Chapter 16.2

Family Chironomidae

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Chapter Outline

INTRODUCTION

Members of the nonbiting midge family Chironomidae (Diptera) are true flies, and they frequently dominate aquatic insect communities in both abundance and species richness (e.g., Cranston, 1982; Ferrington, 2008). Species of Chironomidae inhabit an enormous variety of aquatic ecosystems, from moist soils to pools in tree holes, and from low-oxygen lake sediments to fast-flowing mountain streams (Ferrington et al., 2008). The range of conditions under which chironomids are found is more extensive than that of any other family of aquatic insects. Several species lead semiterrestrial lives in moist habitats or are completely terrestrial. Moreover, Chironomidae is one of the very few insect families that has colonized the marine benthos. The

Thorp and Covich's Freshwater Invertebrates, Fourth Edition. https://doi.org/10.1016/B978-0-12-804223-6.00031-7

adult stage is short, with most of the lifespan spent as a larva (e.g., Thienemann, 1954; Tokeshi, 1995; Silva et al., 2015a). Oliver (1971), and Armitage et al. (1995) have provided an ample overview of chironomid biology and ecology. The great species and habitat diversity makes this family a valuable indicator species for lentic and lotic aquatic ecosystems.

The Chironomidae probably originated in the middle Triassic, approximately 248–210 million years ago (Cranston et al., 2010), and it has undergone extensive adaptive radiation to occupy a wider array of habitats at present than any other aquatic insect group (Jacobsen, 2008). The family comprises eleven subfamilies (Aphroteniinae, Buchonomyiinae, Chironominae, Chilenomyiinae, Diamesinae, Orthocladiinae, Podonominae, Prodiamesinae Tanypodinae, Telmatogetoninae and Usambaromyiinae), within which are at least 10,000 species in more than 400 genera (Cranston, 1995a; Sæther, 2000), with roughly 6200 of these are known to science (P. Ashe, personal communication). Nearly 900 species are recognized from the Neotropical Region (M. Spies, personal communication), of which 80% are assigned to one of the three subfamilies Chironominae, Orthocladiinae, and Tanypodinae (Spies et al., 2009). The remaining subfamilies are less species-rich: Aphroteniinae, Buchonomyiinae, Chilenomyiinae, Prodiamesinae, and Telmatogetoninae, for example, have one or a few species within one or a few genera.

Endemicity in the Antarctic and Neotropics is difficult to evaluate at present. Although many genera and species have been found only in some regions, their full geographic range is not known. While recent years have seen increased activity regarding Chironomidae in the Neotropical Region (e.g., Trivinho-Strixino et al., 2013, 2015; Andersen & Pinho, 2014; Andersen et al., 2015; Silva & Wiedenbrug, 2015; Siri & Donato, 2015; Dantas et al., 2016; Silva & Farrell 2017), the knowledge of the diversity and taxonomy as well as biogeography and phylogeny, particularly in the Central America and Caribbean regions, remains fragmentary. We provide updated information on the larval chironomid fauna in the Antarctic and Neotropical regions and will hopefully encourage further studies in the area.

Therefore, for this assessment, we recognize nine subfamilies, with known larvae, occurring in the Antarctic and Neotropical regions. In total, 144 genera were included in the key. The subfamily Chironominae is prevalent with 55 genera (38.2%), followed by the Orthocladiinae and Tanypodinae with 50 (34.7%) and 23 (16.0%) genera, respectively. The balance of 16 (11.1%) genera represent the six remaining subfamilies. The Antarctic fauna is represented by only three species: the orthoclads *Belgica antarctica* Jacobs and *Eretmoptera murphyi* Schaeffer and the podonomine *Parochlus steinenii* (Gerke) (Alegrucci et al., 2005).

LIMITATIONS

There has been no previous attempt to construct a comprehensive key to Chironomidae from the Antarctic and Neotropical regions. There are a few local keys including those by Paggi (2001, 2009) focusing on the Argentinean fauna, Spies et al. (2009) for Central America, and Trivinho-Strixino (2014), which covers mainly southeast Brazil. Several Neotropical chironomid larvae should key well in Epler (2001) or Ferrington et al. (2008), keeping in mind the divergences between regions in faunal composition (Spies et al., 2009). Andersen et al. (2013b) also included much useful information, but that should be employed with caution because of the geographic ranges. Spies & Reiss (1996) cataloged information and references for all taxa known from the Neotropics, including distribution records by country. Despite these works, the larval chironomid fauna remains poorly known ecologically and taxonomically in the aforementioned regions. Often, the incomplete knowledge of the full life history, associated with the lack of descriptions and keys to a local fauna prevent species identifications. Additionally, it is customary to overlook the Chironomidae in favor of other groups, such as Ephemeroptera, Plecoptera, and Trichoptera, which are more limited in number and diversity, and more easily identified (Spies et al., 2009).

A further limitation stems from species descriptions needing to be based on the adult (Cranston & Nolte, 1996). Association of chironomid immature stages can be achieved by individual rearing of larvae and collecting cast larval and pupal skins to establish the associations between each life stage (Ekrem et al., 2007). This procedure is time-consuming, however, and is not always successful for species with special environmental requirements (Silva et al., 2013). Regardless of these drawbacks, the Chironomidae has recently been studied taxonomically in the Antarctic and Neotropical regions. Several monographs on individual genera have been published (e.g., Mendes et al., 2004; Mendes & Andersen, 2008; Wiedenbrug & Trivinho-Strixino, 2011; Wiedenbrug et al., 2012; Trivinho-Strixino, 2012; Oliveira et al., 2013; Pinho et al., 2013; Silva et al., 2014; Trivinho-Strixino & Pepinelli, 2015), including species-level keys, as well as extensive reference collections. Finally, in this scenario where Chironomidae become an ideal group for investigating molecular/morphologic

correspondence, it is important to point out that the emerging molecular data (e.g., Ekrem et al., 2010; Carew et al., 2011; Stur & Ekrem, 2011; Silva et al., 2013, 2015b; Silva & Wiedenbrug, 2014) support the concept of cryptic speciation in the family, and suggests that its diversity may be profoundly underestimated.

TERMINOLOGY AND MORPHOLOGY

Chironomidae are typical nematocerous dipterans, with four larval instars. Although morphologic and taxonomic examinations are made on the final instar, most structures seem to be present in earlier instars (Cranston, 1995c). The extensive ecologic amplitude displayed by species of Chironomidae is related to the very wide array of morphologic adaptations present among members of the group (Ferrington et al., 2008). The following diagnosis derives from Cranston (1995c; 2013) and Epler (2001). Mature (fourth instar) chironomid larvae possess an exposed, complete, sclerotized, nonretractable cephalic capsule, and an elongate, cylindrical body lacking jointed thoracic legs. The antenna is well developed and multi-articulated (retractile into the head in all Tanypodinae); it may be also mounted on a tubercle on some species. Larval chironomids bear mouthparts directed anteriorly (prognathous), with opposing mandibles, operating in oblique to the horizontal plane, and ventromedially with either transverse, usually toothed plate (the so-called mentum) or movable, toothed ligula (in Tanypodinae). There are usually no open spiracles, except in some members of the Podonominae. The body consists of three thoracic and nine abdominal segments and usually an anterior and posterior pair of parapods bearing spines or claws. The terminal segments usually bear paired procerci and usually four anal papillae, sometimes also with short lateral and/or longer ventral tubuli.

Several different terminologies have been used, with some being consistent with prevailing views of insect morphology, while others have been more idiosyncratic (Cranston, 1995c). Since the publication of Sæther (1980), a detailed assessment of morphologic homology, most discussions of morphologic structures have used the terms included in that glossary (Spies et al., 2009). Therefore, the subsequent list follows Sæther (1980), supplemented by Epler (2001), and it is not intended to be exhaustive. Figs. 16.2.1–5 illustrate most of the terminology used in the key and were modified from Oliver & Roussel (1983). In addition, some of the figures presented in this chapter were kindly provided by J.H. Epler, P.S. Cranston, and S. Trivinho-Strixino.

- accessory blade: smaller elongate appendage adjacent to antennal blade, usually partially fused with blade at base,
- accessory tooth: in Tanypodinae, small tooth between basal tooth and apical tooth of mandible,
- anal tubules: mostly oblong (but also ovoid, tapering, etc.) appendages of anal segment above and between posterior parapods,
- antennal blade: elongate structure adjacent to antennal flagellum, with a common base with accessory blade, arising from apex of first article,
- antennal ratio (AR): the ratio of length of basal antennal article to the combined lengths of remaining articles (the flagellum),
- antennal seta: seta of basal antennal article found in most Tanytarsini,
- antennal tubercle: base or platform from which the antenna arises,
- apical tooth: apical tooth at tip of mandible,
- cephalic index (IC): width of head capsule as a percentage of length of head capsule,
- cephalic setae: dorsal and lateral setae of head capsule, numbered with Arabic numerals from the anterior end to the posterior end of the head,
- clypeus: dorsal plate of the head immediately anterior to the frontal apotome that bears the S3 setae,
- dorsal accessory tooth: dorsal tooth or teeth of mandible in addition to the more apical and larger dorsal tooth,
- dorsal pore (DP): a sensory structure on the dorsum of the head capsule,
- dorsomentum: usually toothed, dorsal plate of double-walled mentum,
- flagellum: collective term for the apical articles of the antenna,
- frontal apotome: the most dorsal sclerite of the head carrying frontal setae S4 and S5, delimited anteriorly from the clypeus,
- frontoclypeal apotome: dorsal plate consisting of fusion of the clypeus and frontal apotome,
- labral lamella: one to several, smooth to pectinate lamellae near median anterior margin of labrum,
- labral sclerites: sclerite(s) on dorsal side of labrum carrying labral setae,
- labrum: the upper lip, consisting of the anterior dorsal portion of the head capsule,
- lateral tubules: small tubule laterally on each side of segment X in some Chironomini,
- Lauterborn organs: sensory organs, usually located on apex of second antennal article; usually digitiform but may be on pedicels and collectively may appear leaf-like (in Tanytarsini),
- ligula: in Tanypodinae, a sclerotized, toothed, tongue-like internal plate near center of head,
- M-appendage: in Tanypodinae, medioventral appendage of prementum, which may be reduced to fine teeth, very large and pronounced with several serrations, smaller with only median and paramedian lamellae, or consisting

of a triangular plate with lateral vesicles carrying a pseudoradula,
- mandible: the jaws, paired, usually toothed, structures inserted laterally, dorsal to the maxillae,
- maxilla: mouthpart located near base of mandible that bears the maxillary palp,
- mentum: usually toothed plate on anterior ventral margin of head capsule, consisting of a fused ventromentum and dorsomentum,
- paraligula: small sclerotized structure adjacent to ligula at ventral apex of prementum,
- parapods: fleshy, unjointed, ventral protuberances on prothorax (anterior parapods) and last abdominal segment (posterior parapods), nearly always carrying apical claws,
- pecten epipharyngis: usually three median scales, lamellae, spines, or rods directly behind labral margin,
- pecten hypopharyngis: in Tanypodinae, the comb-like structures on either side of the base of the ligula,
- pecten mandibularis: group of setae near ventral apex of mandible,
- premandible: a pair of ventral appendage-like structures beneath the labrum, taking the form of toothed plates or processes,
- premandibular brush: group of microtrichia sometimes present near premandible,
- premento-hypopharyngeal complex: double-lobed structure dorsal of, and to a large extent covered by, mentum in ventral view, and posterior and opposed to labrum,
- procercus: preanal tubercle, carrying 1–20 apical setae and usually two lateral setae; absent or vestigial in some taxa,
- pseudoradula: in Tanypodinae (except for *Tanypus*), longitudinal band of fine to coarse points present on middle of M-appendage,
- ring organ: campaniform sensillum present found on the basal article of the maxillary palp and the antenna,
- seta interna: seta on inner dorsomedial side of mandible, usually pectinate,
- seta subdentalis: seta on mandible proximal to inner teeth,
- setae submenti: pair of setae immediately posterior to mentum, anteriorly on submentum,
- S I, S II, S III, SIVA, S IVB: major setae of the anterodorsal surface of the labrum,
- ventral pore (VP): a sensory structure on the venter of the head capsule,
- ventral tubules: one to two pairs of tubules ventrally on abdominal segment 11,
- ventromental plate(s): lamellar ventral outgrowth of the head capsule adjacent to each side of the mentum.

