Chapter 16 Order Odonata

The Odonata is one of the primitive and ancient insect orders. It is very diverse and is the second largest aquatic insect order. Nymphs are truly aquatic. Odonata consists of three suborders: Anisoptera, Zygoptera and Anisozygoptera. The first two orders, Anisoptera (or dragonflies) and Zygoptera (or damselflies) are well known. Suborder Anisozygoptera is a small group that occurs in high altitude streams (more than 2,000 msl) in Japan and the Himalayas (Tani & Miyatake, 1979; Kumar & Khanna, 1983).

Adult stages have been well studied (Fraser (1933, 1934, 1936: India and Burma), Hirose & Itoh (1993: Japan), Pinratana *et. al*. (1988: Thailand), Asahina (1993: Thailand)). But knowledge of nymphal stages is limited and taxonomic problems remain. The illustrated book of Japanese dragonfly nymphs by Ishida (1996) is a useful book for identifying nymphs. All nymphal stages of odonates are predators. Nymphs are used as human food in Thailand and Lao PDR. However, they are the intermediate host of the human intestinal fluke *Phaneuropsolus bonnei* (Radomyos, *et, al*., 1992).

Nymphs of odonates have a characteristic labium. It consists of the submentum and prementum, with an elbowed connection, and a pair of labial palps, each palp with a moveable hook. The labium is thrust forwards by hydrostatic pressure and is used to capture prey. Damselfly nymphs have three caudal gills but dragonflies bear rectal gills inside the abdomen. The characteristic labium is an important feature for identification.

Odonates inhabit all types of water bodies, from streams, rivers, swamps, lakes, permanent and temporary ponds to paddy fields. Dudgeon (1999) cites approximately 12 families of Zygoptera and 5 families of Anisoptera in Asia. Adults are well-known but immature stages are not as well described. In the present study a key to families of mature nymphs was constructed.

Key to Families of Mature Odonate Nymphs of Indochina

1 Larva slender, head wider than thorax and abdomen; posterior of abdomen usually with 3 long caudal tracheal gills at the end of abdomen (Fig. 3, 4a, 6a, 7a, 8a, 9a) .. .. suborder Zygoptera…2

1′ Larva stout, head usually narrower than thorax and abdomen; without 3 long caudal lamellae (Fig. 10, 11, 14a, 15a) ..... suborder Anisoptera…12

2(1) Antennal segment 1 elongate, as long as the combined length of remaining segments (Fig. 1a); prementum with deep median cleft (Fig. 1b).... Calopterygidae

2′ Antennal segment 1 not elongate, less than the combined length of remaining segments; prementum varies 3

3(2′) Nymphs with 2 caudal gills (Fig. 2) ..... Chlorocyphidae
3′ Nymphs with 3 caudal gills 4

4(3′) Abdomen with lateral gills; caudal gills saccoid (Fig. 3) ..... Euphaeidae
4′ Abdomen without lateral gills; caudal gills either saccoid or laminate 5

5(4′) Caudal gills saccoid, prementum with median cleft 6
5′ Caudal gills laminate, prementum with distal margin entire or with median cleft 8

6(5) Labial palps with a single seta, without premental setae (Fig. 4b) ..... Megapodagrionidae
6′ Labial palps and prementum with many setae 7

7(6′) Palpal lobe of prementum with simple round teeth ..... Platystictidae
7′ Palpal lobe of prementum with 3 sharped teeth, the middle one longest (Fig. 6a-b) ..... Amphipterygidae

8(5′) Prementum stalked and spoon shaped (Fig. 5) ..... Lestidae
8′ Prementum not stalked, more or less subquadrate or triangular in shape (Fig. b,8b,9b) 9

9 Caudal lamellae with very thick basal and thin distal portions (Fig. 7c); palpal lobe of prementum deeply bifid, inner teeth longer; prementum with 1 seta (Fig. 7b) ..... Protoneuridae
9′ Caudal lamellae not divided; palpal lobe of prementum shallowly bifid, the outer portion short, broad apically subtruncate, inner teeth sharp and long 10

10(9′) Lamellae nodate or subnodate (Fig. 8c), lateral margin of occiput rounded (Fig. 8d) ..... Coenagrionidae
10′ Lamellae denodate , lateral margin of occiput variable 11

