; branches of Rs basally black; crossveins between psm and psc black at each end; marginal forks black: inner gradates with 18 and outer gradates with 15 crossveins; hindwing: both inner and outer gradates yellow; leg: brownish yellow; abdomen: discoloured and all but two basal segments missing.

Measurements : 1 ex: length of forewing, 30 mm, hind wing, 25 mm.

Material examined : *Female* : India, Assam, Sibsagar (Coll. S. E. Peal) Reg. No. 9899/15.

Distribution : India (Assam).

Remarks : Amongst a couple of specimens referred to by Needham (1909), a single flood damaged specimen bearing registered no. referred to above was available for study. After a careful examination of the wings of this largest chrysopid species so far known, the present author considers the species *robusta* Needham under the genus *Italochrysa* Principi as psm merges with outer gradate series and also other characters related to the wing agree with this genus. However, the genitalic studies were not possible due to the missing apical abdominal segments.

2. *Italochrysa* sp.

Description : Head: yellow including vertex; clypeus, labrum and palpi : yellow; labium : longer than maxillae; antenna : yellow; flagellum with four concentric rows of setae at the middle and apical parts and 3 rows basad; pronotum : yellow, broader than long and with a rounded black spot on either side; with short hairs but moderately long hairs at the region of the spot; wings (figs. 3 & 4): hyaline, without spot; pterostigma pale; all longitudinal veins pale yellow; several crossveins between R & Rs brown but with yellowish ends; cell im much narrower distally and subrectangular; 1st radio-medial crossvein, crossvein between m₁ & m₂ and m₂ & im brown; outer gradates black and merges with psm; inner gradates with 6 and outer gradates with 7 crossveins; apical crossveins between psm & psc black; hindwing: all longitudinal and crossveins but a few partially brownish; apical crossveins between R & Rs pale yellow; both inner and outer

gradates with 5 crossveins; legs: yellow with brown tarsi; abdomen : brownish with short white hairs.

Measurements : 1 ex : length of forewing, 15 mm, hindwing, 14 mm.

Material examined : India, West Bengal, Darjeeling, Singla, 16.iv.1973 (Coll. H. S. Sharma & party).

Distribution : India (West Bengal).

Remarks : Due to the paucity and damaged condition of the material the specimens, though interesting, could not be identified upto species level. However, the species is not agreeing with any of the species so far known from India.

Genus II. *Chrysoperla* Steinmann

1964. *Chrysoperla* Steinmann, *Ann. Hist. -nat. Mus. Nation. Hung., Zool.*, 56 : 260.

Diagnostic characters : Small to medium sized insects; forewing costal area of moderate width; single crossvein in basal part of subcostal area located above the basal part of cell m_2 ; cell im usually ovate and small; usually with two pairs of gradates; hindwing: M & Rs fused for a short distance near base; abdomen: sternites 8 and 9 completely fused in males; male genitalia: tignum present; gonarcus with a pair of entoprocessus and an arcessus; pseudopennis and gonapsis absent.

Type species : *Chrysopa carnea* Stephens.

Distribution : All major regions of the globe.

Remarks : The following Indian species is included in the genus *Chrysoperla* erected by Steinman (1964).

3. *Chrysoperla orestes* (Banks), Comb. nov.

1911. *Chrysopa orestes* Bank, *Proc. ent. Soc. Wash*, 13 : 102.

Redescription : Labrum, clypeus and frons: whitish, a narrow red fascia on lateral margins of frons and red suffusion on either side at the basal portion of clypeus; a narrow black stripe under each eye; vertex : bright yellow; antenna: yellow to fuscous; with a black on outer side of basal joint; pronotum: broad but narrowed in front; with transverse groove and ridge; antero-lateral corners with red fascia; meso- and metanotum: greenish-yellow; forewing: short and broad with tip subacute; venation pale; gradate veinlets, the ends of costal veinlets and a few other crossveins brown; divisory veinlet ending beyond first radio-medial crossvein; gradate veinlets 3/6; inner gradates plainly nearer to outer than to radial sector; pterostigma yellowish; hindwing: slender, gradate veinlets 3/2; leg: pale yellow; tarsi brown; abdomen: brownish; male genitalia: gonarcus arch-shaped; entoprocessus small with more or less acute apex; arcessus elongated with curved tip; tignum arched and with long acumen; female genitalia: spermatheca with high vella.

Measurements : ♂♂ : length of forewing, 9-12 mm, hindwing, 7-10 mm; ♀♀ : length of forewing, 12-13 mm. hindwing, 10 - 11 mm.

Material examined : 42 exs. (♂♂, ♀♀) : 17 exs, India, Nadia, Ranaghat, Purnanagar, 24-27.vi.1982, 1 ex, loc. Ibid., 9.ii.1982, 2 exs., loc. Ibid., 10.vii.1982; 8 exs., 24-Prgs., Kumra, 24-26.iv.1982, 1 ex., loc. Ibid., 11.ii.1982; 3 exs., 24-Prgs., Kuthipara, 12.v.1982 (Coll. D. R. Maulik); 7 exs., Burdwan, Panagarh, Kanksa forest, 9.ii.1984 (Coll. S. K. Ghosh); 2 exs., 24-Prgs., Kakdwip, 18.ii.1984 (Coll. S. K. Ghosh); 1 ex., Orissa, Balasore, Khantapara, 28.ix.1974 (Coll. B. C. Saha).

Distribution : India (Bihar, West Bengal and Orissa).

Remarks : The species was originally described under the genus *Chrysopa* by Banks (1911). But the genitalia specially of males is very characteristics to place the species under the genus *Chrysoperla*. However, the species is for the first time recorded from Orissa and West Bengal.

Genus III. *Anisochrysa* Nakahara

1955. *Anisochrysa* Nakahara, *Kontyu*, 23 (4) : 145.

Diagnostic characters : Small to medium sized insects; antenna: usually shorter but sometimes equal to or longer than forewing; wings: venation similar to *Chrysoperla*; abdomen: 8th and 9th sternites completely fused; male genitalia: tignum, gonarcus and gonapsis present; gonarcus with or without entoprocessus; pseudopennis absent.

Type species : *Anisochrysa paradoxa* Nakahara.

Distribution : Africa, Europe, Asia including India, Australia and Islands in the Pacific.

Remarks : Nakahara (1955) though erected the genus but Tjeder (1966) gave it a subgeneric status. Presently, *Anisochrysa* is considered as genus to accommodate two Indian species.

Key to the species of the genus *Anisochrysa* Nakahara

- Gradates of forewing black and all other cross veins dark at each end; gena with red mark.....*alcestes* (Banks)
- Gradates of forewing and most other crossveins pale; gena with black mark.....*boninensis* Okamoto

4. *Anisochrysa boninensis* Okamoto, Comb. nov.