MATERIAL PREPARATION AND PRESERVATION

Larval chironomids are best preserved in 70%–80% ethanol or isopropanol. Material intended for molecular studies should be preserved in ethanol or isopropanol 96%–100% (Andersen et al., 2013c). Formalin should be absolutely avoided, since it makes the material preserved in this way useless for molecular approaches. Although not also recommended, some workers add Rose Bengal stain to samples to facilitate to sort out the specimens from the debris, which nearly always excessively stains the mouthparts, making them too dark for appropriate light transmission (Epler, 2001). In this case, the specimens may be immersed in 2% acid alcohol, which acts as a clearing agent, for a few minutes before being transferred to ethanol (Trivinho-Strixino, 2014). The accurate larval identification relies on the examination of several structures in the cephalic capsule, usually requiring slide-mounting of the specimen, which may involve dissection and the removal of internal tissues. There are several techniques recommended by different authors (e.g., Epler, 2001; Andersen et al., 2013c) for preparation of permanent slides. Nearly all of them, however, involve the maceration of the larval head in a warm 5–10% solution of caustic potash (KOH) and posterior slide-mounting in Canada balsam or Euparal. Detailed descriptions of methods can be found in Epler (2001), Trivinho Strixino (2014), and Andersen et al. (2013c).

When dealing with reared series of an adult associated with larval and pupal exuviae, it is essential that all stages be mounted on the same slide to avoid the possibility of future misassociation (Andersen et al., 2013c). In the case of large amounts of larvae and whether routine identification is all that is required, the process of mounting permanent slides may be time consuming and needlessly complex. Numerous mounting media may be used to eliminate the need for dehydration in the preparation of permanent slides, and these can act as clearing agents. One such mounting medium, popularly used for mounting semipermanent slides, is the Hoyer's mounting medium. An advantage of this medium is its high refraction index and macerating properties of the small specimens. The main drawback of Hoyer's is its tendency to crystallize on drying. This may be overcome by ringing the cover slips with two layers of nail varnish or Euparal, after the initial drying period, which will prevent rehydration and medium deterioration (Andersen et al., 2013c). Hoyer's medium

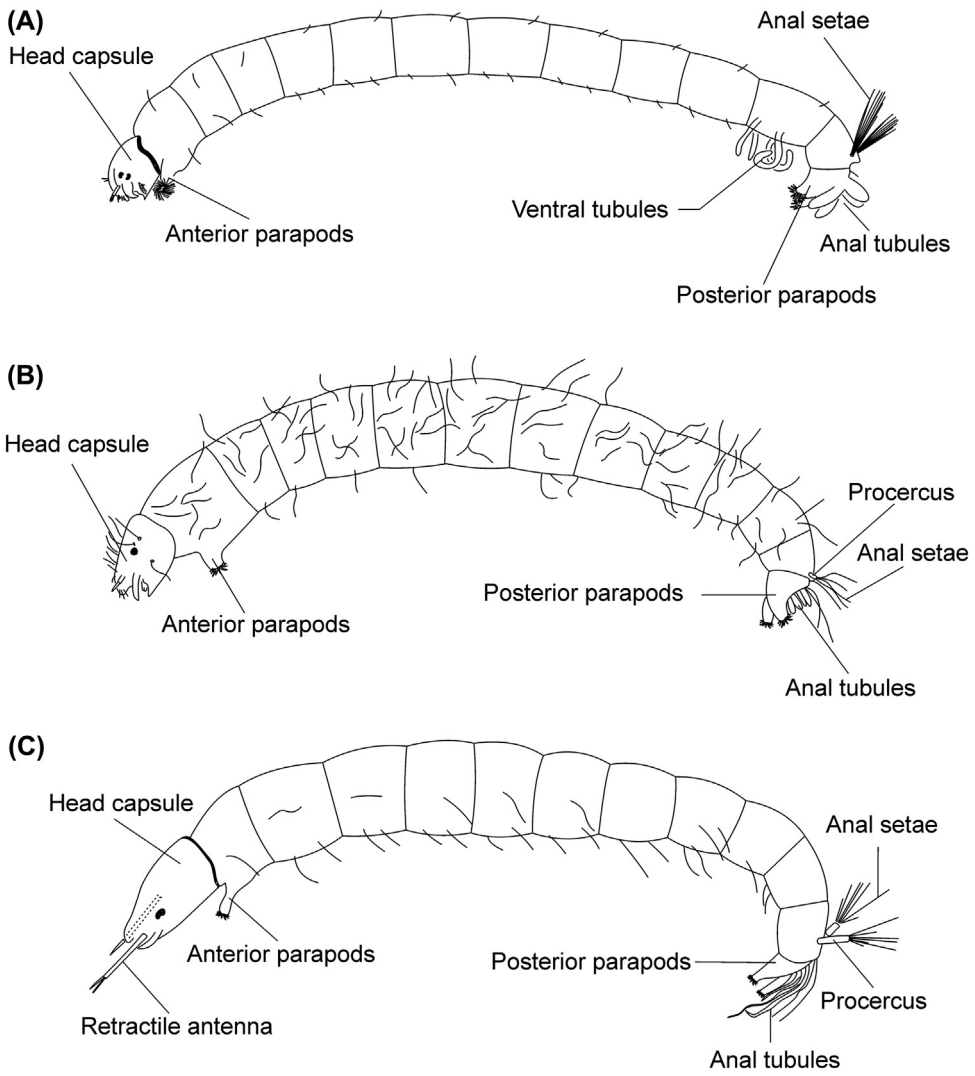

FIGURE 16.2.1 Chironomidae larva habitus, lateral view: (A) Chironominae; (B) Orthocladiinae; (C) Tanypodinae.

mounting may be prepared by dissolving gum arabic (30 g) in water (50ml), then adding in order chloral hydrate (200 g) and glycerol (16ml). This mixture is then filtered through glass wool before usage and/or storage (Epler, 2001). All slides should be labelled with information on where the specimen was collected, the date when it was collected, and the name of the collector (Figs. 16.2.1–16.2.29).

KEYS TO CHIRONOMIDAE

Chironomidae: Subfamilies

1 Antenna not retractile; prementum variously developed, ligula never developed as in Tanypodinae; mentum usually well developed and sclerotized 2

1' Antenna retractile into head; prementum with a distinctive ligula bearing four to eight teeth; mentum weakly developed, partially membranous with comb ..... **Tanypodinae [p. 667]**

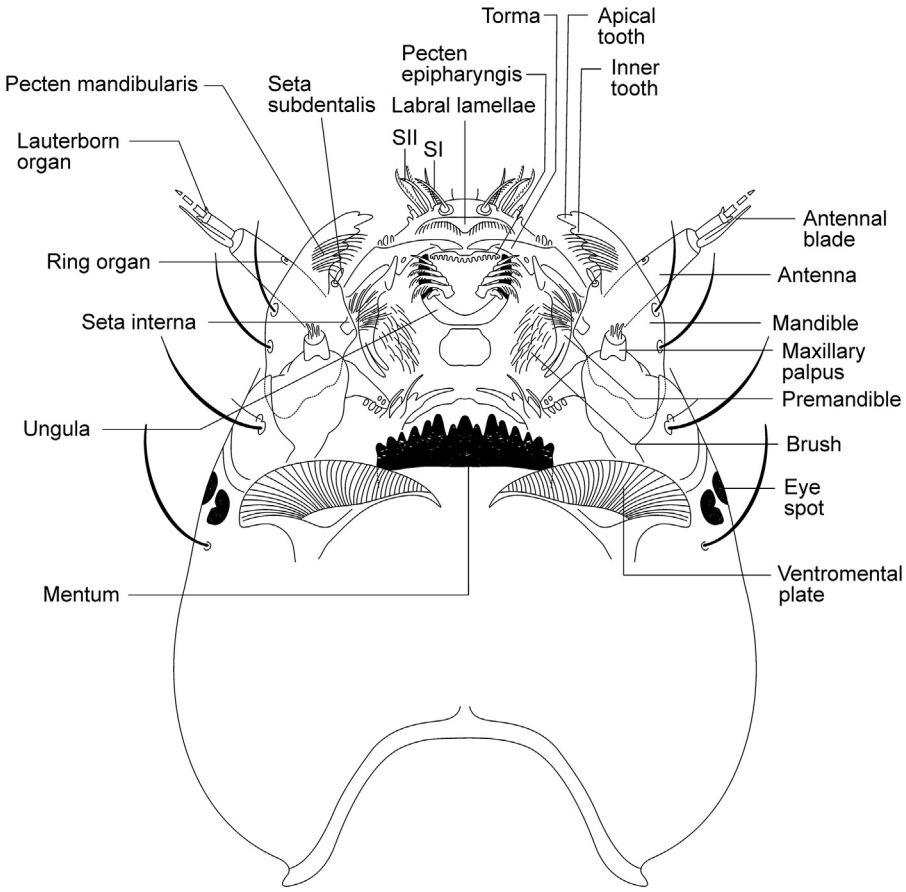

FIGURE 16.2.2 Chironominae (Chironomini) larva. Head capsule, ventral view.

