

**DESCRIPTION OF THE LARVAE OF *ANAX NIGROFASCIATUS NIGROLINEATUS* FRASER, 1935 AND *A. PARTHENOPE PARTHENOPE* (SELYS, 1839) FROM INDIA, WITH A KEY TO THE KNOWN LARVAE OF THE INDIAN REPRESENTATIVES OF THE GENUS *ANAX* LEACH, 1815 (ANISOPTERA: AESHNIDAE)**

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Larvae of *Anax nigrofasciatus nigrolineatus* Fraser and *A. parthenope parthenope* (Sel.) are described and illustrated on the basis of material from various Indian localities. A key to the larvae of the five hitherto known Indian representatives of the genus is appended (incl. *guttatus* [Burm.], *immaculifrons* Ramb., *imperator* Leach). The larval stages of *A. indicus* Lieft. and *A. marginope* Baijal et Agarwal are still unknown.

## INTRODUCTION

Subsequent to our publication of the descriptions of the larvae of *Anax guttatus* (Burmeister) and *Anax immaculifrons* Rambur from the Dehra Dun Valley, India (SANGAL & KUMAR, 1970), we have studied the larvae of two more representatives of this genus, viz., *A. nigrofasciatus nigrolineatus* Fraser and *A. parthenope parthenope* (Selys).

The larva of *A. nigrofasciatus nigrolineatus*, from the Nepal Himalaya, has been briefly described by ST. QUENTIN (1970), that of *A. parthenope* by various authors, e.g. RIS (1909), MUNCHBERG (1932), MAY (1933), POPOVA (1953), CONCI & NIELSEN (1956) and ROBERT (1958). The Indian material has so far not been examined.

Out of the seven representatives of the genus *Anax* known to occur in India

(FRASER, 1936; LIEFTINCK, 1942; BAIJAL & AGARWAL, 1955; ASAHINA, 1962), the larvae of five species and subspecific taxa have now been studied in detail, while the larval stages of *A. indicus* Lieftinck and *A. marginope* Baijal & Agarwal, still remain unknown, though FRASER & DOVER (1922 sub *guttatus*) have given brief notes on larval habits of *A. indicus*.

In the present paper we have amended the previously published key (SANGAL & KUMAR, 1970), to include the two newly described species.

Larvae of *A. nigrofasciatus nigrolineatus* were collected in the field and reared in the laboratory of the Zoology Department, D.S.B. Government College, Naini Tal, India. Subsequently I had the opportunity to examine 5 larvae of *A. parthenope parthenope* (identified by the late Col. F.C. Fraser) while going through the larval reference collection of the Forest Research Institute, Dehra Dun, India.

### *ANAX NIGROFASCIATUS NIGROLINEATUS* FRASER

#### Figures 1 - 15

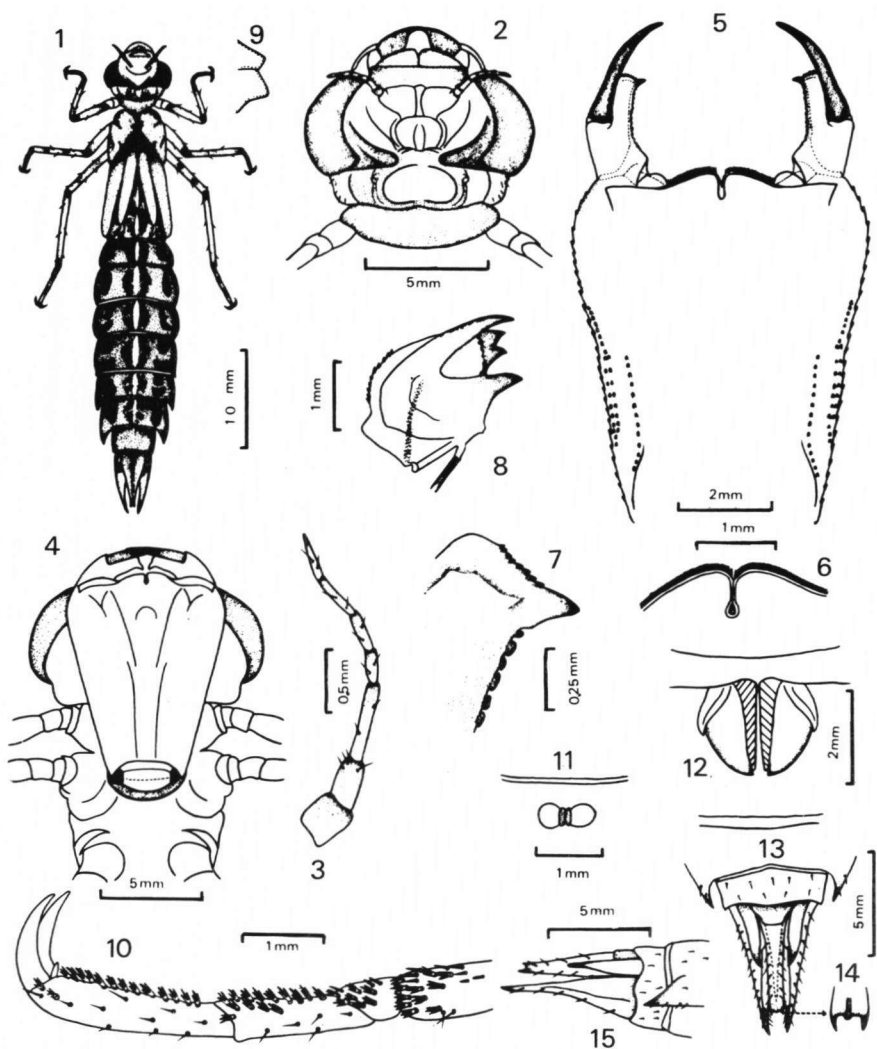
**Material.** — 1 ♂, 1 ♀ (both emerged in the laboratory), Naini Tal Lake, Naini Tal, U.P., India, 21-VIII-1971, A. Kumar coll.