1914. *Chrysopa boninensis* Okamoto, Jour. Coll. Agr. Tohoku Univ., 6 : 62; 1919, *Rep. Hokkaido Agric. Exper. Sta.*; 9 : 61.
1924. *Chrysopa boninensis*, Kuwayama, *Trans. Nat. Hist. Soc. Formosa*, 13 : 12; 1956, *Trans. Shikoku ent. Soc.*, 5 : 29; 1962, *Pacif. Insects*, 4(2) : 365.
1959. *Chrysopa boninensis*, Adams, *Insects of Micronesia*, 8, no. 2 : 28.
1927. *Chrysopa rutila* Esben-Petersen, *Ann. Mag. nat. Hist.*, (9) 19 : 453.
1929. *Chrysopa obliqua* Navas, *Ann. Mus. Civ. Storia Nat. Giacomo Doria*, 53 : 362.

1966. *Chrysopa (Anisochrysa) boninensis*, Tjeder, *South Afr. Anim. Life*, **12** : 476.

Measurements : ♂♂ : Length of forewing, 12-13 mm, hindwing, 11-11.5 mm; ♀♀ : length of forewing, 13-14.4 mm, hind wing, 12-13.5 mm.

Material examined : 15 exs (♂♂, ♀♀), India, West Bengal, 24-Prgs., Kumra, 24-26.iv.1982 (Coll. D. R, Maulik).

Distribution : Japan, Ryukyu Is., Bonin Is., Chagos Is., Central and South Africa, Cape Verde Is., Taiwan, India (West Bengal).

Remarks : Adams (1959), while studying the Micronesian chrysopids, redescribed the species under the genus *Chrysopa* along with the figures of male genitalia. Tjeder (1966) examined the species from Bonin Island, African continent and Cape Verde Island and recorded his observations by describing the species under *Chrysopa (Anisochrysa)* in details from different places along with illustration of wings and genitalia. However, the author in course of his study of the material of Chrysopids from north-east India encountered the aforesaid species from West Bengal and considered it under the genus *Anisochrysa* on the basis of male genitalic structures. All the specimens are agreeing with the specimens from Bonin Island in having black genal spot, pronotum with mid-dorsal stripe, inner gradate with six and outer gradate with seven crossveins and characteristic genital elements in males e.g., narrowly arched gonarcus along with ovate side-pieces but without entoprocessus, long arcessus, flattened gonapsis splitting distally into two prongs, left one being narrower and also with long and narrow lateral arms and angularly arched tignum with indistinct acumen. So, with the first record of the species from India the distributional range has further been extended.

5. *Anisochrysa alcestes* (Banks), comb. nov.

1911. *Chrysopa alcestes* Banks, *Proc. ent. Soc. Wash*, **13** : 102.

1959. *Chrysopa alcestes*, Adams, *Insects of Micronesia*, **8**, no. 2: 32.

Measurements : ♂♂ : length of forewing, 11-12 mm, hindwing, 9-10 mm; ♀♀ : length of forewing, 12-13 mm, hindwing, 10-11 mm.

Material examined : 20 exs. (♂♂, ♀♀) : India, West Bengal, Burdwan, Panagarh, Kanksa forest, 9.ii.1984 (Coll. S.K. Ghosh).

Distribution : Bonin Is., India (West Bengal).

Remarks : Adams (1959) redescribed the species under the genus *Chrysopa* along with suitable illustrations while studying the type described by Banks (1911) and also a few Micronesian specimens. Presently, the author has collected quite a large number of specimens from a forest locality of West Bengal. The specimens agree with the descriptions given by Adams (*loc. cit.*) and Banks (*loc. cit.*) except the red suffusion on the frontal suture. Considering the genital armature the species is now being placed in the genus *Anisochrysa* which was considered by Tjeder (1966) as subgenus. The species constitutes new locality record for West Bengal.

Genus IV *Brinckochrysa* Tjeder

1966. *Brinckochrysa* Tjeder, *South Afr. Anim. Life*, 12 : 360.

Diagnostic characters : Antenna : little longer than forewing; wing venation: *Chrysoperla* - pattern; abdomen: ectoproct distinctly separated dorsally but completely fused with tergite 9 laterally and forming a lappet-like structure with the enlargement of ventral margin proximally; male genitalia: without tignum, pseudopennis and gonapsis; gonarcus with a pair of entoprocessus and a spine-like arcessus.

Type species : *Chrysopa (Brinckochrysa) peri* Tjeder.

Distribution : Micronesia, South Africa, Congo, Cape Verde Islands and India.

Remarks : Tjeder (1966) erected the subgenus under the genus *Chrysopa*. But the male genitalia is quite significant to raise the status to generic level. Only one species is so far recorded from India which is dealt with here.

6. *Brinckochrysa scelestes* (Banks), comb. nov.

1911. *Chrysopa scelestes* Banks, *Proc. ent. Soc. Wash*, 13 : 103.

1959. *Chrysopa scelestes*, Adams, *Insects of Micronesia*, 8, no. 2 : 28.

1966. *Chrysopa (Brinckochrysa) scelestes*, Tjeder, *South Afr. Anim. Life*, 12 : 361.

Measurement : ♀♀ : length of forewing, 13.5 mm, hindwing, 11.5 mm.

Material examined : 1 ♀ : India, West Bengal, Darjeeling, Rangia forest Rest house, 5.iv.1973 (Coll. H. S. Sharma).

Distribution : India (Bihar & West Bengal); Micronesia.

Remarks : Adams (1959) redescribed the species under the genus *Chrysopa* on the basis of type described by Banks (1911) and also the specimens available to him from Micronesia. Later, Tjeder (1966) referred to this species under *Chrysopa (Brinckochrysa)*. Presently, the author on the basis of male genitalic structures as described and figured by both Adams & Tjeder (*loc. cit.*) raised the status of the subgenus to the generic level to accommodate the concerned species. However, the species is a new record for West Bengal.

Genus V *Ceratochrysa* Tjeder

1966. *Ceratochrysa* Tjeder, *South Afr. Anim. life*. 12 : 352.

Diagnostic characters : Antenna : very long, longer than forewing; forewing : inner gradates few in number in comparison to outer gradate; abdomen: ectoprocts not fused with each other dorsally and a distinct suture present between them; sternites 8 and 9 fused in males; male genitalia: without tignum and gonapsis; gonarcus without arcessus; pseudopennis present; female genitalia: subgenital sternite-like and hairy.

Type species : *Chrysopa ceratina* Navas.

Distribution : South Africa, Katanga; "Guinea" and India.

Remarks : Tjeder (1966) treated this as a subgenus of *Chrysopa*. But the distinctive male and female genitalia are sufficient to raise the status to a generic level. Only a single species from India may be considered under the genus.

7. *Ceratochrysa lacciperda* (Kimmins) comb. nov.

1955. *Chrysopa lacciperda* Kimmins, *Indian J. Ent.*, 17, pt. 2 : 217.

Measurements : ♀ : Length of forewing, 17 mm, of hindwing, 14 mm.

Material examined : 1 ♀ : India, Bihar, Ranchi, Namkum, 8.iii.1972 (Coll. A. K. Sen).

Distribution : India (Bihar).

Remarks : Kimmins (1955) described the species from India (Bihar). Although a single female specimen was available to the author for study from the same locality but the genitalia in male described and figured by Kimmins (*loc. cit.*) led him to place this species under the genus *Ceratochrysa* which was considered by Tjeder as a subgenus of *Chrysopa*.