2(1) Ventromental plates, if developed, never striated and usually with beard beneath 3

2' Ventral part of mentum laterally developed into ventromental plates, usually striate and never with beard beneath ..... **Chironominae [p. 691]**

3(2) Mentum nearly always toothed; anterior labrum with short sensorial setae; body smooth, although may be strongly setose (Fig. 16.2.6 B) 4

3' Mentum untoothed; anterior labrum with elongated sensorial setae; body covered with sclerotized plates and strong setae (Fig. 16.2.6 A) (except for *Paraphrotenia*) ..... **Aphroteniinae [p. 694]**

4(3) Premandibles absent 5

4' Premandibles present (Fig. 16.2.6 C) 6

5(4) Antenna weakly developed, third article not annulate (Fig. 16.2.6 D); procercus absent ..... Buchonomyiinae, one genus: *Buchonomyia*

5' Antenna distinct, with four to five articles, with second/third article often annulate (Fig. 16.2.23 D); procercus well developed (Fig. 16.2.6 B) ..... **Podonominae [p. 694]**

6(4) Third antennal article not annulate (Fig. 16.2.15 J); prementum with lamellae rather than brushes 7

6' Third antennal article annulate (except for Heptagiinii) (Fig. 16.2.15 I); prementum with three dense brushes of setaform processes ..... **Diamesinae [p. 694]**

7(6) Ventromental plates, if developed, then either setal beard absent or antenna not with four articles (Fig. 16.2.15 J) 8

7' Ventromental plates well developed, with setal beard beneath; antenna with four articles (Fig. 16.2.23 J) ..... **Prodiamesinae [p. 695]**

8(7) Antennae short, with four articles (Fig. 16.2.15 J); prementum with flabelliform appendage; premandible with strong brush ..... **Telmatogetoninae [p. 695]**

8' Antennae variously developed (Fig. 16.2.18 E), if short, with four articles, then segmentation indistinct; prementum without brush-like appendage; premandible without brush, if present, weak ..... **Orthocladiinae [p. 695]**

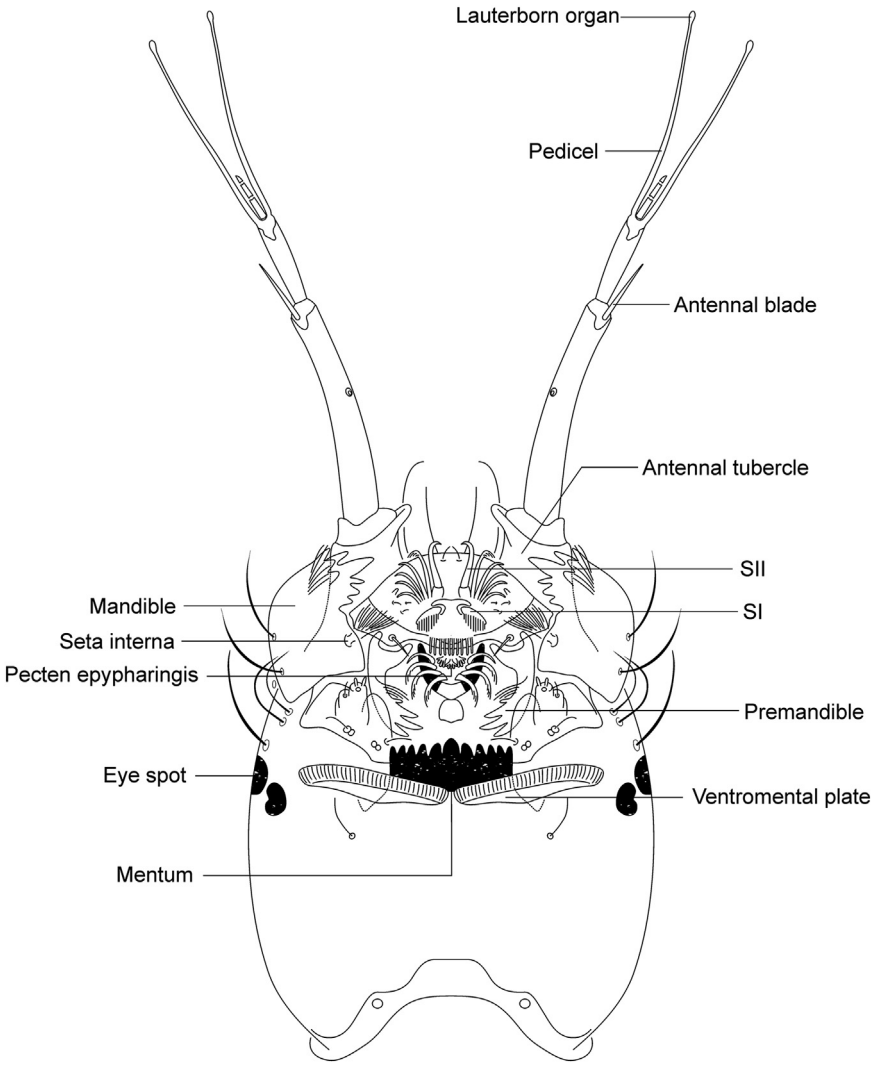

FIGURE 16.2.3 Chironominae (Tanytarsini) larva. Head capsule, ventral view.

Chironomidae: Tanypodinae: Tribes

This subfamily is the third most diverse, with species distributed widely across most of the globe, occupying numerous habits including small streams and ponds to lakes and bays (Silva et al., 2011). The larvae of the majority of species are free-living and none are known to produce larval or pupal cases (Ashe et al., 1987). Typically predators, some species feed on diatoms and detritus (Oliver, 1971). The monophyly of the subfamily is well supported (Cranston et al., 2012; Silva & Ekrem, 2016). Tanypodinae is subdivided into nine tribes (Silva & Ekrem, 2016). All, with exception of Anatopyniini, Coelopyniini, and Natarsiini, are found in the Neotropical Region. The *Thienemannimyia* group mature larvae may be easily identified. However, early instars should be regarded as *Thienemannimyia* group spp.

1 Head capsule rounded to oval; dorsomental teeth present in transverse plates or in longitudinal rows; body with lateral dense fringe of setae 2

1' Head capsule more elongate; dorsomentum indistinct, teeth reduced or absent; lateral fringe of setae absent, although isolated hairs or groups of hairs may be present ..... **Pentaneurini [p. 668]**

2(1) Dorsomental teeth arranged at margin of transverse or diagonal plates (Fig. 16.2.24 B); ligula with four to five pale or dark teeth..... 3

2' Dorsomental teeth aligned in longitudinal rows (Fig. 16.2.24 A), but not on distinct plates; ligula with six to seven pale teeth..... **Clinotanypodini [p. 691]**

3(2) Mandible with base slenderer and apical tooth longer (Fig. 16.2.24 F); M-appendage with pseudoradula; pecten hypopharyngis present 4

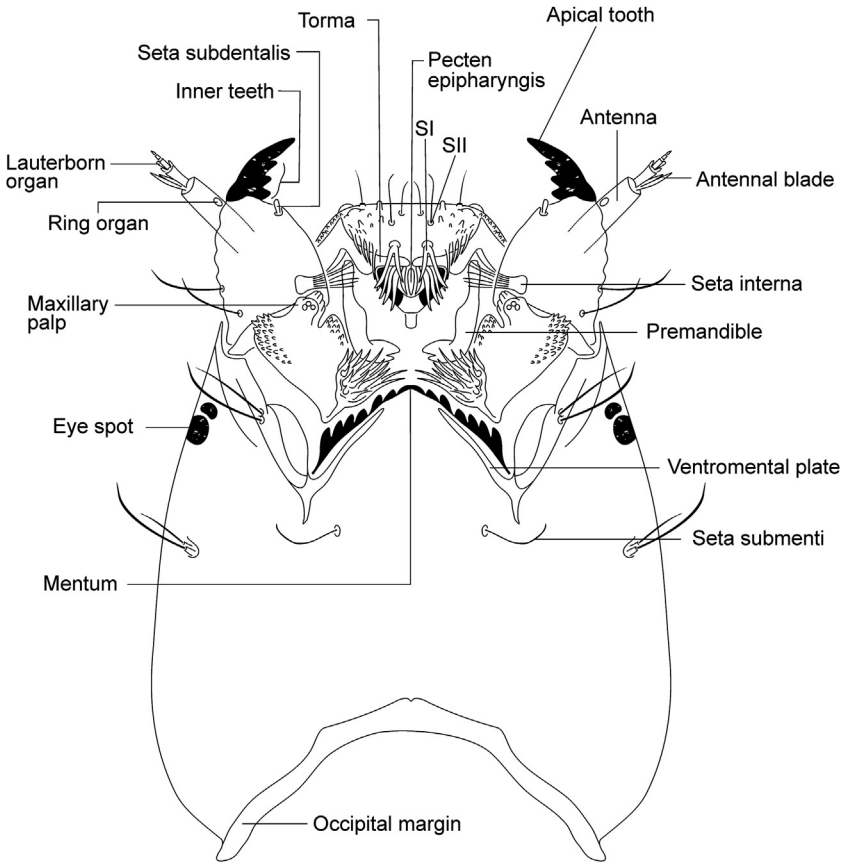

FIGURE 16.2.4 Orthocladiinae larva. Head capsule, ventral view.

3' Mandible with enlarged base and short apical tooth (Fig. 16.2.24 E); M-appendage without pseudoradula; pecten hypopharyngis absent ..... Tanypodini, one genus: *Tanypus*

4(3) Dorsomentum not continuous, toothed plate distinctly subdivided into median and lateral sections; mandible without rows of additional teeth 5

4' Dorsomentum with continuous, concave-arched, toothed plate weakly subdivided into median and lateral sections; mandible with several rows of additional small dorsal and ventral teeth (Fig. 16.2.24 G) ..... Fittkauimyiini, one genus: *Fittkauimyia*

5(4) Mandible with large blunt basal tooth; ligula with four or five dark teeth; paraligula pectinate (Fig. 16.2.24 H) ..... **Procladiini [p. 691]**

5' Mandible with weak basal tooth; ligula with five teeth, dark or light; paraligula bifid (rarely trifid) (Fig. 16.2.24 I) ..... **Macropelopiini [p. 691]**

Tanypodinae: Pentaneurini: Genera

1 Maxillary palp with two or more articles (Fig. 16.2.25 D) 2

1' Maxillary palp with single basal article (Fig. 16.2.25 E) 3

2(1) Maxillary palp with two unequal articles (Fig. 16.2.25 F); pseudoradula broadened posteriorly; posterior parapods with pale claws ..... *Zavrelimyia* (*Paramerina*) (in part)

2' Maxillary palp with two to six articles; if only two articles, then articles subequal in length (Fig. 16.2.25 D); pseudoradula not broadened posteriorly; posterior parapods usually with one to three dark claws ..... *Ablabesmyia*

3(2) Posterior parapod with bifid or pectinate claw (Fig. 16.2.25 G) 4

3' Posterior parapod with simple claws (Fig. 16.2.25 H) 7

4(3) Ligula with middle tooth distinctly longer than or subequal to inner tooth (Fig. 16.2.25 J); posterior parapod with one bifid claw; anal tubules shorter than parapods 5

4' Ligula with middle tooth longer than inner tooth; posterior parapod with one pectinate claw (Fig. 16.2.25 I) or claws with only inner serrations; anal tubules longer than parapods ..... *Nilotanypus*

5(4) Ligula with subequal teeth (Fig. 16.2.25 K); bifid claws of posterior parapod with outer tooth longer than inner tooth 6