**Description.** Length ♂ 52.1 mm, ♀ 54.2 mm. Width 9.9 mm across the 6th abdominal segment. Colour dirty brown, mottled dorsally. Distinct puncta present on abdominal segments. Legs with dark markings on femora.

Head (Fig. 2) widest over the vertex across the eyes. Length 7.2 mm, width 9.3 mm. Crescent shaped, alternate dark and light markings present on the vertex. Antennae (Fig. 3) piliform, inconspicuous; the measurements (in mm) of the segments being 0.51, 0.57, 0.97, 0.39, 0.50, 0.60 and 0.58; total length 4.12. Labium (Figs. 4-7) almost rectangular, ventrally extending up to the coxae of middle pair of legs (Fig. 4). Length 9.5 mm, width 7.5 mm maximum at the distal end, decreasing gradually towards proximal side. Distal margin of prementum convex, thickly beset with piliform setae (Figs. 5-6); a distinct cleft, 0.45 deep, present at the distal margin. Lateral margins of prementum bear small chitinous papillae. Palpus as shown in Figure 5; its distal and inner margins serrated. End hook short, beak like, slightly curved (Fig. 7). Movable hook thick, long, slightly larger than the palpus. Mandible as shown in Figure 8. Propleural processes (Fig. 9) narrow, posterior distinctly larger than the anterior one.

Legs robust, medium sized; femur of all three pairs with dark markings. Tibial comb (Fig. 10) consists of a number of tridentate setae; tarsi also beset with a double row of tridentate setae on the inner side and a few simple setae on the outer side.

Abdomen light to dirty brown. A median dorsal and paired dorsolateral rows of greyish spots present on segments 3-8, becoming confluent on segments 9 and



Figs. 1-15. *Anax nigrofasciatus nigrolineatus* Fraser; (1) ultimate instar larva; - (2) enlarged view of head; - (3) antenna; - (4) aboral view of labium; - (5) oral view of labium; - (6) enlarged view of distal margin of prementum; - (7) enlarged view of end hook; - (8) mandible; - (9) propleural processes; - (10) tibial comb and tarsi; - (11) male gonapophyses; - (12) female gonapophyses; - (13) dorsal view of anal appendages; - (14) enlarged view of distal margin of epiproct; - (15) lateral view of anal appendages.

10. Intermittent light areas present in between the dark spots. Dorsal puncta present on segments 3-8, lateral puncta present on segments 2-9. Lateral spines on segments 7-9. Gonapophyses (Figs. 11-12) in male small, rounded processes, situated in the anterior half of the 9th abdominal segment; female gonapophyses conspicuous, arising from the anterior side of the 9th segment and extending up to its posterior half. Anal appendages (Figs. 13-15) dark brown, black at the tips. Epiproct length 5.4 mm, width 2.1 mm (at base); triquetral. Distal margin of epiproct bifid, lateral tips shortly spined. Distal margin of male projection straight. Paraprocts length 6.5 mm. Both epiproct and paraprocts beset with thick setae.

**Taxonomic status.** *Anax nigrolineatus* Fraser has been considered by ASAHINA (1962) as only infraspecifically distinct from *A. nigrofasciatus* Oguma, known from Japan, Korea and Central China.