Genus 7. *Glenochrysa* Esben - Petersen

1920. *Glenochrysa* Esben-Petersen, *Ann. South Afr. Mus.*, 17 : 520.

Diagnostic characters : **Wings** : with brilliant iridescence and strongly marked; crossveins in pterostigmatic area; venation: *Chrysoperla*-type; abdomen: spiracles in male small but with large atria; male genitalia: tignum absent; gonarcus with a pair of entoprocessus and an arcessus; with gonapsis.

Type species : *Glenochrysa typica* Esben-Petersen.

Distribution : Africa, Sunda Islands, India, Australia, North America, West Indies.

Remarks : The genus *Glenochrysa* described by Esben-Petersen (1920) as a subgenus under the genus *Chrysopa*. The author after studying the wings and genitalia has considered *Glenochrysa* as a genus and a single species hitherto recorded from India has been dealt with under this taxon.

9. *Glenochrysa marmorata* (Needham)

1909. *Eremochrysa marmorata* Needham, *Rec. Indian Mus.*, 3 : 205.

1940. *Glenochrysa marmorata* Kimmins, *Ann. Mag. nat. Hist.*, 11(5) : 449.

1980. *Chrysopa (Glenochrysa) marmorata*, Ghosh, *Rec. zool. Suve. India*, 77 : 249.

Measurements : 2 exs: length of forewing; 10-12 mm; hindwing, 8-10 mm.

Material examined : 2 exs: India, Nadia, Ranaghat, Purnanagar, 10.vii.1982 (Coll. D. R. Maulik).

Distribution : India (Assam, West Bengal, South Andaman).

Remarks : Though the wings of the species closely resemble the specimens described by Needham (1909) and redescribed by Ghosh but the morphovariations observed by the author while examining the fresh specimens from West Bengal may be referred to as follows: body green in colour; vertex with a rounded red spot; scape, pedicel and prescutum of mesothorax dark red; pronotum with two reddish spots anteriorly; without milk white spots between the branches of Rs as observed in the specimens from Andaman; wings with red suffusion at the extreme base. As the abdominal tips of both the specimens have been lost so on the basis of wing characters the specimens have been kept under the species *G. marmorata* (Needham) at the moment. However, the species is a new record for West Bengal.

Genus VII. *Chrysopa* Leach

1815. *Chrysopa* Leach, Artikel entomology-Brewster, *Edinburgh Encyclopaedia*, 9 (1): 138.

Diagnostic characters : Wing venation : chrysoperla-type; male abdomen : tergite 9 and ectoprocts dorsally fused above the anus; 8 and 9 sternites separated by an intersegmental membrane; male genitalia: gonarcus with a pair of entoprocessus but without arcessus; pseudopennis lying in gonosaccus and situated below the gonarcus; gonosaccus paired.

Type species : *Chrysopa perla* (Linnaeus) sensu Schneider, 1851 (i.e. *Hemerobius chrysops* Linnaeus, 1758, sensu Tjeder, 1952).

Distribution : Palaearctic, Oriental (India) and Nearctic regions.

Remarks A subgenus *Chrysopa* (*s. str.*) was erected by Tjeder (1966). The species, *Chrysopa septempunctata* Wesmael recorded by Tjeder (*loc. cit.*) is known from India. So, only one species is so far recorded under this genus in strict sense. However, other four species mentioned below are kept under this genus at the moment due to the paucity of material specially that of males at hand.

9. *Chrysopa virgestes* Banks

1911. *Chrysopa virgestes* Banks, *Proc. ent. Soc. Wash*, 13 : 103.

1914. *Chrysopa virgestes*, Banks. *Rec. Indian Mus.*, 8 : 103.

1933. *Chrysopa virgestes*, Banks, *Indian Forest Rec.*, 18(6) : 3.

Redescription : Female : Head : face pale yellow; yellowish white dorsal vittata on vertex continued over thorax and abdomen; pronotum: slightly broader than long; strong ridge at middle; wing: venation pale; forewing: rather slender, acute at tip; gradates dark; a few costals, radials and medio-cubital crossveins dark; four inner and five to six outer gradate veinlets present; pterostigma inconspicuous; inner row nearer to outer than to Rs; hindwing with 3-4 inner and 4-5 outer gradates; leg: slender, pale; tarsi pale brown; abdomen yellow with white hairs and bristles; female genitalia: tergite 9 and ectoproct, a rather elongated structure; subgenital weak, its distal lobes separated broadly by incision and ventral lobes short; spermatheca with triangular vella and with narrow duct.

Measurement : 5 ♀♀ : length of forewing, 10.5 to 11 mm; hindwing. 9 to 9.5 mm.

Material examined : 1 ♀ : India, West Bengal, Darjeeling, Rangia rest house, 5.iv.1973 (Coll. H. S. Sharma & party); 1 ♀ : West Bengal, Panagarh, Burdwan, Soai forest, 9.ii.1984 & 3 ♀♀ : Kanksa forest, 9. ii. 1984 (Coll. S. K. Ghosh).

Distribution : India (Bihar & West Bengal).

Remarks : Banks (1911) described the species from Pusa, Bihar. Presently, only five female specimens from West Bengal were available for study and these constitute new locality records for the state. It may be mentioned here that without examining the male genitalia it is not possible to change the generic status of the species. Therefore, the concerned species is retained for the time being under the genus *Chrysopa*

10. *Chrysopa ignobilis* Walker

1859. *Chrysopa ignobilis* Walker, *Trans. R. ent. Soc. Lond.*, 5 : 183.

Redescription : Labrum, clypeus and gena : dark brown; frons and vertex: yellowish; antenna: basal segments brown; pronotum: yellowish with two narrow black stripes on either side and a distinct ridge at middle; mesonotum: blackish; forewing : cell im ending beyond the first radio-medial crossvein; 2nd cubital cell about as long as 3rd and the latter broadened at apex; outer gradate with 8 and inner gradate with 6 crossveins; inner row at nearly equal distance from both outer row and radial sector; hindwing : missing; legs : brownish.

Measurements : length of forewing, 13 mm.

Material examined : 1 ex., India, Calcutta, West Bengal.

Distribution : India (West Bengal).

Remarks : Walker (1859) described the species from 'Hindustan' without specifying the exact locality. However, the present author while working out the collection of the chrysopidae, a flood damaged specimen from Calcutta, West Bengal is available in the National Zoological collections. So, an account of the species on the basis of the intact parts of the damaged specimen has been provided. But it is not possible at the moment to make any comment on the generic status of the species without studying the male genitalia. Therefore, the author has no other alternative than to retain its position in *Chrysopa*

*11. *Chrysopa notata* Navas

1910. *Chrysopa notata* Navas, *Broteria S. Fiel.* 9 : 55.

Distribution : India (West Bengal).

Remarks : Navas (1910) described the species from Darjeeling, West Bengal. The literature and material being inaccessible it is not possible to provide comment on it.

***12. *Chrysopa guttata* Navas**

1929. *Cintameva guttata* Navas, *Rev. Acad. Sci.*, 13 : 42.

Distribution : India (West Bengal).