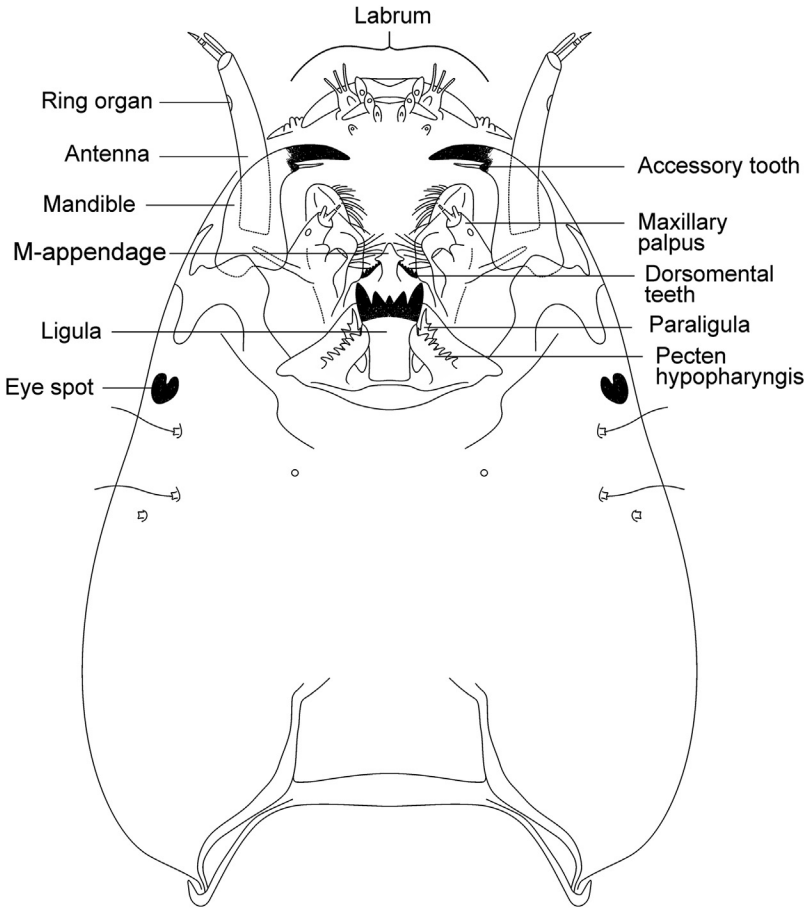

FIGURE 16.2.5 Tanypodinae larva. Head capsule, ventral view.

5’	Ligula with middle tooth distinctly longer (Fig. 16.2.25 J); posterior parapod with a bifid claw with outer tooth shorter than inner tooth ..... *Labrundinia*
6(5)	Ligula with median and inner teeth lighter than outer teeth (Fig. 16.2.25 K); paraligula trifid ..... *Denopelopia*
6’	Ligula with dark teeth (Fig. 16.2.25 L); paraligula bifid ..... *Zavrelimyia* (*Zavrelimyia*) (in part)
7(3)	Posterior parapod with simple claws (Fig. 16.2.26 B) 8
7’	Posterior parapod with one to two pectinate claws (Fig. 16.2.26 A), dark or light, with inner margin serrated ..... *Monopelopia*
8(7)	Ring organ of maxillary palp situated usually near middle of basal article (Fig. 16.2.26 D); mandible with weakly to moderately developed basal tooth 9
8’	Ring organ of maxillary palp situated near apex of basal article (Fig. 16.2.26 C); mandible with no basal tooth *Thienemannimyia* Group 10
9(8)	Length of antennal article 1 divided by mandible length >1.75; distance between ventrolateral setae 2 and 3 of mandible ½ as great as that between seta 2 and sensillum minusculum ..... *Metapelopia*
9’	Length of antennal article 1 divided by mandible length <1.90; distance between ventrolateral setae 2 and 3 of mandible smaller than ½ distance between seta 2 and sensillum minusculum ..... *Thienemannimyia*
10(8)	Ligula with subequal teeth (Fig. 16.2.26 F); supraanal seta arising from dark sclerotized area; anal tubules long and thin, surpassing length of posterior parapods 11
10’	Ligula with median and inner teeth shorter than outer teeth (Fig. 16.2.26 E); supraanal not arising from dark sclerotized area; anal tubules shorter ..... *Larsia*
11(10)	Head pale yellow (Fig. 16.2.26 H); posterior parapods with light claws 12
11’	Head usually dark brown (Fig. 16.2.26 G); posterior parapods with dark claws ..... *Hudsonimyia*
12(11)	Cephalic seta S10 between S9 and ventral pore (VP) forming an 80°−90° angle (Fig. 16.2.26 I) ..... *Pentaneura*
12’	Ventral pore (VP) between cephalic setae S9 and S10 forming a more or less straight line diagonal to longitudinal axis of head capsule (Fig. 16.2.26 J) ..... *Parapentaneura*

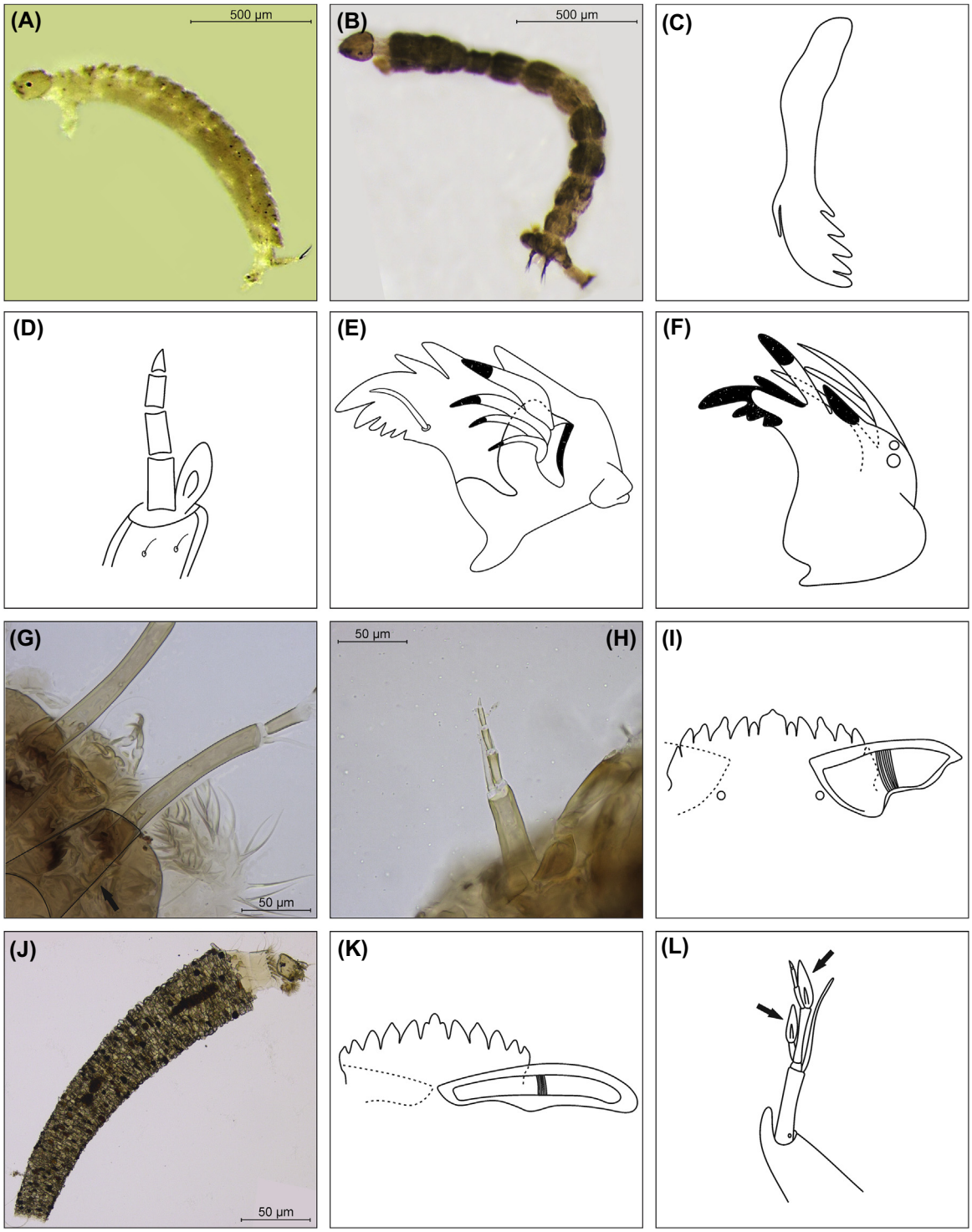

FIGURE 16.2.6 Chironomidae larva: (A) *Aphrotenia* sp.; (B) *Podonomus* sp.; (C) *Diamesa* sp.; (D) *Buchonomyia* sp.; (E) *Paraphrotenia* sp.; (F) *Aphroteniella* sp.; (G) *Caladomyia* sp.; (H) *Asheum* sp.; (I) *Stempellina* sp.; (J) *Constempellina* sp.; (K) *Tanytarsus* sp.; (L) *Stempellinella* sp.