11(10′) Lamellae with a filamentous fringe (Fig. 9c), lateral margins of occiput slightly angled (Fig. 9a) ..... Platycnemididae, in part
11′ Lamellae without a filamentous fringe, lateral margins of occiput variable ..... Platycnemididae, in part, Coenagrionidae, in part

12(1′) Labium spoon-shaped (Fig. 14b, 15b) 14
12′ Labium flat 13

13(12′) Antennae with 4 segments, segment 3 very large (Fig. 10a-b) .....Gomphidae
13′ Antennae with 6-7 segments, each segment subequal in length (Fig. 11a-b)..... ..... Aeshnidae

14(12) Distal part of each palpal lobe with large irregular teeth (Fig. 12) .... Cordulegastridae
14′ Distal part of each palpal lobe smooth or crenuate (Fig. 14b,15b) 15

15(14′) Head with a prominent median horn between bases of antennae; metasternum with tubercle; legs very long, apex of hind femur reaching to or beyond posterior margin of abdominal segment VIII (Fig. 13) .....Corduliidae, Macromiinae
15′ Head without a horn between bases of antennae; metasternum without sclerite; legs not so long, apex of hind femur never reaching posterior of abdominal segment VIII 16

16(15′) Distal part of each palpal lobe with shallow indentations; if deep indentation, then lateral spine of abdominal segment VII as long as or longer than midlength of abdominal segment IX (Fig. 14a-b)..... Libellulidae
16′ Distal part of each palpal lobe with deep indentations; without spine on abdominal segment VIII; if spines present, it is shorter than midlength of abdominal segment IX (Fig. 15a-b)..... Corduliidae, Corduliinae