Remarks : Banks (1940) and Tjeder (1966) synonymized the genus *Cintameva* with *Chrysopa*. In that event *guttata* should fall under *Chrysopa*. But as the species is not available for study it is not possible to make any comment whether the species really belongs to *Chrysopa* s. str. or not.

***13. *Chrysopa madestes* Banks**

1911. *Chrysopa madestes* Banks, *Proc. ent. Soc. Wash.*, 13 : 119.

Distribution : India (Bihar).

Remarks : Though Banks (1911) did not consider the structure of male genitalia while describing the species, the characters of the wings as stated by him appears to be convincing to consider the species as a distinct one.

Genus VIII. *Ankylopteryx* Brauer

1864. *Ankylopteryx* Brauer, *Verh. Zool. Bot. Ges. Wien*, 14 : 889.

1866. *Ankylopteryx*, Brauer, *Zool. Theil. 2. Neuropteren* : 34.

1866. *Ankylopteryx*, Hagen, *Stettin Ent. Ztg.*, 27 : 377.

1940. *Ankylopteryx*, Banks, *Proc. U.S. natn. Mus.*, 88, no. 3079 : 187.

1952. *Ankylopteryx*, Kimmins, *Ann. Mag. nat. Hist.*, (12) 5 : 80.

1909. *Ankylopteryx*, Weele, in : Y. SJOSTEDT'S *Kilimandjaro Meru Expedition*, 2(3) : 18.

1910. *Ankylopteryx*, Navas, *Broteria*, 9 : 57.

1954. *Leucochrysa* Fraser, *Nat. Malgache*, 3 : 16.

1966. *Ankylopteryx*, Tjeder, *South Afr. Anim. Life*. 12 : 493.

Diagnostic Characters : Forewing : very broad especially at base, from where costa originating very steeply; Sc and R very close upto pterostigmatic region and then suddenly diverging; radial cross vein placed near base of wing; Rs arising at level with or beyond the fork of M; im ovate or elongate and in oblique position; second medio-cubital crossvein located distad of the furcation of M; two series of gradate crossveins; psm merges with outer gradates; hindwing; narrow; costal area narrow; frenulum present as a small lobe with some stiff hairs; legs : very short and slender; abdomen: male with sternite 8 and 9 and also tergite 9 and ectoprocts fused; male genitalia: gonarcus arch-shaped; entoprocessus present; gonosaccus very long; hypandrium internum and comes present; tignum and gonapsis lacking; female: tergite 8 not prolonged downwards laterally; tergite 9 and ectoproct fused; subgenitale bilobed, spermatheca flattened with indistinct vela and without ventral impression.

Type species : *Chrysopa venusta* Hagen.

Distribution : Africa, China, Cambodia, India, Malagasy, Malaysia, the Philippines, Singapore, Taiwan.

Remarks : Amongst a total of three species recorded so far from India only two are dealt with hereunder.

Key to the species of the Genus *Ankylopteryx* Brauer

Pronotum with antero-lateral spot; presence of black points at the end of both marginal and costal cross veins of forewing.....

.....*octopunctata* (Fabricius)

Pronotum without antero-lateral spot; absence of black points at the end of both marginal and costal cross veins of forewing... *tessalatus* Needham

14. *Ankylopteryx octopunctata* (Fabricius)

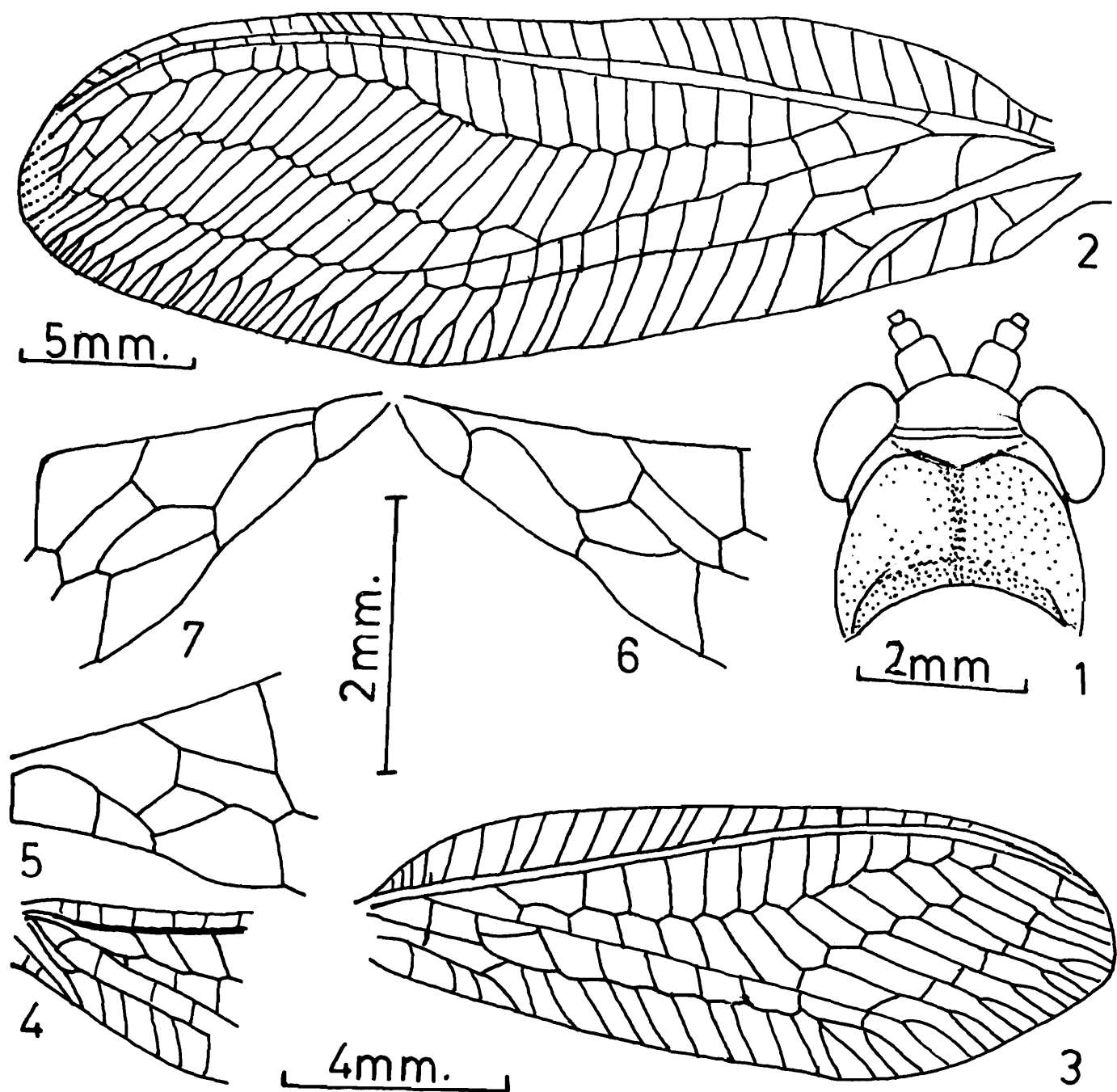
1793. *Hemerobius octopunctatus* Fabricius, *Ent. Syst.*, 2 : 85.
 1798. *Hemerobius candidus* Fabricius, *Ent. suppl.* : 202.
 1851. *Chrysopa candida* Schneider, *Mon. Chrysop* : 161.
 1864. *Ankylopteryx candida*, Brauer, *Verh. Zool. bot. Ges. Wien*, 14 : 901.
 1858. *Chrysopa punctata* Hagen, *Syn. Neur. Ceyl.*, 1 : 483.
 1864. *Ankylopteryx punctata*, Brauer, *Verh. zool. bot. Ges. Wien*, 14 : 901.
 1853. *Hemerobius trimaculata* Girard, *Ann. Soc. Ent. Fr.*, (3) 87 : 163.
 1864. *Ankylopteryx trimaculata*, Brauer, *Verh. zool. bot. Ges. Wien*, 14 : 901.
 1864. *Ankylopteryx anomala* Brauer, *Novara Exp. Zool.* 2 : 35.
 1893. *Ankylopteryx sigillaris* Gerstaecker, *Mitt. naturw. Ver. Neu-vorpomm. u. Rugen*, 25 : 162.
 1909. *Ankylopteryx octopunctata*, Weele, *Notes Leyden Mus.*, 31 : 57.
 1935. *Ankylopteryx octopunctata*, Handschin, *Revue Suisse Zool.*, 42 : 695.
 1980. *Ankylopteryx octopunctata*, Ghosh, *Rec. zool. Surv. India*, 77 : 251.