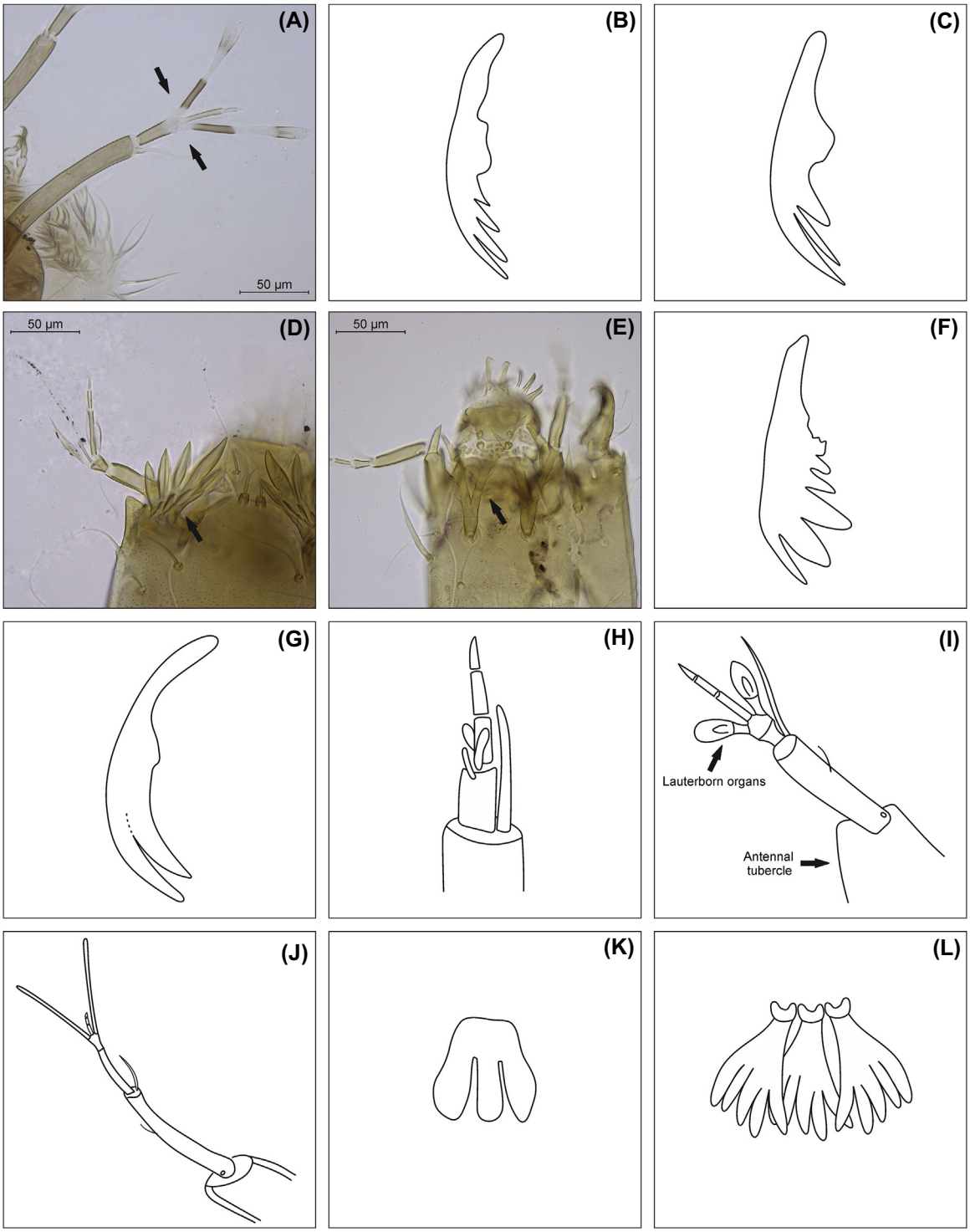

FIGURE 16.2.7 Chironomidae larva: (A) *Caladomyia* sp.; (B) *Zavrelia* sp.; (C) *Stempellinella* sp.; (D) *Stempellina* sp.; (E) *Constempellina* sp.; (F) *Pontomyia* sp.; (G). *Paratanytarsus* sp.; (H) *Pontomyia* sp.; (I) *Cladotanytarsus* sp.; (J) *Tanytarsus* sp.; (K). *Sublettea* sp.; (L) *Paratanytarsus* sp.

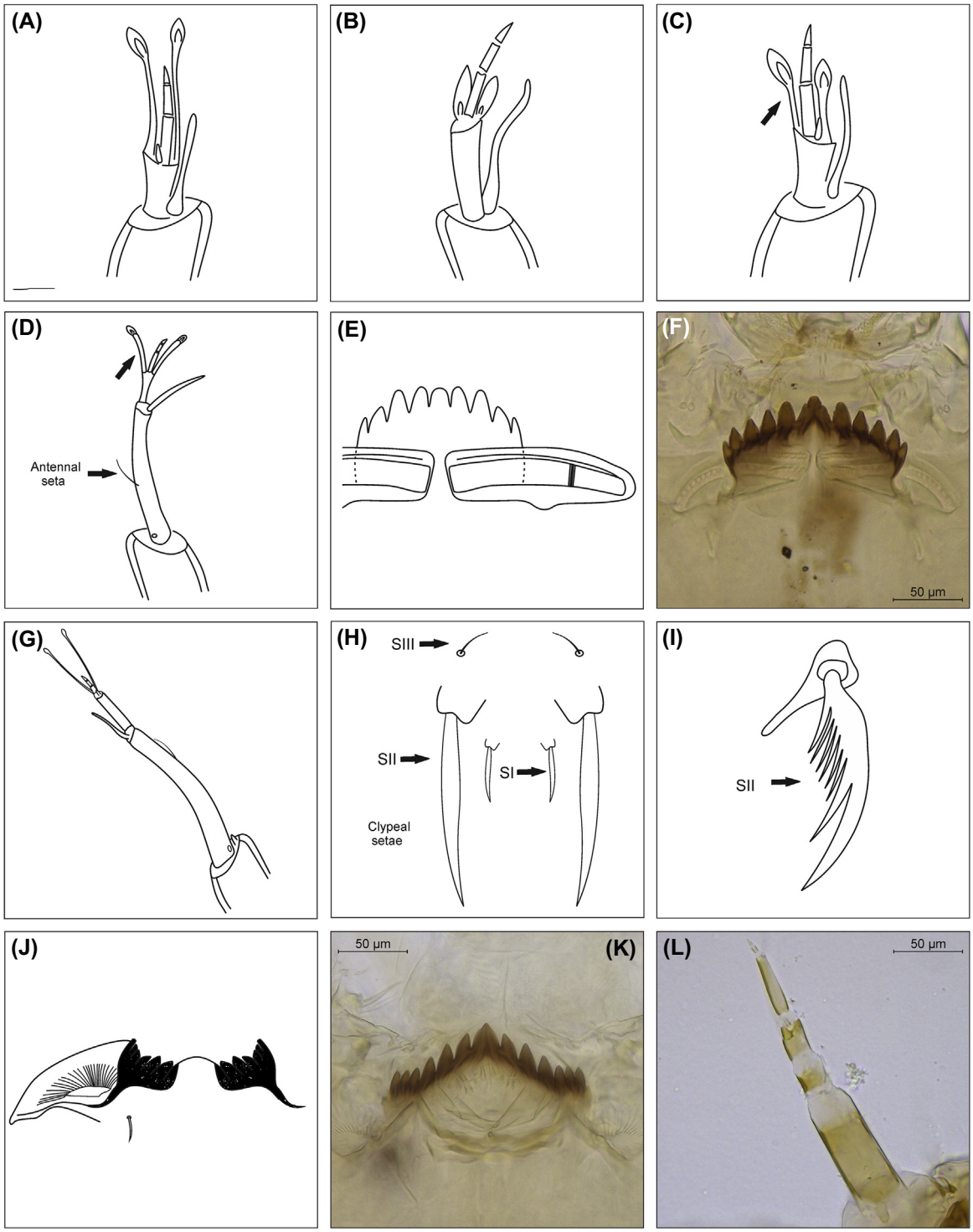

FIGURE 16.2.8 Chironomidae larva: (A) *Sublettea* sp.; (B, D) *Paratanytarsus* sp. (C, F) *Rheotanytarsus* sp.; (E) *Neozavrelia* sp.; (G) *Micropsectra* sp.; (H) *Cladopelma* sp.; (I) *Dicrotendipes* sp.; (J) *Cryptochironomus* sp.; (K) *Parachironomus* sp.; (L) *Demicryptochironomus* sp.

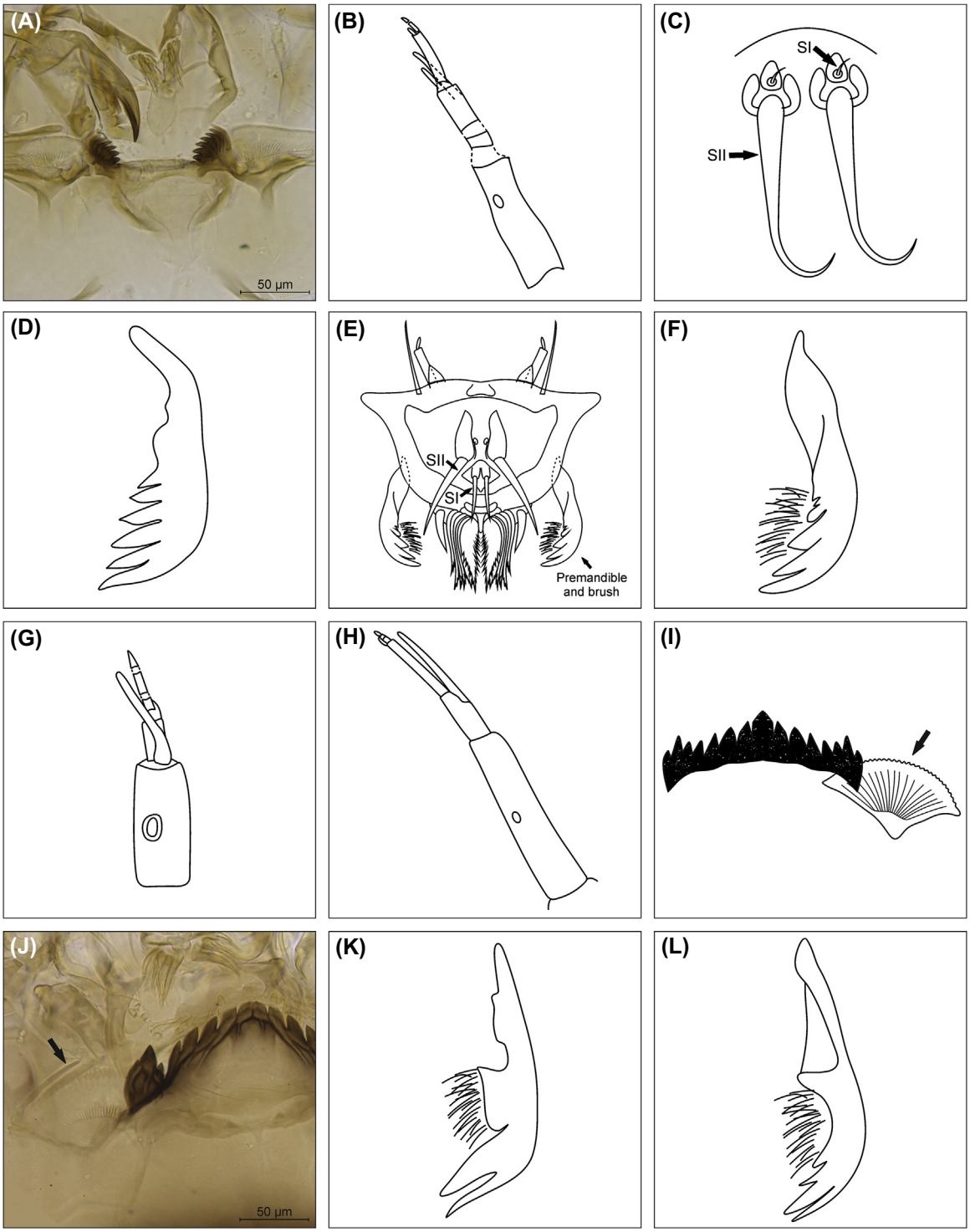

FIGURE 16.2.9 Chironomidae larva: (A) *Demicryptochironomus* sp.; (B) *Cryptochironomus* sp.; (C, D) *Gillotia* sp.; (E, F) *Cryptochironomus* sp.; (G) *Cryptotendipes* sp.; (H) *Pelomus* sp.; (I) *Parachironomus* sp.; (J) *Cladopelma* sp.; (K) *Microchironomus* sp.; (L) *Paracladopelma* sp.