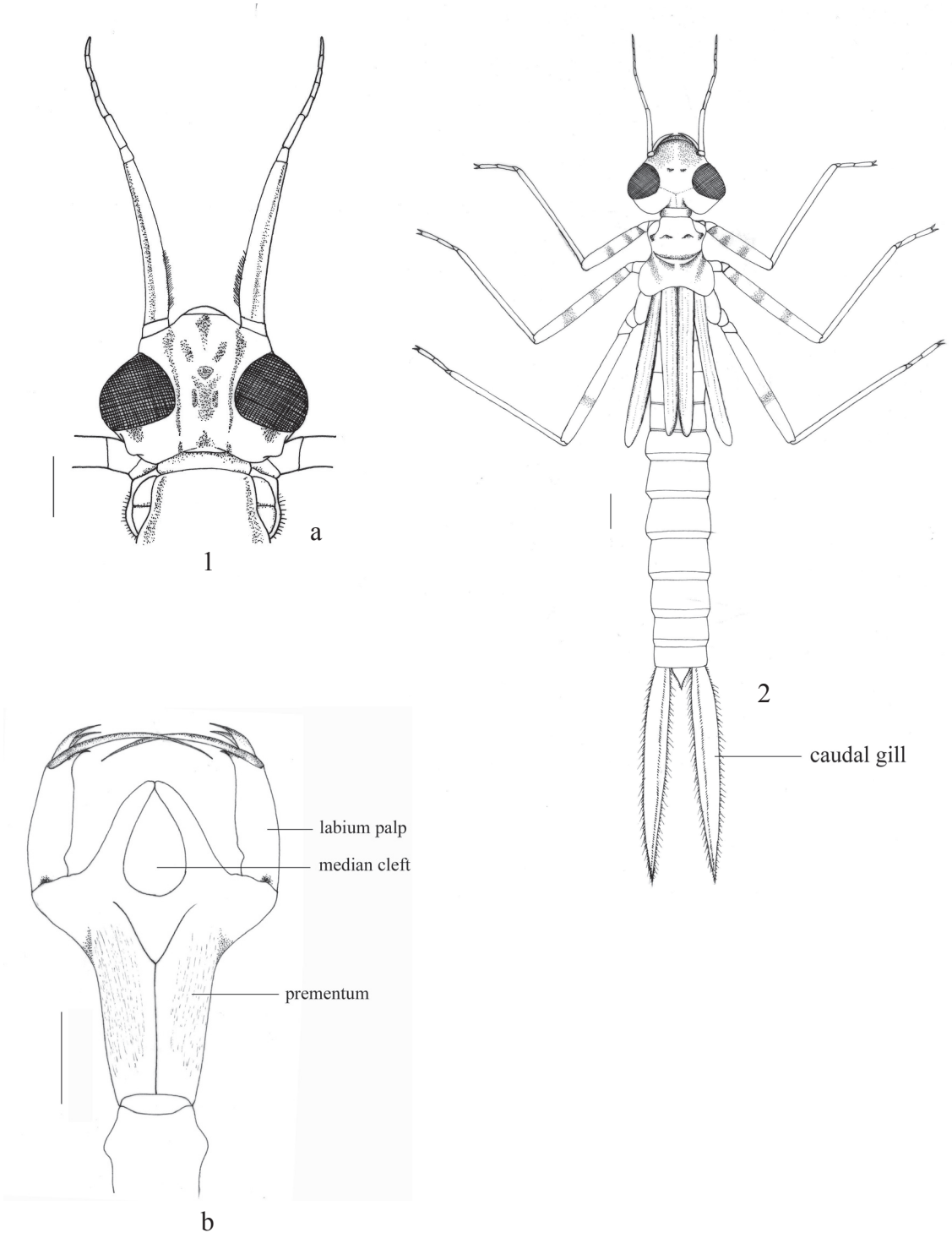


Fig. 1-2 1. Dorsal view of head (a) and labium (b) of Calopterygidae; 2. Dorsal view of nymph of Chlorocyphidae.
Scale = 1 mm.