Measurements : ♂♂ : length of forewing, 11 mm; hindwing, 10 mm; ♀♀ : length of forewing, 12 mm, hindwing, 11 mm.

Material examined : 63 exs (♂♂, ♀♀) : 46 exs : India, West Bengal 24-Prgs., Kumra, 22-24-vi.1982; 4 exs : Nadia, Ranaghat, 26.vi.1982 & 10.vii.1982 (Coll. D. R. Maulik); 12 exs : West Bengal, Burdwan, Panagarh Kanksa forest, 9.ii.1984 (Coll. S. K. Ghosh) and 1 ex : West Bengal, Dum Dum Park, 13.ix.1971 (Coll. T. R. Mitra).

Distribution : China, India (West Bengal, South India, Western Himalayas; Andamans), Insulinde.

Remarks : The species originally described by Fabricius has been redescribed by Weele (1909). The author, in course of his study of the material collected during West Bengal Survey, observed an interesting morphovariation of the forewing. Intramedian cell dividing the third cubital cell of the forewing shows a gradual transition from incomplete division of the cubital cell to a complete division (Figs. 5-7).



Figs. 1-2. *Italochrysa robusta* (Needham). (1) Head & pronotum, dorsal; (2) forewing. Figs. 3-4. *Italochrysa* sp. (3) forewing; (4) part of hindwing. Figs. 5-7. *Ankylopteryx octopunctata* (Fabricius). (5) general disposition of intramedian cell of forewing; (6) further extension of intramedian cell; (7) intra-median cell dividing the third cubital cell completely.

15. *Ankylopteryx tesselatus* Needham

1909. *Ankylopteryx tesselatus* Needham, *Rec. Indian Mus.* 3 : 205.

1980. *Ankylopteryx tesselatus*, Ghosh, *Rec. zool. Surv. India*, 77 : 252.

Measurement : 1 ex : Length of forewing, 12 mm.

Material examined : 1 ex : India, Assam, date - nil, Reg. no. 1275/9.

Distribution : India (Assam).

Remarks : Needham (1909) described the species from Assam. A flood-damaged specimen in National Zoological collections is available for study bearing the same registered no. of Needham's type. However, the specimen is very badly damaged and it is not possible by the author to study the material in details excepting for noting down certain characters of the forewing along with measurement and of pronotum. Presence of large and conspicuous pterostigma, absence of black points at the end of both marginal and costal crossveins of forewing and also the pronotum without antero-lateral spot are the salient features for distinguishing the species from *A. octopunctata* (Fabricius).

Genus IX. *Chrysopidia* Navas

1910. *Chrysopidia* Navas, *Broteria*, 9 : 54.

1971. *Chrysopidia*, Holzel, *Zeitschr. Arbeitsgem. Ost. Entom.* 23 : 57.

Diagnostic characters : Mandibles asymmetric; forewing : 12 to 20 mm; without jugal lobe; costal field broad; only a single basal crossvein between Sc and R; apex of im ending beyond the 1st r - m crossvein; three rows of gradate crossveins; hindwing : with feebly developed frenulum; M and R occasionally fused; 3 rows of gradates; abdomen : tergite 9 and ectoproct in both sexes fused; sternite 8 and 9 in males completely fused, elongated and small; gonarcus and areessus attached together.

Type species : *Chrysopidia nigrata* Navas.

Distribution : India and Nepal.

Remarks : Only two species are so far reported from India. At present a new species is described below.

16. *Chrysopidia manipurensis*, sp. nov.

♂ : Labrum, clypeus and frons : pale yellowish; gena : pale brownish; antenna: basal segment yellow; a red line on the outer side of the basal segment of each antenna; vertex : yellow : pro-meso-and metanotum : yellow but laterally somewhat greyish; wings : membrane unspotted; longitudinal veins and Rs pale; fore wing (fig.8) : costals pale but partially black; radials partially black; gradates black; some of the marginal forks black; pterostigma yellowish, about 22 costals before it; a single basal crossvein between Sc and R; intramedian cell ending beyond 1st r-m crossvein; 3 rows of gradate crossveins; number of gradates 8-4-8 in the left and 10-3-9 in the right wing; inner gradates extending

basally; hindwing (Fig. 9) : narrower than forewing; all veins and crossveins pale except a few costals partially dark; number of gradates 6-1-8 in left wing but in right one the intermediate gradate absent; inner gradates extending basally; leg; pale but the tarsal segments and the claws brown; abdomen (Fig.10): yellow with short hairs; apex of the abdomen as in fig. 10; male genitalia (Fig.11) : gonarcus with expanded side pieces, with almost 'y' - shaped entoprocessus and relatively short arcessus which is narrowed at base and expanded at apex with three distinct dents.

Measurement : 1 ♂ : length of forewing, 16 mm; of hindwing, 13 mm.

Material examined : 1 ♂ (Holotype : Reg. no. 1180/H₁₂) : India, Manipur, Mao, Inspection Bungalow, 12.iv.1975 (Coll. M.S. Shishodia).

Distribution : India (Manipur).

Remarks : The present species comes closer to *C. fuscata* Navas by the presence of more or less distinct red mark on the outer side of the basal joint of antennae but it can be easily differentiated by the basal extension of inner gradates, number of crossveins in gradate series and by the absence of crossveins in the pterostigmatic area.

*17. *Chrysopidia nigrata* Navas

1910. *Chrysopidia nigrata* Navas, *Broteria*, 9 : 55.

1971. *Chrysopidia nigrata*, Holzel, *Wien. Z. Arabgem. Ost. Ent.*, 23 (2) : 57.

Distribution : India (West Bengal).