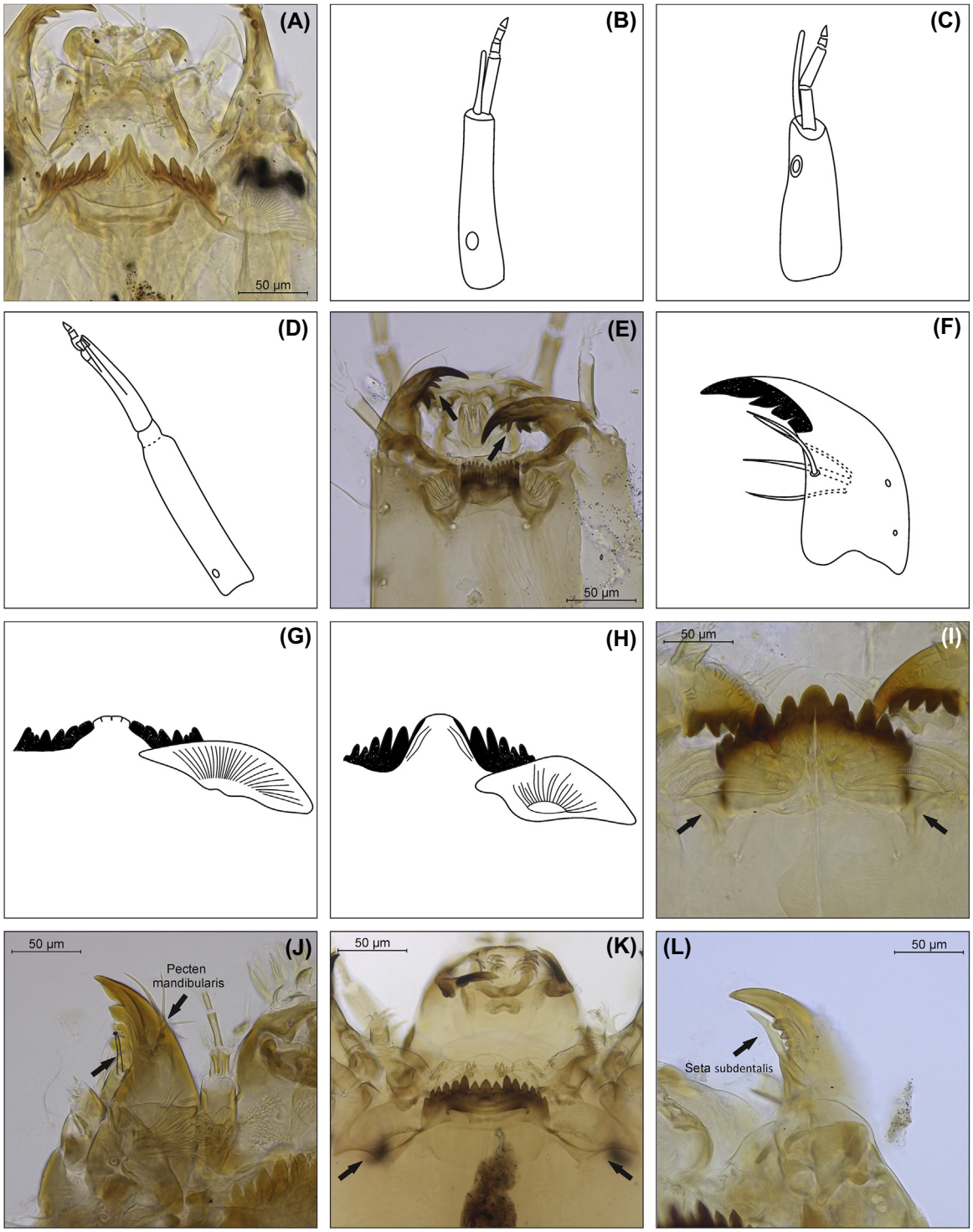

FIGURE 16.2.10 Chironomidae larva: (A) *Microchironomus* sp.; (B) *Cladopelma* sp.; (C) *Harnischia* sp.; (D) *Paracladopelma* sp.; (E) *Robackia* sp.; (F, G) *Pelomus* sp.; (H) tentatively identified as *Saetheria* sp.; (I) *Pseudochironomus* sp.; (J) *Aedokritus* sp.; (K) *Chironomus* sp.; (L) *Fissimentum* sp.

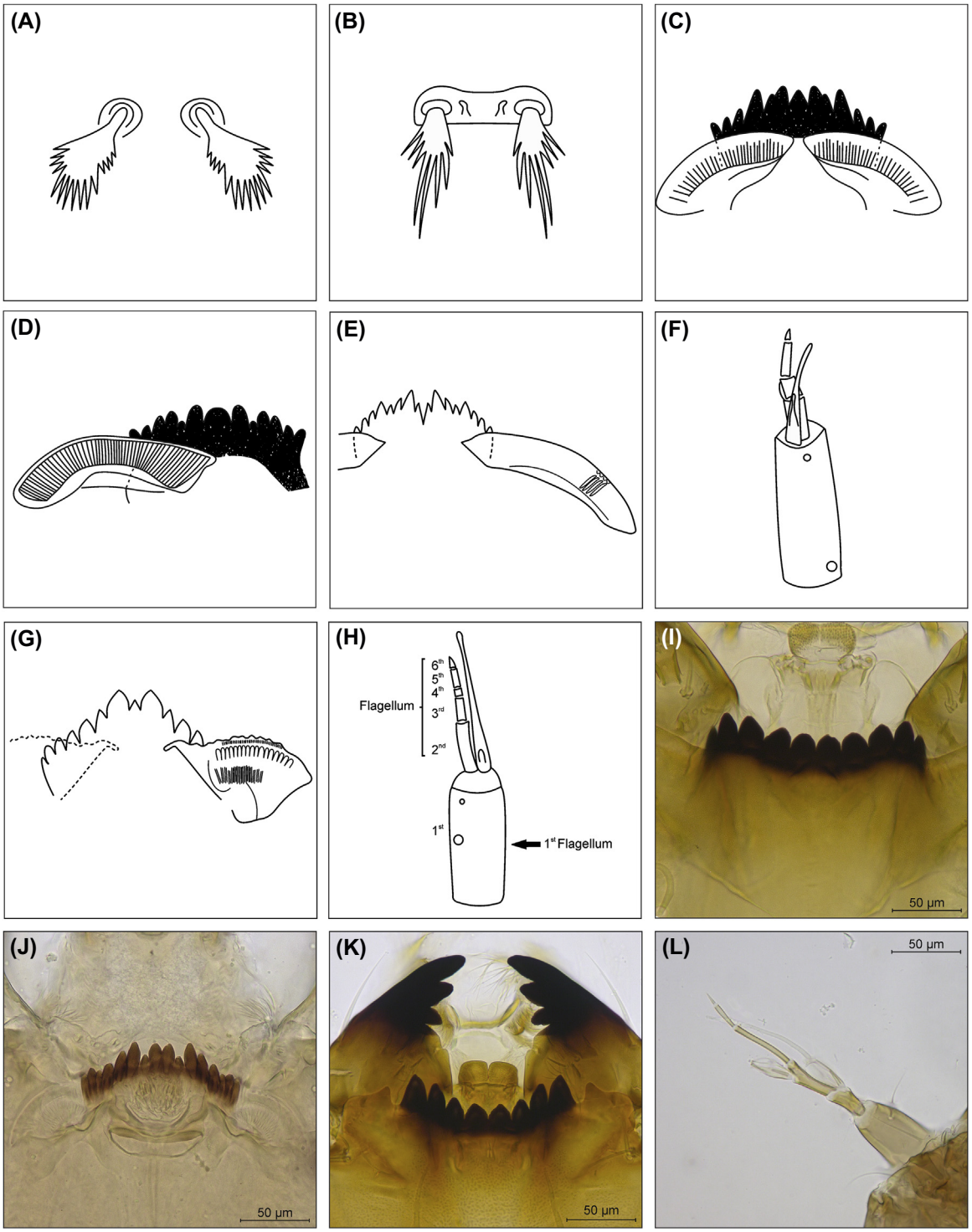

FIGURE 16.2.11 Chironomidae larva: (A) *Pseudochironomus* sp.; (B, C) *Manoa* sp.; (D) *Riethia* sp.; (E, H) *Fissimentum* sp.; (F, G) *Hyporhygma* sp.; (I) *Stenochironomus* sp.; (J) *Polypedilum* sp.; (K) *Xestochironomus* sp.; (L) *Zavreliella* sp.

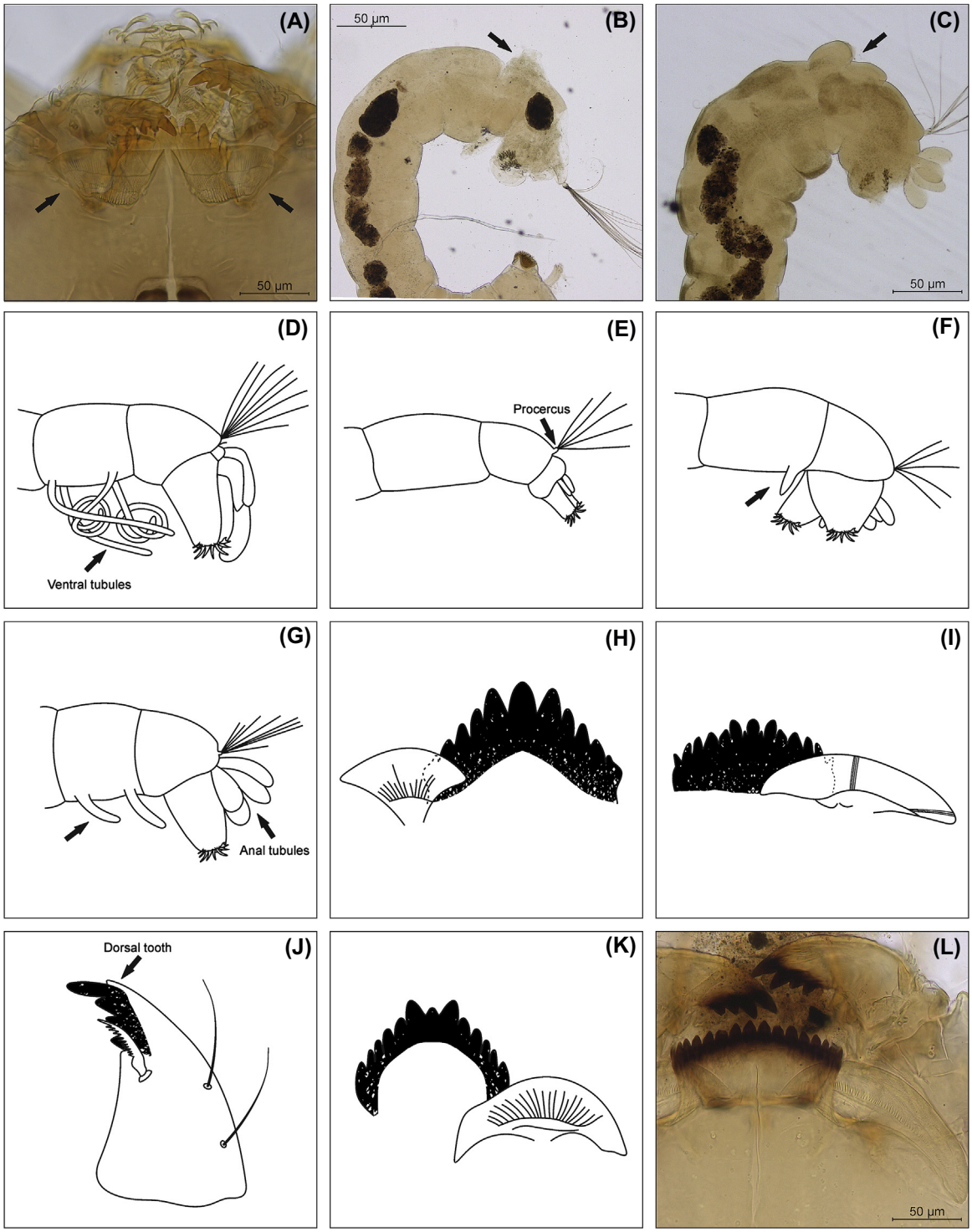

FIGURE 16.2.12 Chironomidae larva: (A, B) *Zavreliella* sp.; (C) *Lauterborniella* sp; (D) *Chironomus* sp.; (E) *Beardius* sp.; (F, H) *Dicrotendipes* sp.; (G, J, K) *Goeldichironomus* sp.; (I) *Kiefferulus* sp.; (L) *Polypedilum (Asheum)* sp.