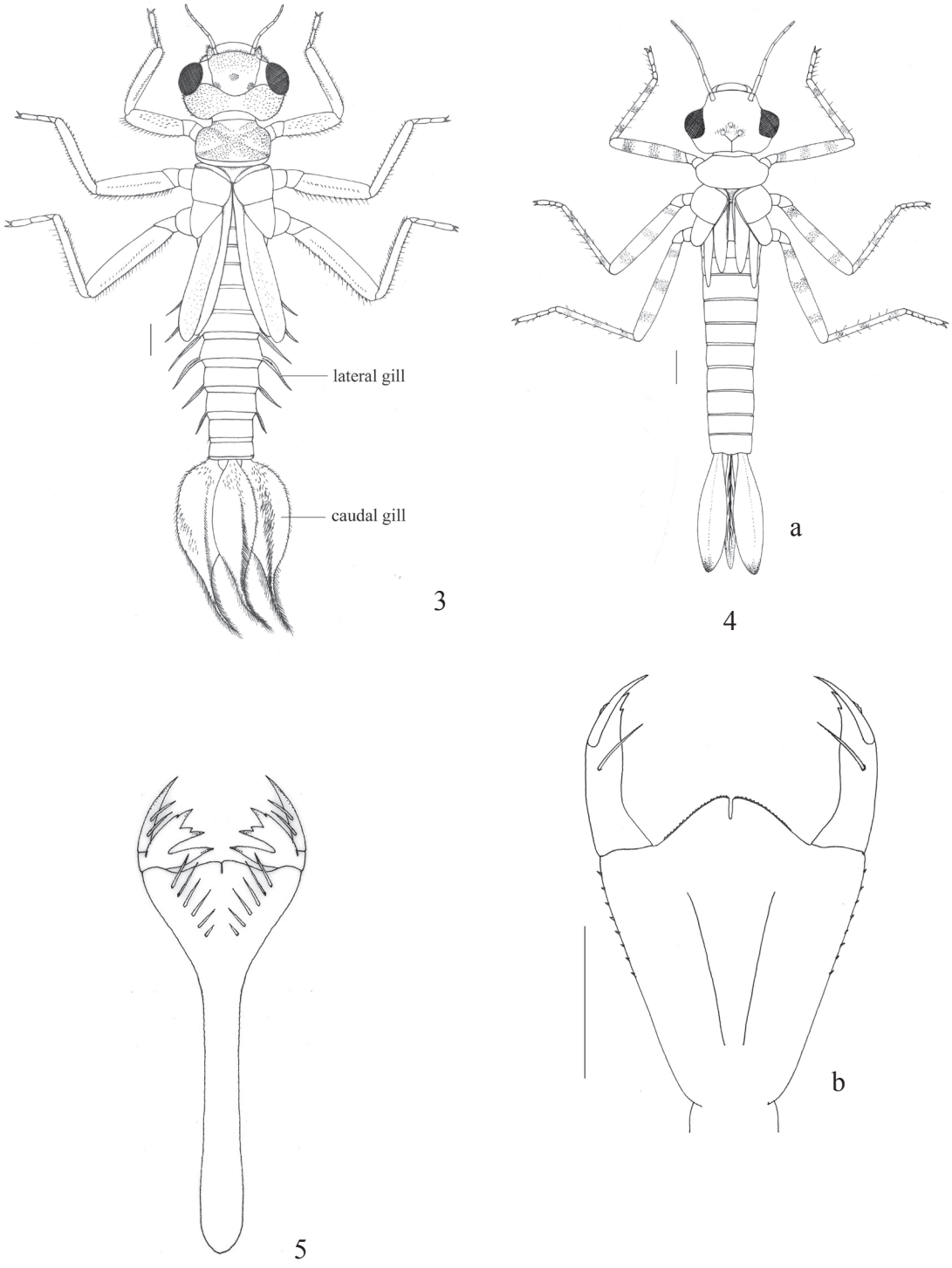


Fig. 3-5 3. Dorsal view of nymph of Euphaeidae; 4. Dorsal view (a) and labium (b) of nymph of Megapodagrionidae; 5. Labium of Lestidae (redrawn from Xiufu, 1998, fig. 11.148).
Scale = 1 mm.