Remarks : Holzel (1971) redescribed a male of the species along with illustrations. The internal genital structures as well as the shape of the atrium of the abdominal tracheae distinguish this species from its close allies.

*18. *Chrysopidia numerosa* Navas

1914. *Chrysopidia numerosa* Navas, *Russk. Ent. Obozr.* 14 : 11.

Distribution : India (West Bengal).

Remarks : Navas (1914) described this species from Darjeeling, West Bengal. Holzel (1971) while redescribing the species, *Chrysopidia migrata* Navas referred to the species, *C. numerosa* in the discussion and considered this species as *Nomina dubia* due to the imperfect description.

Genus X. *Tumeochrysa* Needham

1909. *Tumeochrysa* Needham, *Rec. Indian Mus.*, 3 : 204.

1910. *Chrysoplecta* Navas, *Broteria*, 9 : 55.

1940. *Tumeochrysa*, Banks, *Proc. U. S. natn. Mus.*, 88(3079) : 187.

Diagnostic characters Antenna : about as long as the body, shorter than wings; with huge, erect basal segments; wings: costal area very narrow at base, then gradually widening; forewing Cu bending down to hind margin before apical third of the wing; 3rd cubital cell obliquely divided with the vein ending on its upper margin; more than

two rows of irregular gradates which are many; leg : hind tibia more than three times as long as hind tarsus.

Type species : *Tumeochrysa indica* Needham.

Distribution : China and India.

Remarks : Only two species hitherto recorded from India of which one is dealt with hereunder.

19. *Tumeochrysa indica* Needham

1909. *Tumeochrysa indica* Needham, *Rec. Indian Mus.*, 3 : 204.

Redescription : Remale : Frons, clypeus, labrum and maxillary palpi : yellow; vertex : yellow, somewhat elevated and rounded posteriorly and with a narrow triangular dilatation anteriorly which extends between the basal segment of antenna; antenna : yellowish brown; basal segment erect, swollen and approximated to each other and as long as following 6 subequal segments taken together; each antenna reaching almost base of pterostigma of forewing; thorax: yellow ventrally and darker dorsally; tinged with reddish on the principal convex areas; pronotum : elongated and with short black hairs; Wings : elongate, subacute at tip; veins and crossveins mainly yellow; crossveins in gradate series mostly black, forewing : 31 costal veinlets before yellowish pterostigma; 21 cross veins between R and Rs; 3rd cubital cell almost equal in length to 2nd and broadened apically; first intramedian cell ending beyond 1st cross vein of Rs; leg : slender mainly yellow with short black hairs; each claw dark brown with a dent at base; abdomen : (Fig. 12). blackish brown dorsally and yellowish ventrally; abdominal segments with yellow pubescence and apical segment with moderately long hairs; lamina superior large and lamina lateralis with almost straight margin; coxite narrow; subgenital plate (fig. 13) small; its distal margin deeply emarginate; spermatheca (fig. 14) large, strongly chitinised with its dorsal sail acute at lip.

Measurement : ♀♀; Length of forewing, 21-24 mm, hindwing, 19-22 mm.

Material examined : 2 ♀♀ : India, Manipur, Ukhrul, alt. 6200 ft., Inspection Bungalow, 3.x.1975 (Coll. M.S. Shishodia).

Distribution : India (Manipur and Western Himalayas).

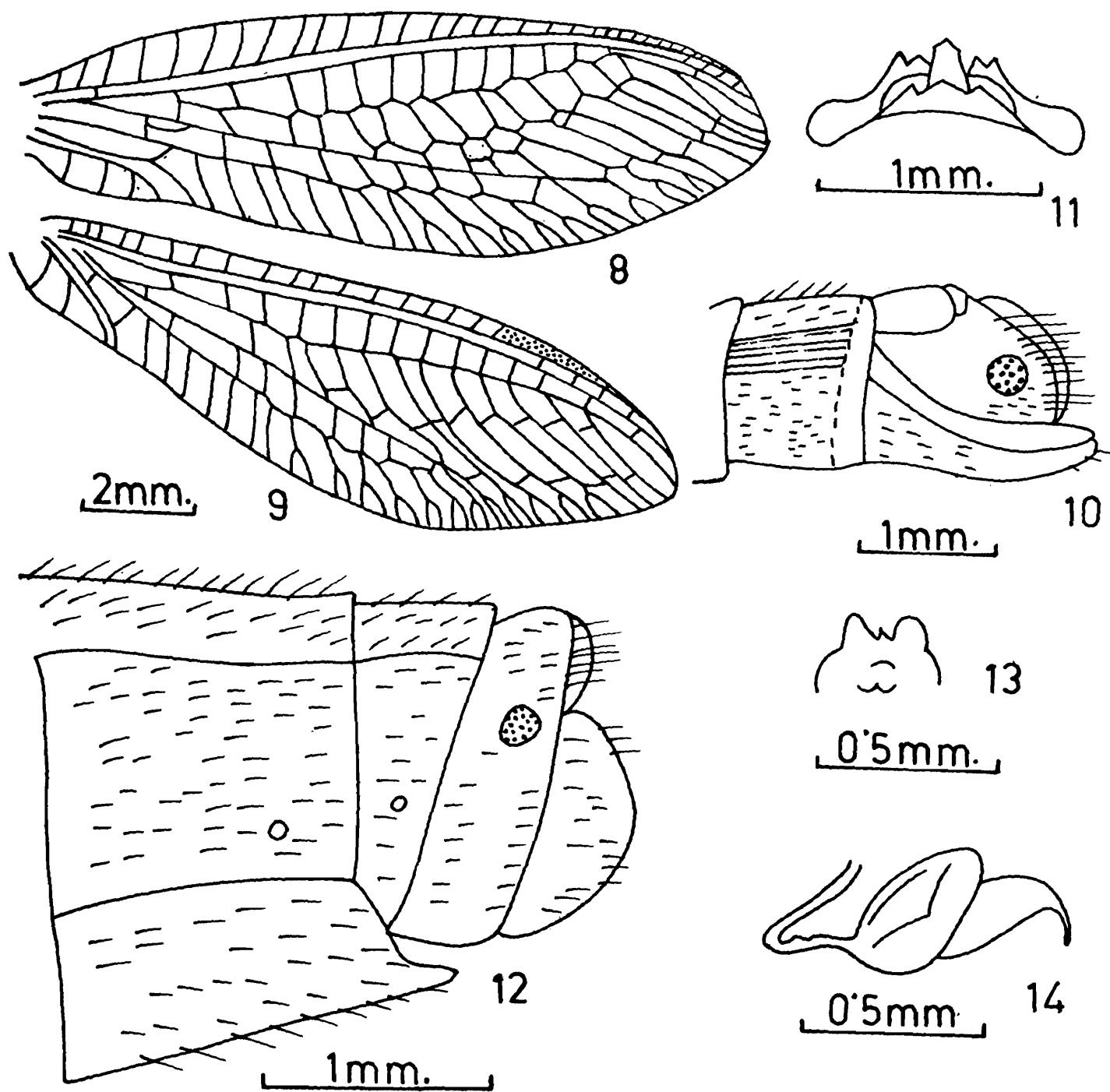
Remarks : The species was described by Needham (1909) from a male collected in Western Himalayas. So, the female is recorded for the first time from India. However, the range of distribution is now known to extend from Western Himalayas to Eastern Region.