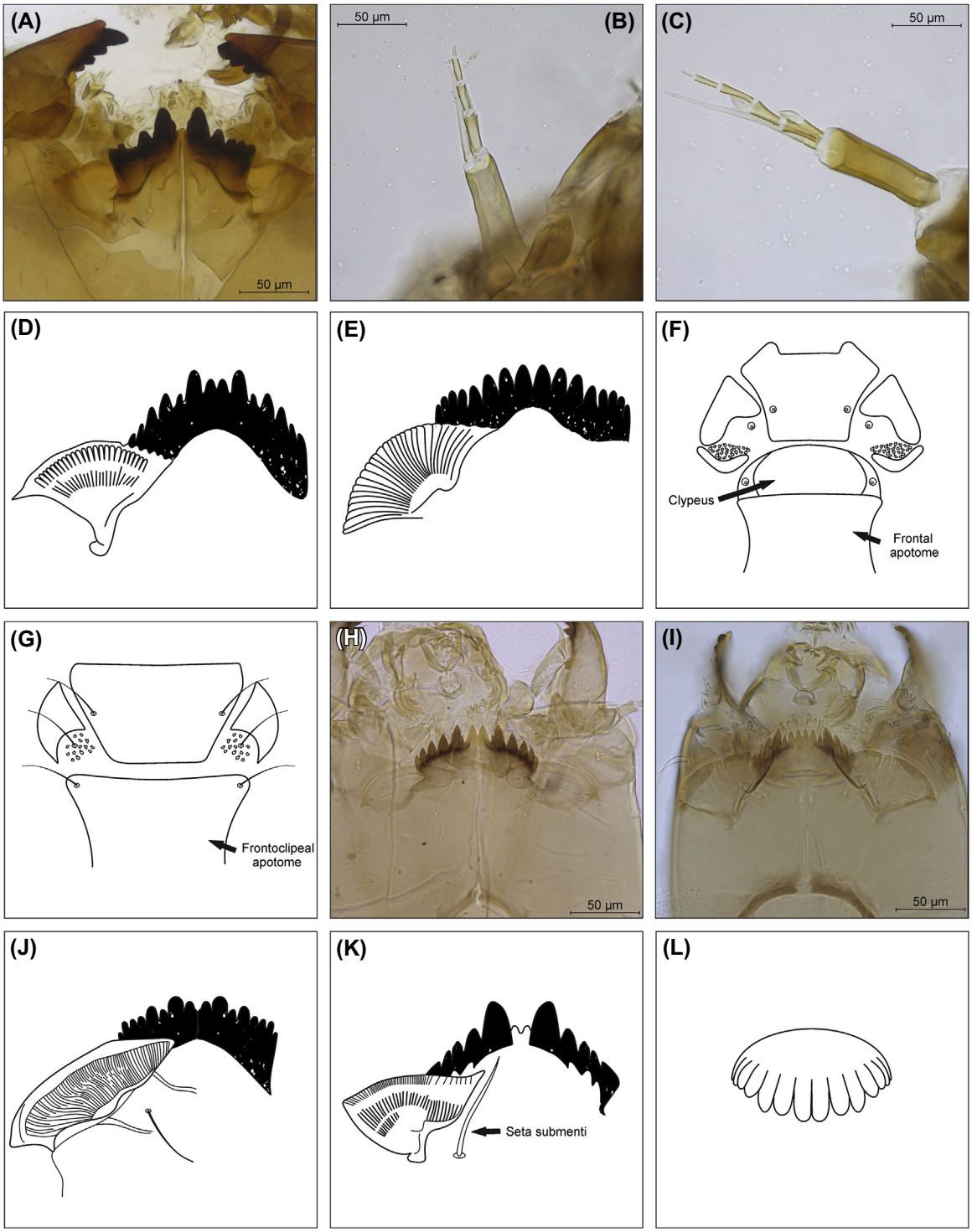

FIGURE 16.2.13 Chironomidae larva: (A, C, K) *Oukuriella* sp.; (B) *Polypedilum (Asheum)* sp.; (D, F) *Endotribelos* sp.; (E) *Polypedilum* sp.; (G) *Phaenopsectra* sp.; (H) *Apedilum* sp.; (I) *Paratendipes* sp.; (J) *Sigmoitendipes* sp.; (L) *Claudiotendipes* sp.

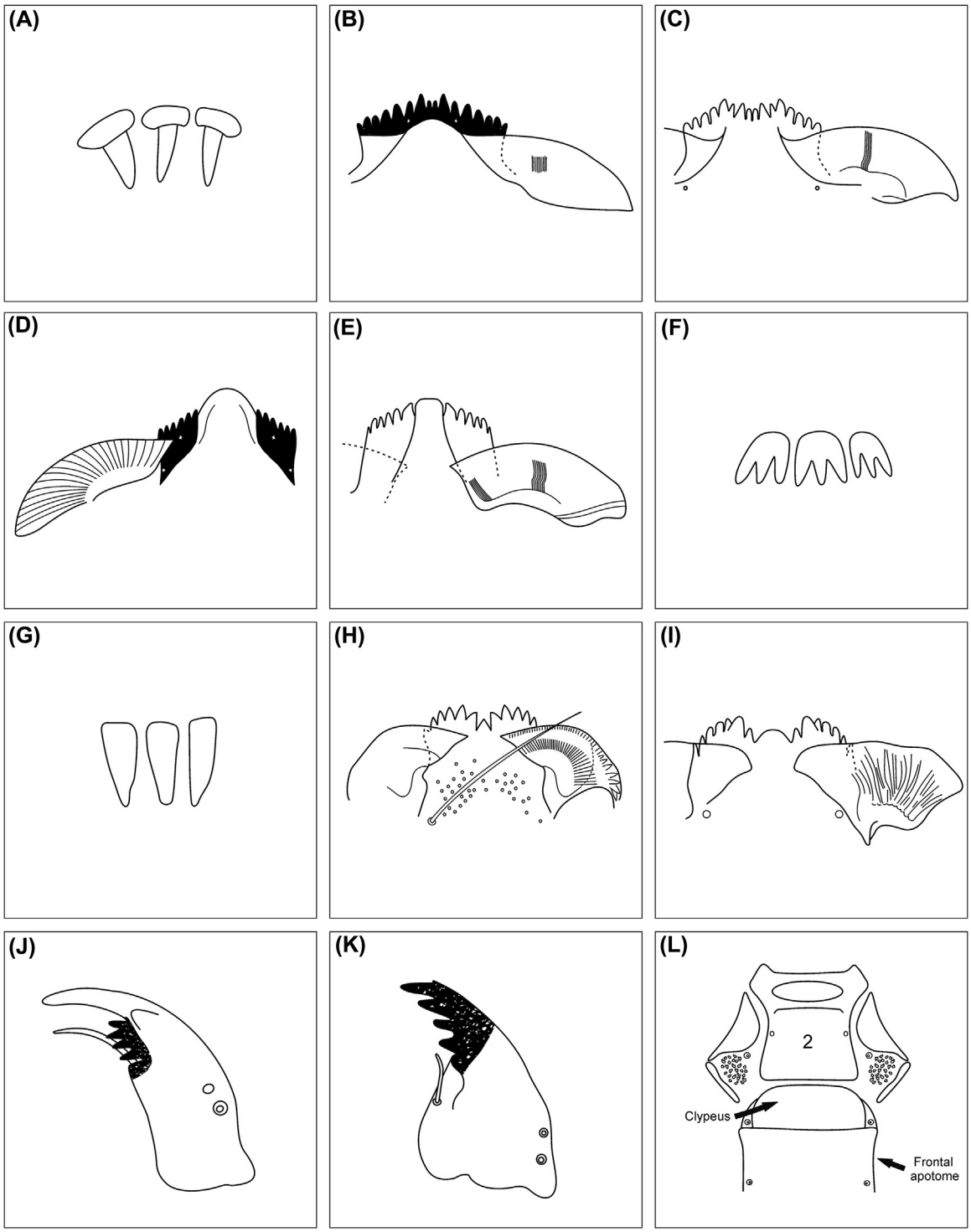

FIGURE 16.2.14 Chironomidae larva: (A) *Paratendipes* sp.; (B) *Stictochironomus* sp.; (C) *Omisus* sp.; (D) *Paralauterborniella* sp.; (E, J) *Nilothauma* sp.; (F) *Beardius* sp.; (G) *Oukuriella* sp.; (H) *Kribiodorum* sp.; (I) *Xenochironomus* sp; (K, L) *Endotribelos* sp.