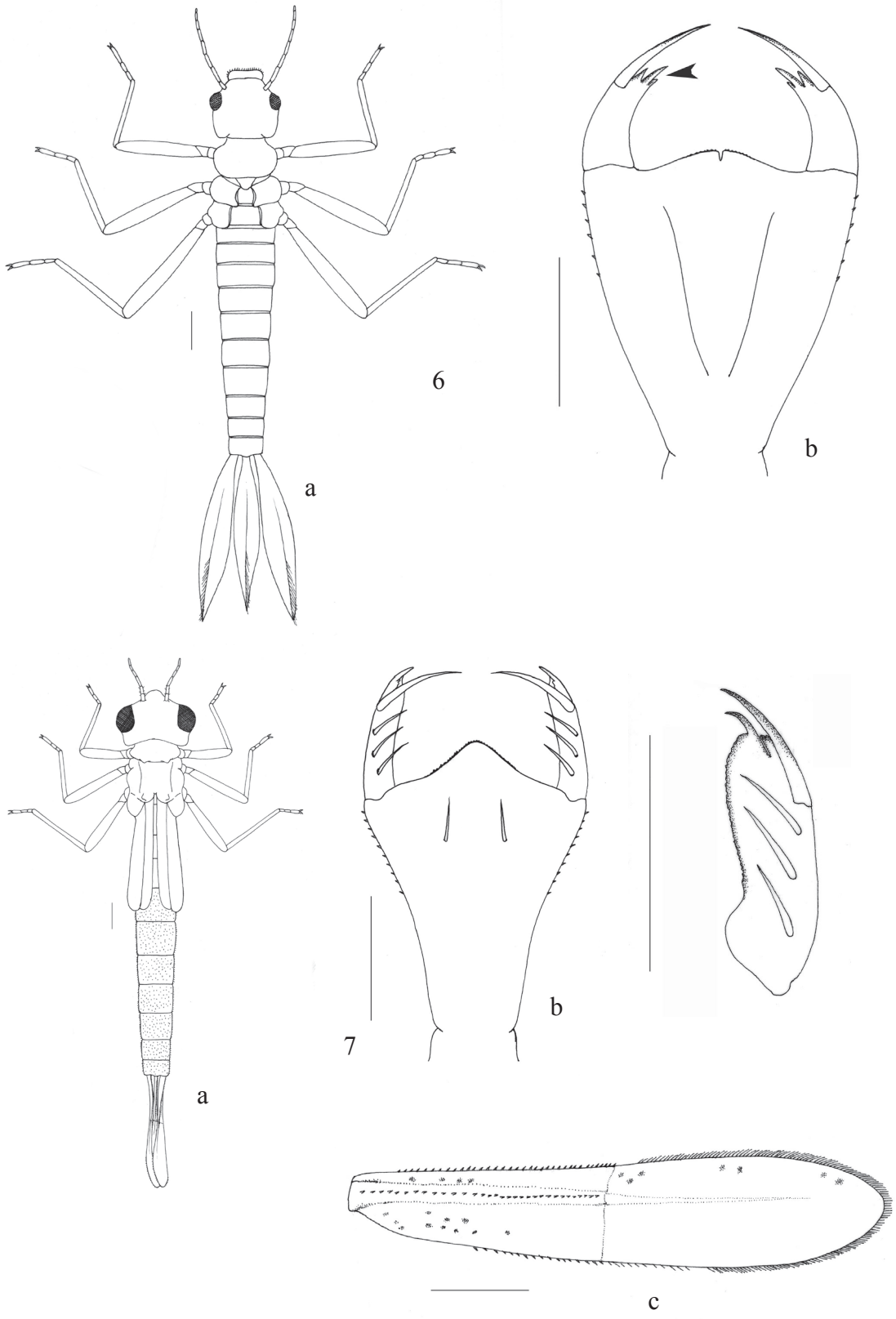


Fig. 6-7 6. Dorsal view of nymph (a) and labium (b) of Amphipterygidae; 7. Dorsal view of nymph (a), labium (b) and gill lamella (c) of Protoneuridae.
Scale = 1 mm.

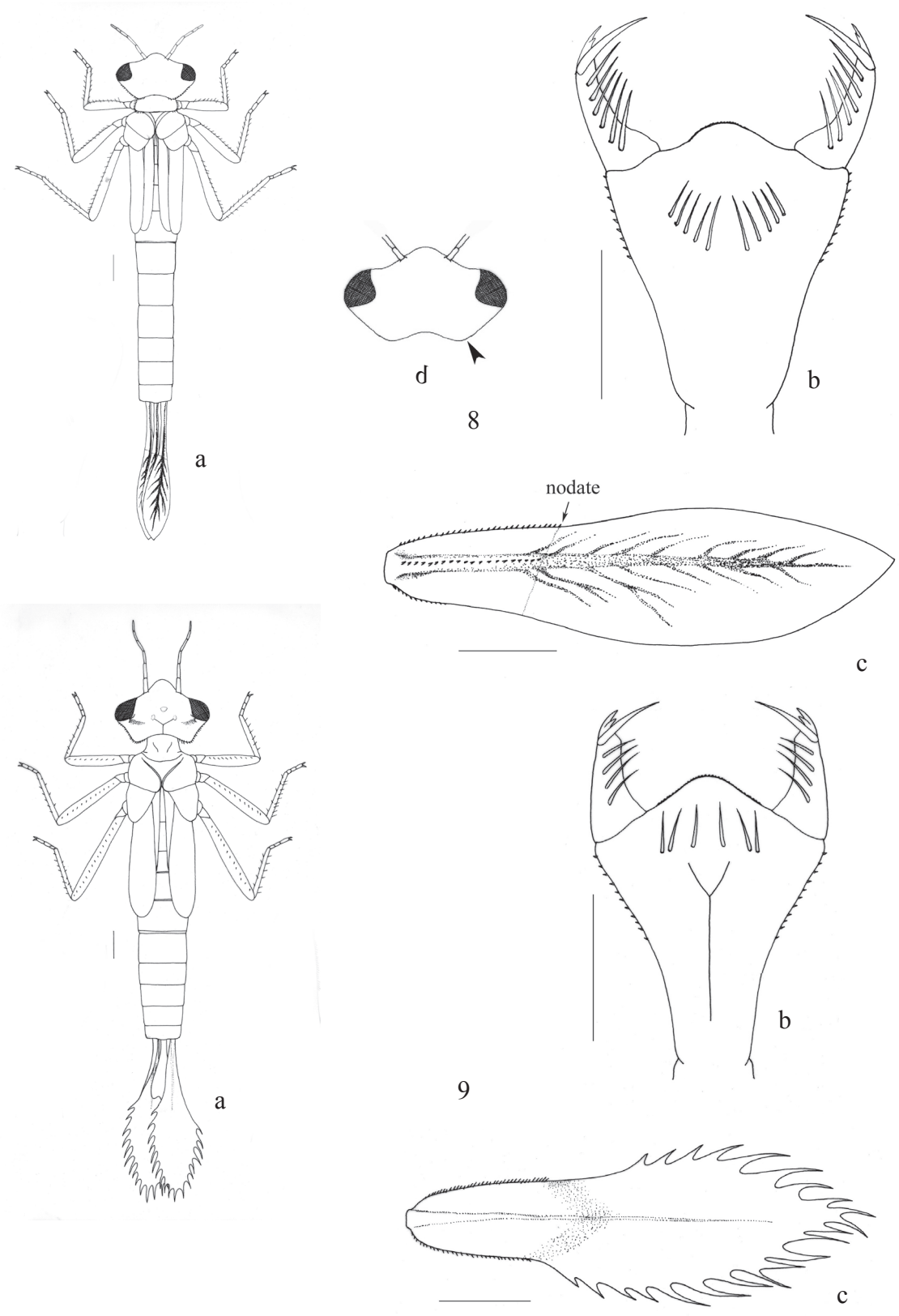
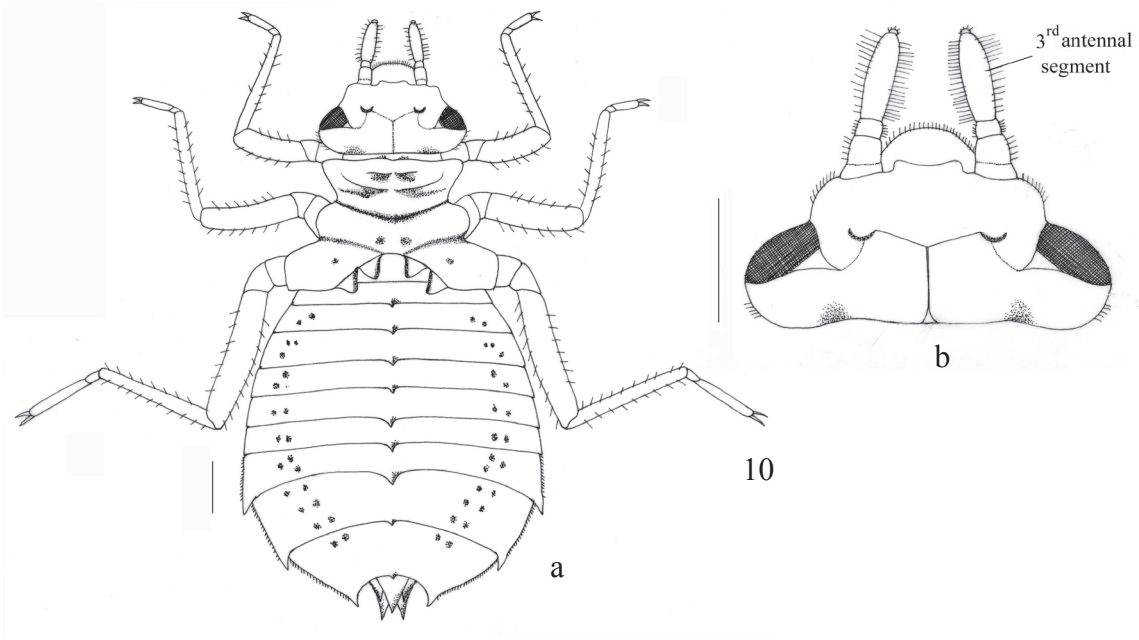