20. *Tumeochrysa cirerai* Navas

(= *Chrysoplecta cirerai* Navas)

1930. *Chrysoplecta cirerai* Navas, *Rev. Acad. Sci.*, 13 : 43.

Distribution : India (West Bengal).



Figs. 8-11. *Chrysopidia manipurensis*, sp. nov., male. (8) forewing; (9) hindwing; (10) tip of abdomen, lateral; (11) male genitalia, dorsal. Figs. 12-14. *Tumeochrysa indica* Needham. (12) tip of abdomen, lateral; (13) subgenital plate, ventral; (14) Spermatheca, lateral.

Remarks : Banks (1940) synonymised *Chrysoplecta* Navas with *Tumeochrysa* Needham without assigning any reason. At this stage it is not possible to state how far such synonymisation has been justified.

Subfamily B. NOTHOCHRYSINAE Navas

Wings : Veins nearly uniform in diameter at base but evenly tapering apically; posterior media not fused with R; forewing : tympanal organ absent on ventral side of R; jugal lobe large and conspicuously produced; psm merging with inner gradate series specially in *Nothochrysa*; prosternum: area largely membranous; colour: usually non-green.

Genus XI. *Nothochrysa* MacLachlan

1868. *Nothochrysa* MacLachlan, *Trans. Ent. Soc. Lond.*, (1868) : 195.
 1903. *Nothochrysa* , Banks, *Trans. Am. ent. Soc.*, **29** : 142
 1909. *Nothochrysa* , Vander Weele, *Notes Leyden Mus.*, **31** : 75.
 1919. *Nothochrysa* , Okamoto, *Hokkaido Agr. Exp. Sta. Rep.*, **9** : 26.
 1924. *Nothochrysa* , Kuwayama, *Trans. Nat. Hist. Soc. Formosa*, **13** : 8.
 1941. *Nothochrysa* , Tjeder, *Ent. Tidskr.*, p. 30-31.
 1946. *Nothochrysa* , Principi, *Bol. Inst. Entomol. Univ.*, Bologna, **15** : 86.
 1913. *Nathanica* Navas, *Trans. 2nd Intern. Congr. Entomol.*, **2** : 181. Oxford.
 1937. *Nathanica* , Killington, *A monograph of British Neuroptera*, **2** : 235. Ray Society, London.
 1941. *Nathanica* , Tjeder, *Ent. Tidskr.*, p. 30.
 1967. *Nothochrysa*, Adams. *Bull. Mus. comp. zool.*, Harvard, **135**(no. 4) : 222.

Diagnostic characters : Antenna : about as long as forewing; forewing : basal subcostal crossvein lying between first medial crossvein and medial fork; Rs originating basad of medial fork; two rows of gradates; psm formed by overlapping longitudinal veins may extend beyond basal inner gradates; pseudomedial fold present; upper and lower prongs of im parallel to each other; second medial crossvein intersecting lower prong of im parallel to each other; second medial crossvein intersecting lower prong of im midway between M and Cu₁; psc parallels psm and passing to outer gradate series; jugal lobe prominent; hindwing : frenulum well developed; M coalescent with Rs for moderate distance; two rows of gradates; psm well developed; veins between psm and psc lying exactly opposite the basal branches of Rs; pseudomedial fold present; abdomen: male: 9th abdominal tergite fused with ectoproct and gonarcus with wide triangular mediuncus; gonocoxites small; female: no hooked hairs on 9th gonocoxites; 8th sternum bilobed and lobes fitting into cup-like 9th valvulae.

Type-species : *Chrysopa fulviceps* Stephens.

Distribution : Owing to the confusion with *Italochrysa* it is not possible to furnish a reliable account of the distribution of this genus. However, the distribution of four true *Nothochrysa* species, viz., *N. fulviceps* (Stephens), *N. capitata* (Fabricius), *N.*

californica Banks and *N. indigena*. Needham is Great Britain for the first two, North America and India for the last two species respectively.

Remarks : Adams (1967) & Tjeder (1966) mentioned in their papers the existence of only three true *Nothochrysa* species. The present author after studying the diagnostic characters of *indigena* adds one more species in the genus concerned.

21. *Nothochrysa indigena* Needham

1909. *Nothochrysa indigena* Needham, *Rec. Indian mus.*, 3 : 203.

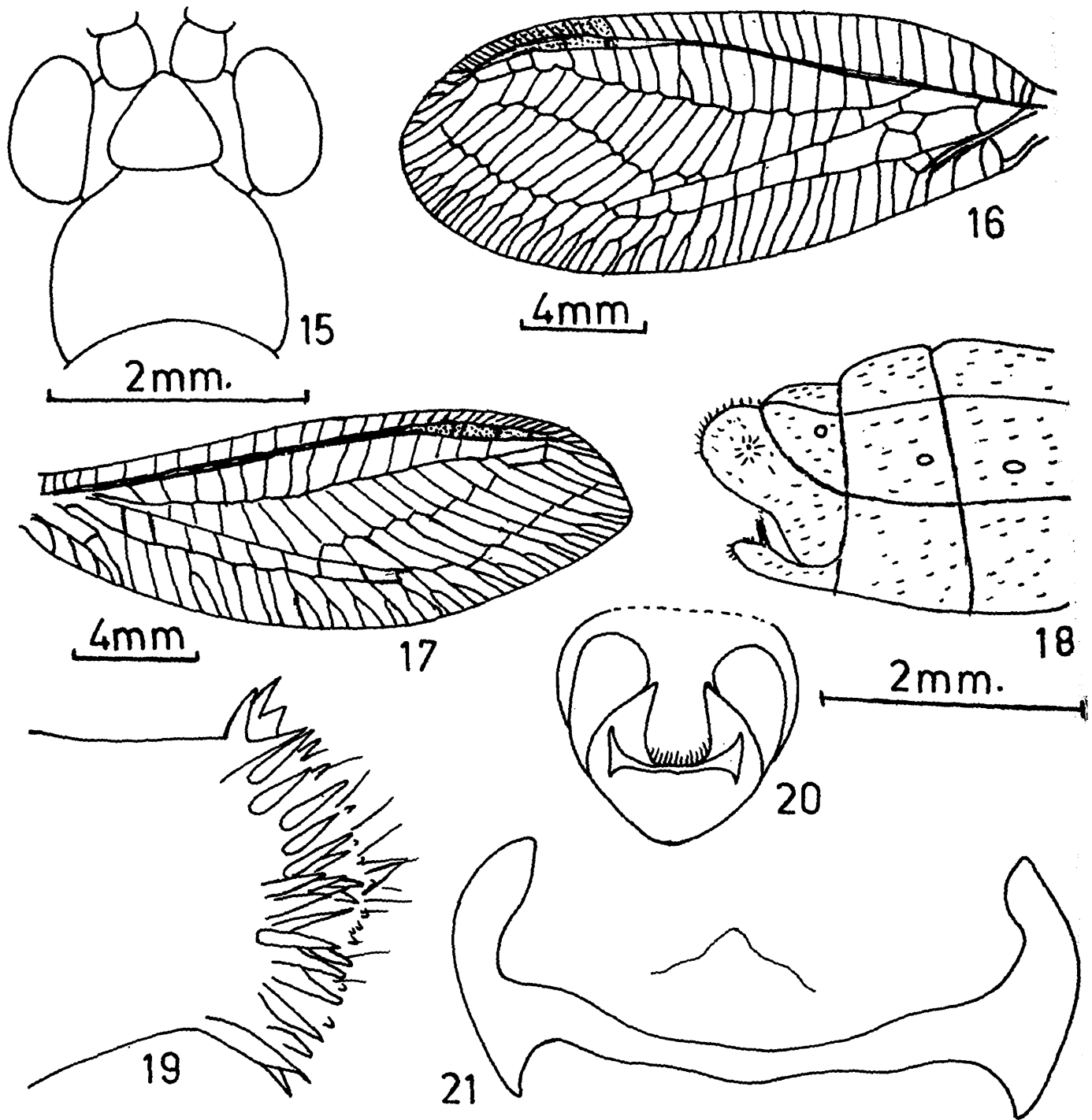
Redescription : ♂ : Head and mouth parts: discoloured; antenna: flagellum with four concentric rows of setae; thorax: discoloured; pronotum (fig. 15) broader than long with front angles broadly eroded; wings : hyaline, without spot; wing roots specially in the forewing black; pterostigma elongated, brown; longitudinal veins yellow; forewing (fig. 16) costal crossveins yellow; two basal and 5 apical crossveins between R and Rs black; gradates blackish with 12 crossveins in both outer and inner rows; 3 apical crossveins between psm & psc and the crossvein between 1A and posterior margin and between 2A & 3A black; hindwing (fig. 17) : both longitudinal and crossveins yellow; inner gradate with 9 and outer row with 11 crossveins; abdomen (fig. 18) : discoloured but tip and sternite yellow; tip of 8th and 9th sternite (fig. 19) rounded with a row of stout bristles and hairs; male genitalia (figs. 20 & 21); gonarcus transverse, almost straight and with lateral pieces; mediucus as shown in fig. 21.