**Range.** It is peculiar to the Himalayan region. FRASER (1936) recorded it from hilly regions of India, Assam and Sikkim; BHASIN (1953) from Naga Hills and Almora Hills (U.P.), SAHNI (1965) from Naini Tal Hills (U.P.), and ST. QUENTIN (1970) from the Nepal Himalaya.

**Remarks.** ST. QUENTIN (1970) has given a figure of anal appendages of a male larva of this species. It resembles our material in the shape of the male projection and the distal margin of epiproct. Larvae also resemble closely the descriptions of *A. nigrofasciatus nigrofasciatus* (ASAHINA, 1957; 1959), but differ from the latter in the shape of the end hook of the palpus, which is slightly more elongated and curved in the latter.

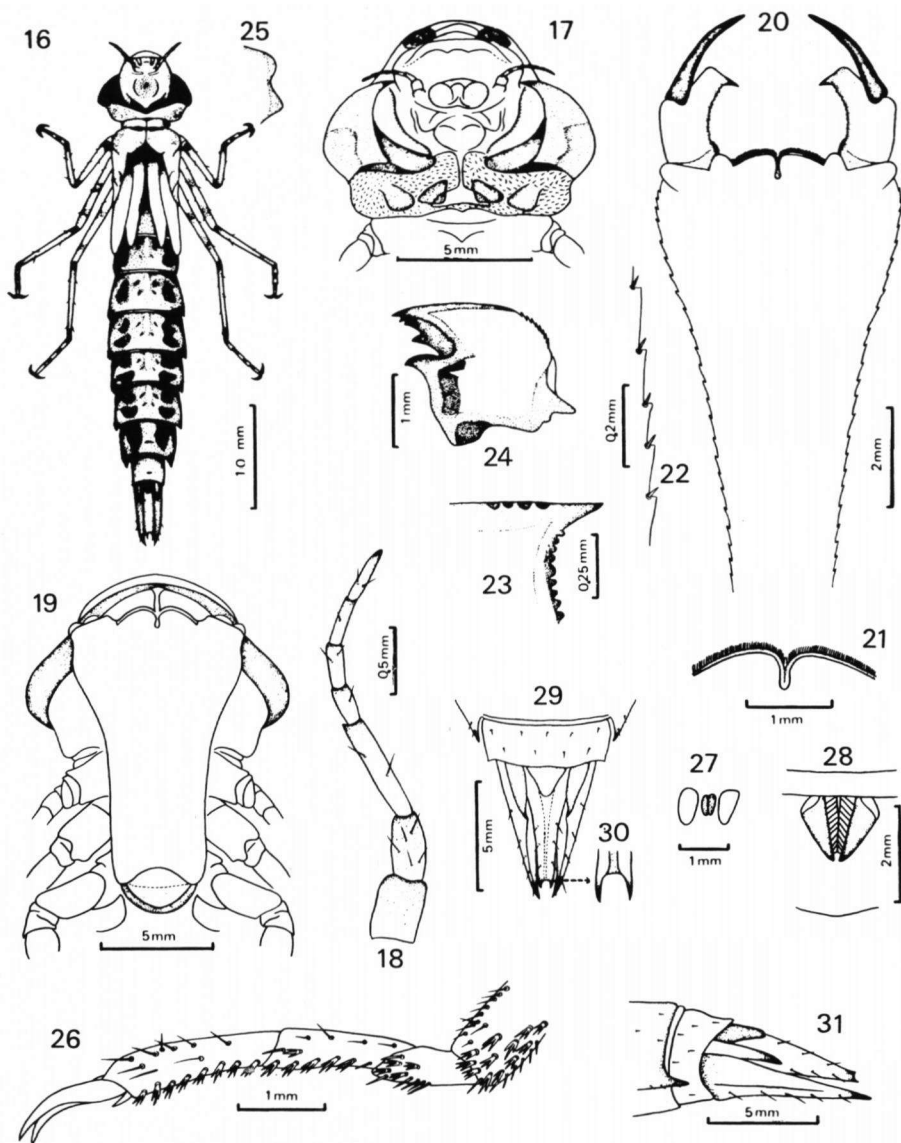
### *ANAX PARTHENOPE PARTHENOPE* (SELYS)

Figures 16-32

**Material.** — 1 ♂ (ultimate instar), 3 ♂ (penultimate instar), 1 ♀ (penultimate instar), U.P., India, 18-VII-1921, S.N. Chatterjee col., F.C. Fraser det.

**Description.** Length 48.7 mm ultimate instar, (40.0–42.0 mm) penultimate instar. Width 8.9 mm maximum across the head. Colour dark brown to chocolate (probably due to long preservation in spirit). Markings and puncta not distinct.