Fig. 8-9 8. Dorsal view of nymph (a), labium (b), gill lamella (c) and head (d) of Coenagrionidae; 9. Dorsal view of nymph (a), labium (b) and gill lamella (c) of some Platycnemidae.
Scale = 1 mm.



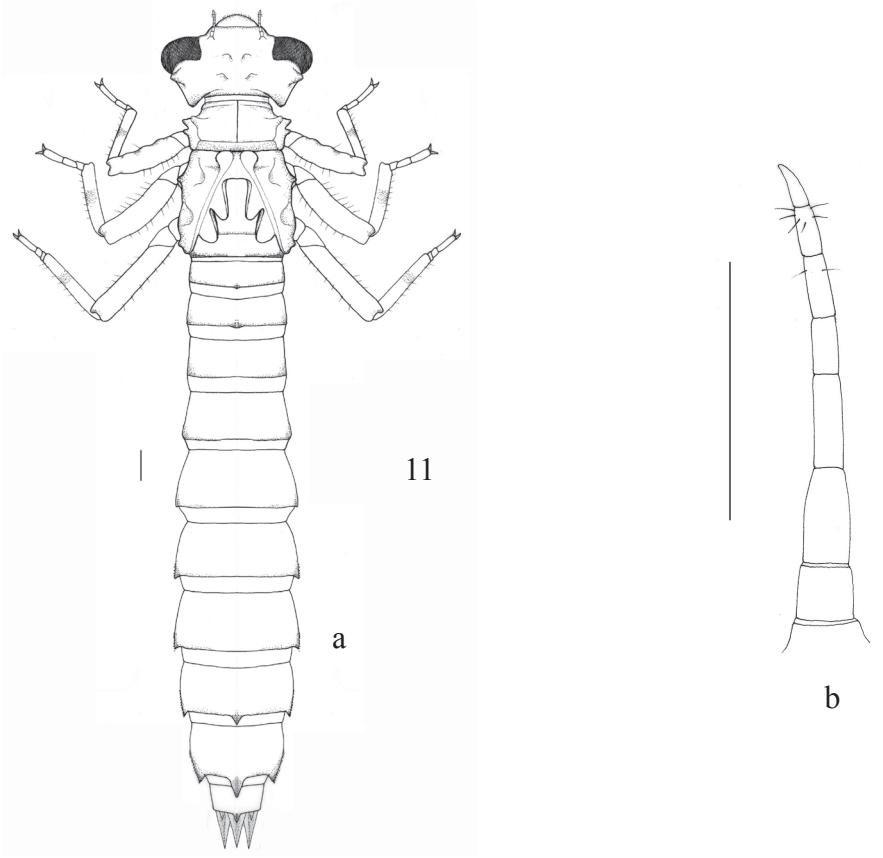
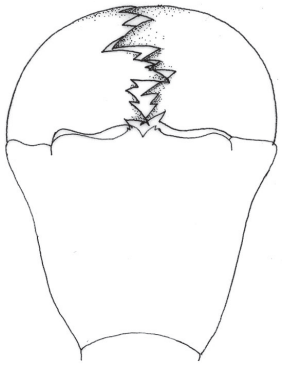


Fig. 10-11 10. Dorsal view of nymph (a) and head (b) of Gomphidae; 11. Dorsal view of nymph (a) and antennae (b) of Aeshnidae.
Scale = 1 mm.



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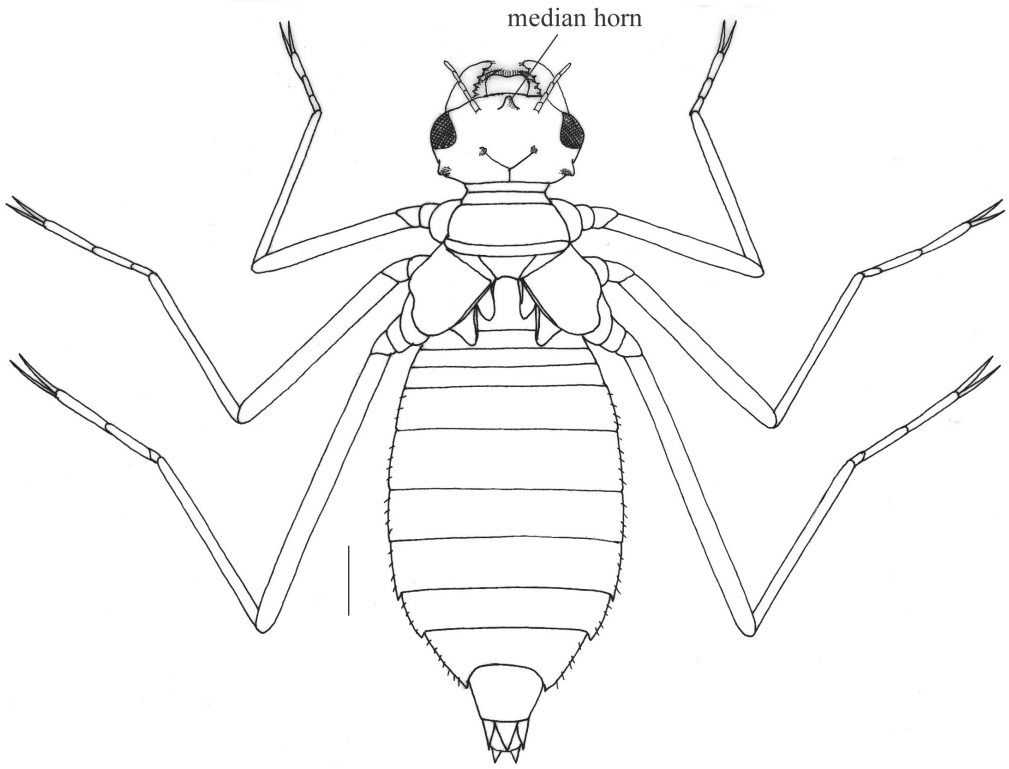

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Fig. 12-13 12. Labium of Cordulegastridae (redrawn from Xiufu, 1998, fig. 11.85);
13. Dorsal view of nymph of Corduliidae (Macromiinae).
Scale = 1 mm.