Measurement : ♂ : length of forewing, 22 mm, hindwing, 19 mm, abdomen, 8 mm.

Material examined : 1 ♂ : India, West Bengal, Calcutta, Reg. no. 9595/7, Indian Museum premises, (Coll. R. Hodgart).

Distribution : India (West Bengal).

Remarks : Needham (1909) described the species from West Bengal. A flood-damaged specimen is available from National Zoological collections bearing the aforesaid registered no. which was referred to by Needham (loc. cit.) in the text. So, the present author unhesitatingly thinks it as a type and redescribes it along with drawings of wings and genitalia. After a thorough study it is confirmed that the species *indigena* Needham has been rightly placed by its author in *Nothochrysa* as it lacks tympanum and psm merges with inner gradate series. Thus the comments made by Tjeder (1966), "We know for the present only three *Nothochrysa* species", viz., *N. fulviceps* (Stephens), *N. capitata* (Fabricius) and *N. californica* Banks and also by Adams (1967), "It appears that the great majority of old world species formerly included in *Nothochrysa* belong instead to *Italochrysa*" may be revised in the light of present work and present species under report may be added to the aforesaid three species.



Figs. 15-21. *Nothochrysa indigena* Needham. (15) pronotum, dorsal; (16) forewing; (17) hindwing; (18) tip of abdomen, lateral; (19) tip of 8th & 9th sternite, lateral; (20) male genitalia, caudal; (21) gonarcus and mediuncus, dorsal.

***22. *Nothochrysa carletoni* Banks**

1939. *Nothochrysa carletoni* Banks, *Bull. Mus. comp. Zool. Harv.*, **85**(7) : 472.

Distribution : India (Sikkim).

Remarks : Tjeder (1966) while giving synonymical notes of the genus *Italochrysa* commented on the genus *Nothochrysa* as "A great many species have been described under the genus name *Nothochrysa*, most of which apparently have to be transferred to *Italochrysa*. Though similar in general appearance the species may easily be distinguished in the following way; psm merges with inner gradate series - *Nothochrysa*; with outer gradate series - *Italochrysa*. *Nothochrysa* lacks tympanium and belongs to the subfamily Distyochrysinæ. We know for the present only three true *Nothochrysa* species, namely, *Chrysopa fulviceps* Stephens, *Chrysopa capitata* (Fabricius) and *Chrysopa californica* Banks". The description of *Nothochrysa carletoni* Banks (1939) reads, "The outer gradates very pale as a continuation of the medius" Consideration of Bank's description vis-a-vis Tjeder's opinion leads one to include the species *carletoni* under the genus *Italochrysa*.

***23. *Nothochrysa lefroii* Needham**

1909. *Nothochrysa lefroii* Needham, *Rec. Indian Mus.*, **3** : 203.

Distribution : India (Assam, Bihar, Meghalaya, Punjab and Western Himalayas).

Remarks : Needham (1909) while describing the species laid emphasis only on colouration. From the description no definite comment can be made on the identity of the species.

***24. *Nothochrysa talaverae* Navas**

1928. *Nothochrysa talaverae* Navas, *Bol. Soc. Ent. Eso.*, **11** : 133.

Distribution : India (Sikkim).

Remarks : Neither the literature nor the specimen has been available for making a definite comment.

SUMMARY

The paper incorporates the taxonomic account along with earlier investigations, geographical distribution, review on the taxonomy, external morphology and terminology of the family Chrysopidae from eastern India. Amongst a total of twenty four species, fifteen species have been examined and nine other species have been reviewed from literature. From the examined material, one species has been described new to science, six species including two type-species described by Needham (1909) have been redescribed, one indetermined species and an unknown female of a species have been described. One species has been recorded for the first time from India and three species from West Bengal and also another species from both West Bengal and Orissa have been established as new locality records for the area under consideration. Besides, six species

have been newly combined. The distribution of the said fauna is quite interesting, since four species are hitherto known to be exotic, while the remaining twenty species are endemic in India. Running keys to all the taxa examined, literature review of nine species, references, and relevant illustrations have been provided. Thus, an account of twentyfour species distributed over eleven genera and two subfamilies of Chrysopidae has been furnished in the paper.

ACKNOWLEDGEMENT

I would like to express my thanks to the various Survey parties of Zoological Survey of India and my colleagues including Sri D. R. Maulik of this Institute who made valuable collections of Neuroptera. I am indebted to Dr. B. K. Tikader, Director, Zoological Survey of India, Calcutta for the permission accorded to me to work on this group and constant encouragement. My deepest appreciation and gratitude go to Late D. N. Raychaudhuri, Former Professor of Zoology, Calcutta University for his valuable suggestions. I gratefully acknowledge the cooperation of Dr. B. Tjeder, Sweden and Dr. H. Holzcl, Austria for valuable suggestions and reprints. I record my sincerest thanks to Late W. Nakahara, Japan; Dr. S. Kuwayama, Japan; Dr. P. Adams, California and Dr. M. Principi, Spain for helping me with important literature.

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