**Head** (Fig. 17) widest over the vertex across the eyes. Length 7.2 mm, width 8.9 mm. Portion of vertex surrounding the eyes dark, beset with small, blunt setae. Antennae (Fig. 18) piliform, inconspicuous; the measurements (in mm) of the segments being 0.46, 0.48, 0.80, 0.27, 0.32, 0.34 and 0.42; total length 3.09. Labium (Figs 19-23) long, slender, ventrally extending slightly beyond the coxae of hind pair of legs (Fig. 19). Length 12.5 mm, width 7.1 mm, maximum at the distal end, distinctly narrowing proximally. Distal margin of prementum convex,



Figs. 16-31. *Anax parthenope parthenope* (Selys): (16) ultimate instar larva; - (17) enlarged view of head; - (18) antenna; - (19) anoral view of labium; - (20) oral view of labium; - (21) enlarged view of distal margin of prementum; - (22) enlarged view of lateral margin of prementum; - (23) enlarged view of end hook; - (24) mandible; - (25) propleural processes; - (26) tibial comb and tarsi; - (27) male gonapophyses; - (28) female gonapophyses; - (29) dorsal view of anal appendages; - (30) enlarged view of distal margin of epiproct; - (31) lateral view of anal appendages.

thickly beset with piliform setae (Figs. 20-21); a median cleft, 0.40 mm deep, present at the distal margin. Lateral margins of prementum spinous all along the length, a single spiniform seta present at the base of each spine (Fig. 22). Inner margin of palpus serrated. End hook comparatively long, formed into a narrow process (Fig. 22). Movable hook slender, thickly chitinized; distinctly longer than the palpus; 18-22 small setae present on it. Mandible as shown in Figure 24. Propleural processes (Fig. 25) almost rounded at apices, the posterior slightly larger than the anterior one.

Legs slender, long. Tibial comb (Fig. 26) consists of a number of tridentate setae; tarsi beset with a double row of tridentate setae.

Abdomen dark brown. Colour pattern not distinct because of long preservation. Lateral abdominal spines present on segments 7-9. Gonapophyses (Figs. 27-28) in male small, oval processes, situated in the anterior half of the 9th abdominal segment; female gonapophyses arising from the anterior side of the 9th segment and extending up to its middle. Anal appendages (Figs. 29-31) dark, chitinous at the tips. Epiproct at base 5.4 mm long and 2.3 mm wide, distal margin deeply concave (Fig. 30). Male projection triangular; paraprocts length 6.1 mm. Both epiproct and paraprocts beset with thick setae.

**Range.** Across S. Europe, U.S.S.R., Africa, Asia Minor to India (FRASER, 1936); MÜNCHBERG, 1932; POPOVA, 1953; ROBERT, 1956). BUCHHOLZ (1955) distinguished two subspecies, viz. *jordansi* from Greece and *geyeri* from Spain and North Africa. The nominate form has been recorded in India from West coast and Deccan (FRASER, 1936), Shrinagar, Kashmir (LAIDLAW, 1921) and Naini Tal Hills, Uttar Pradesh (SAHNI, 1965).

**Remarks.** The shape and length of the labium and the distal margin of epiproct resemble closely those of specimens from Europe and from the U.S.S.R. (MÜNCHBERG, 1932; POPOVA, 1954; CONCI & NIELSEN, 1956). Larvae differ from those of the Japanese *A. parthenope julius* Brauer (ASAHINA, 1957, 1959) in the shape of the end hook of the palpus, which is shorter and blunter in the latter.

#### KEY TO THE KNOWN LARVAE OF THE INDIAN REPRESENTATIVES OF THE GENUS *ANAX*

1. Labium extends only up to coxae of middle pair of legs. Distal margin of epiproct bifid ..... 2  
     Labium extends up to coxae of hind pair of legs. Distal margin of epiproct concave ..... 3
2. Length not exceeding 44 mm. End hook on palpus small, notchlike. Breeds in temporary monsoon ponds ..... *A. guttatus* (Burm.)  
     Length 52-54 mm. End hook of palpus short, beak-like, slightly curved. Breeds in perennial lakes ..... *A. nigrofasciatus nigrolineatus* Fraser

3. Lateral abdominal spines on segments 6-9. Lateral margins of prementum smooth ..... *A. immaculifrons* Rambur  
Lateral abdominal spines on segments 7-9. Lateral margins of prementum serrated or smooth ..... 4
4. Lateral margins of prementum spinous, a small spiniform seta present at the base of each spine ..... *A. parthenope parthenope* (Selys)  
Lateral margins of prementum smooth ..... *A. imperator* Leach

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