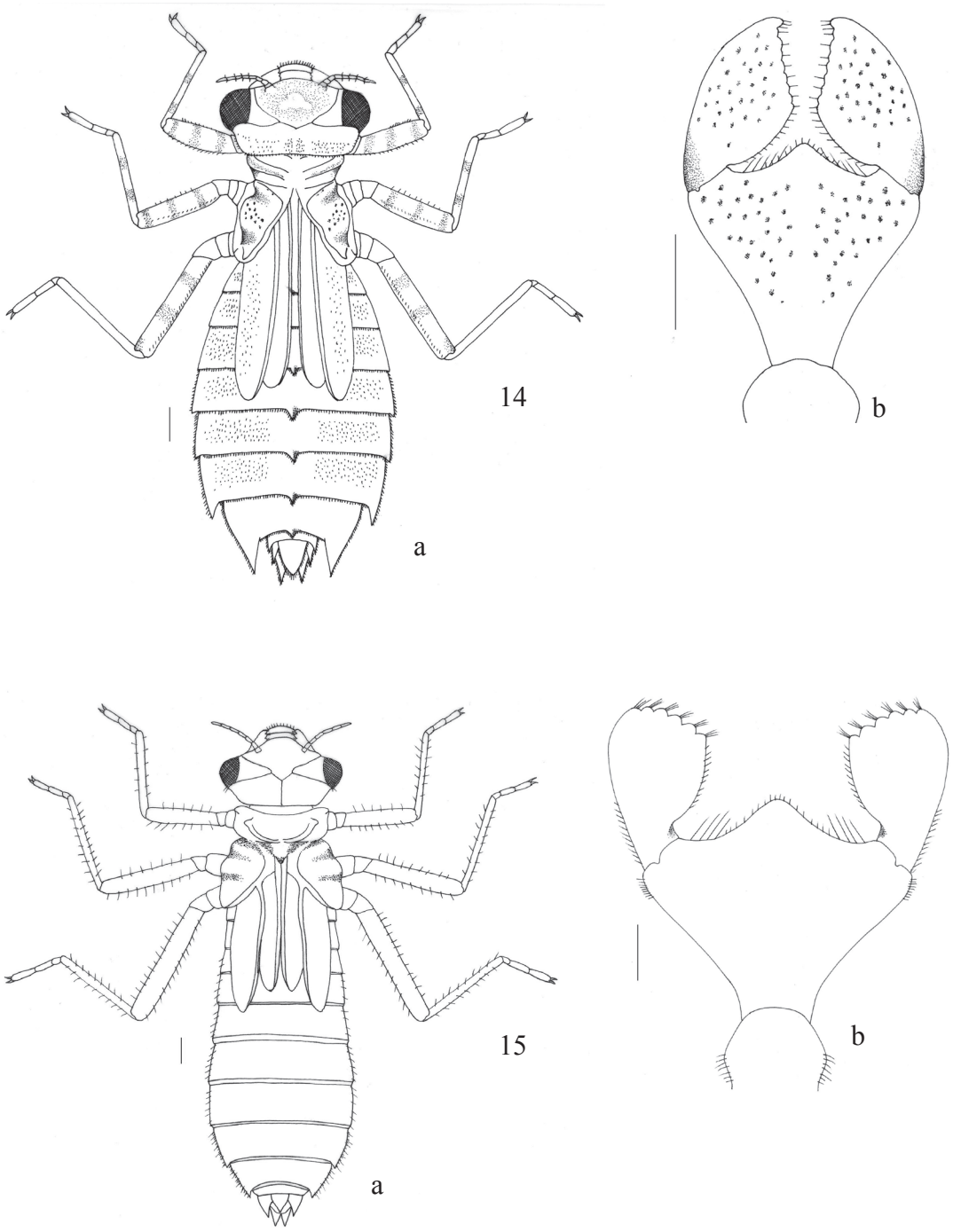

Fig. 14-15 14. Dorsal view of nymph (a) and labium (b) of Libellulidae; 15. Dorsal view of nymph (a) and labium (b) of Corduliidae (Corduliinae).
Scale = 1 mm.