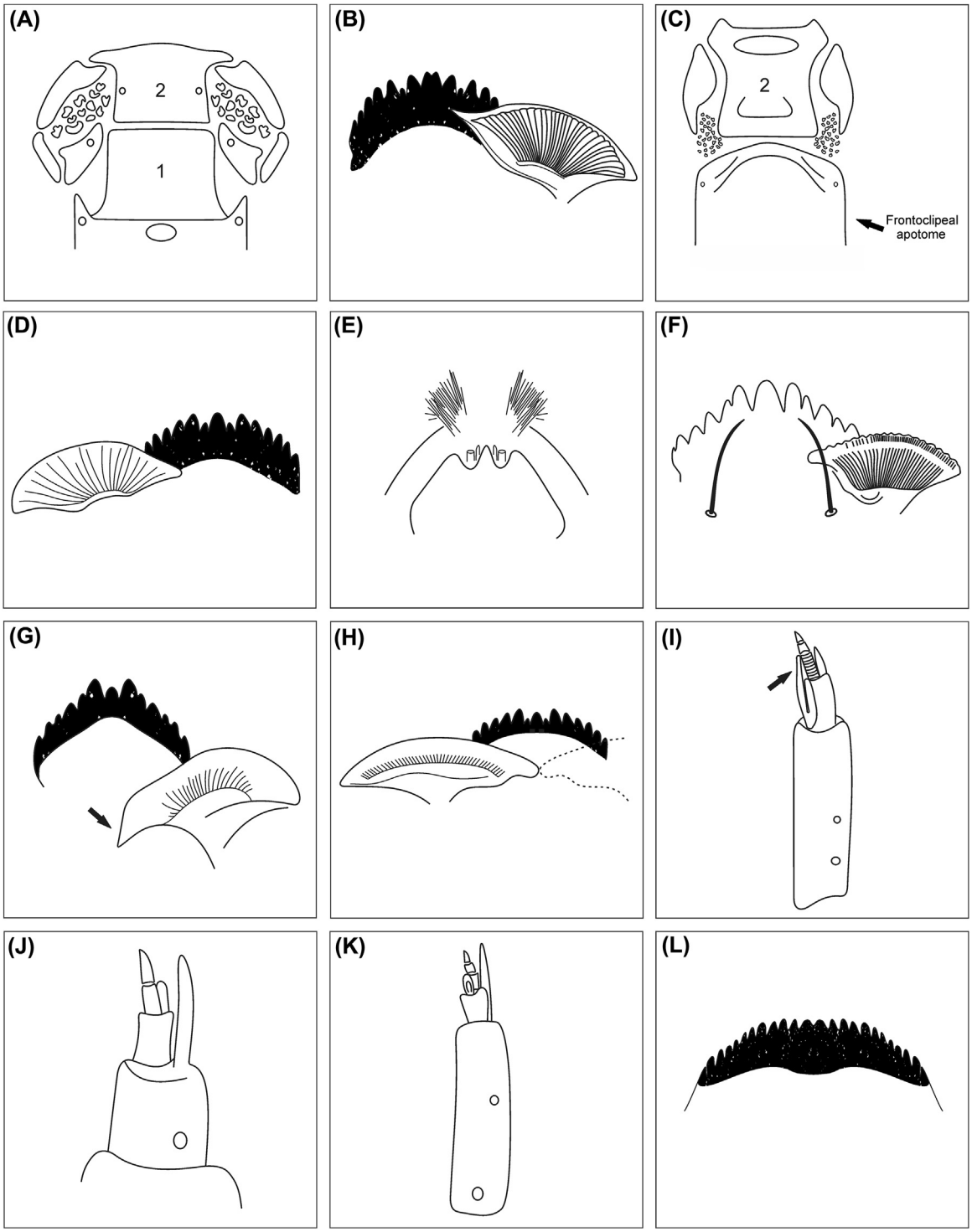

FIGURE 16.2.15 Chironomidae larva: (A, F) *Dicrotendipes* sp.; (B) *Endotribelos* sp.; (C, D) *Chironomus* sp.; (E) *Xenochironomus* sp.; (G) *Goeldichironomus* sp.; (H) *Axarus* sp.; (I) *Diamesa* sp.; (J) *Telmatogeton* sp.; (K, L) *Paraheptagyia* sp.

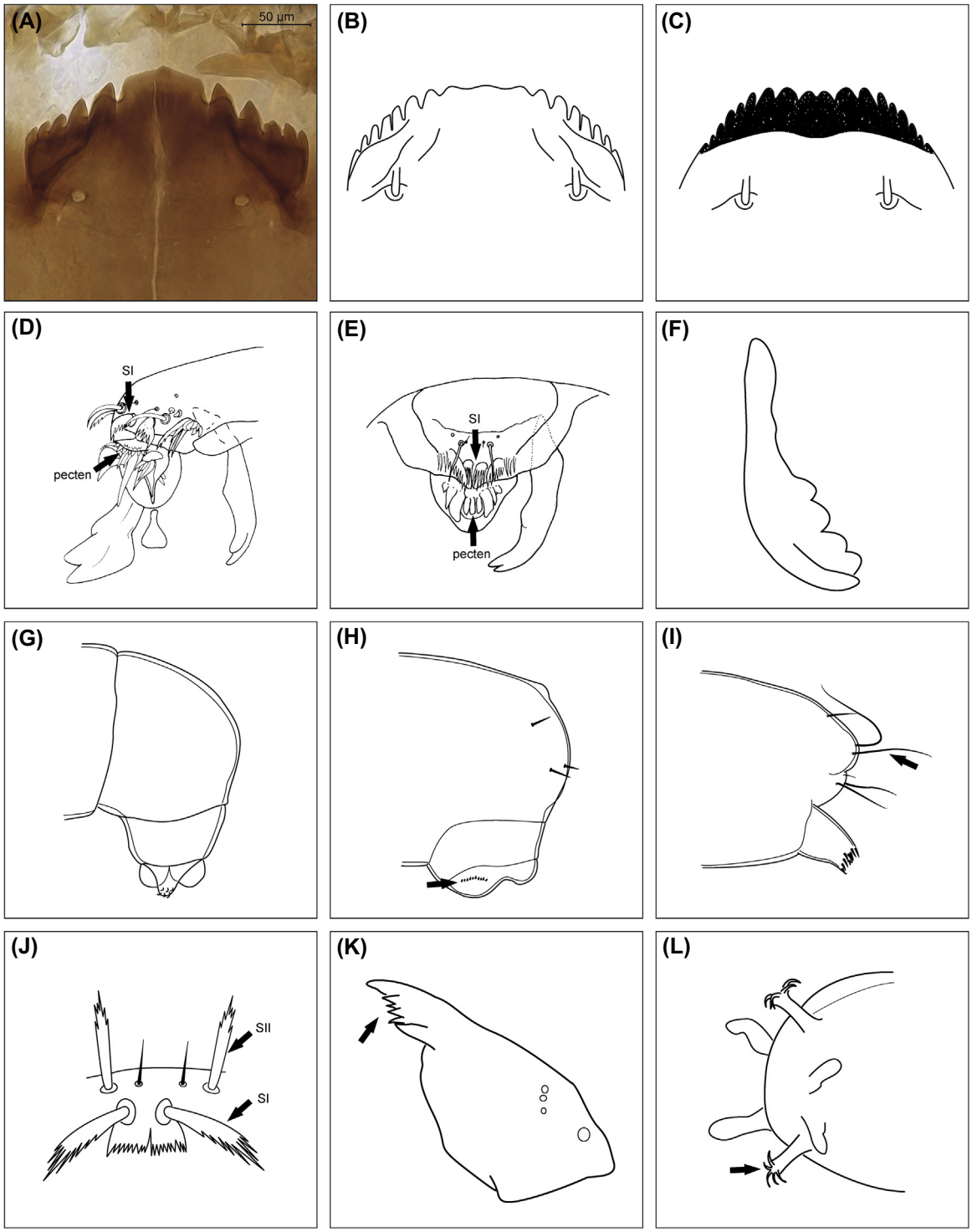

FIGURE 16.2.16 Chironomidae larva: (A) *Limayia* sp.; (B) *Reissmesa* sp.; (C) *Heptagyia* sp.; (D) *Antillocladius* sp.; (E) *Smittia* sp.; (F) *Eretmoptera* sp.; (G) *Bryophaenocladius* sp.; (H) *Gymnometriocnemus* sp.; (I, J) *Clunio* sp.; (K) *Symbiocladius* sp.; (L) *Pseudosmittia* sp.

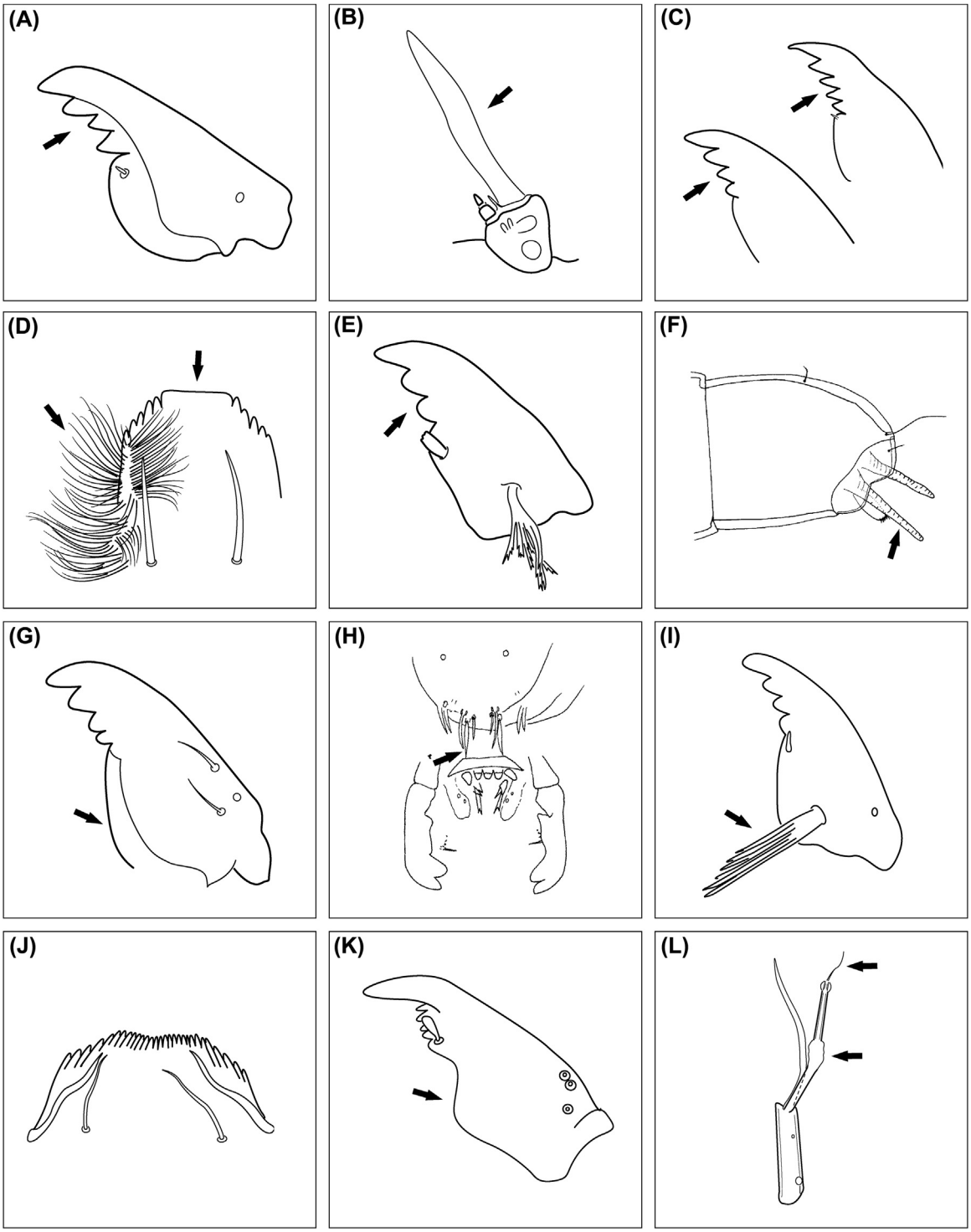

FIGURE 16.2.17 Chironomidae larva: (A, B) *Pseudosmittia* sp.; (C) *Allocladius* sp.; (D) *Barbadocladius* sp; (E, F) *Georthocladius* sp.; (G, H) *Mesosmittia* sp.; (I) *Smittia* sp.; (J, K) *Ichthyocladius* sp.; (L) *Stictocladius* sp.

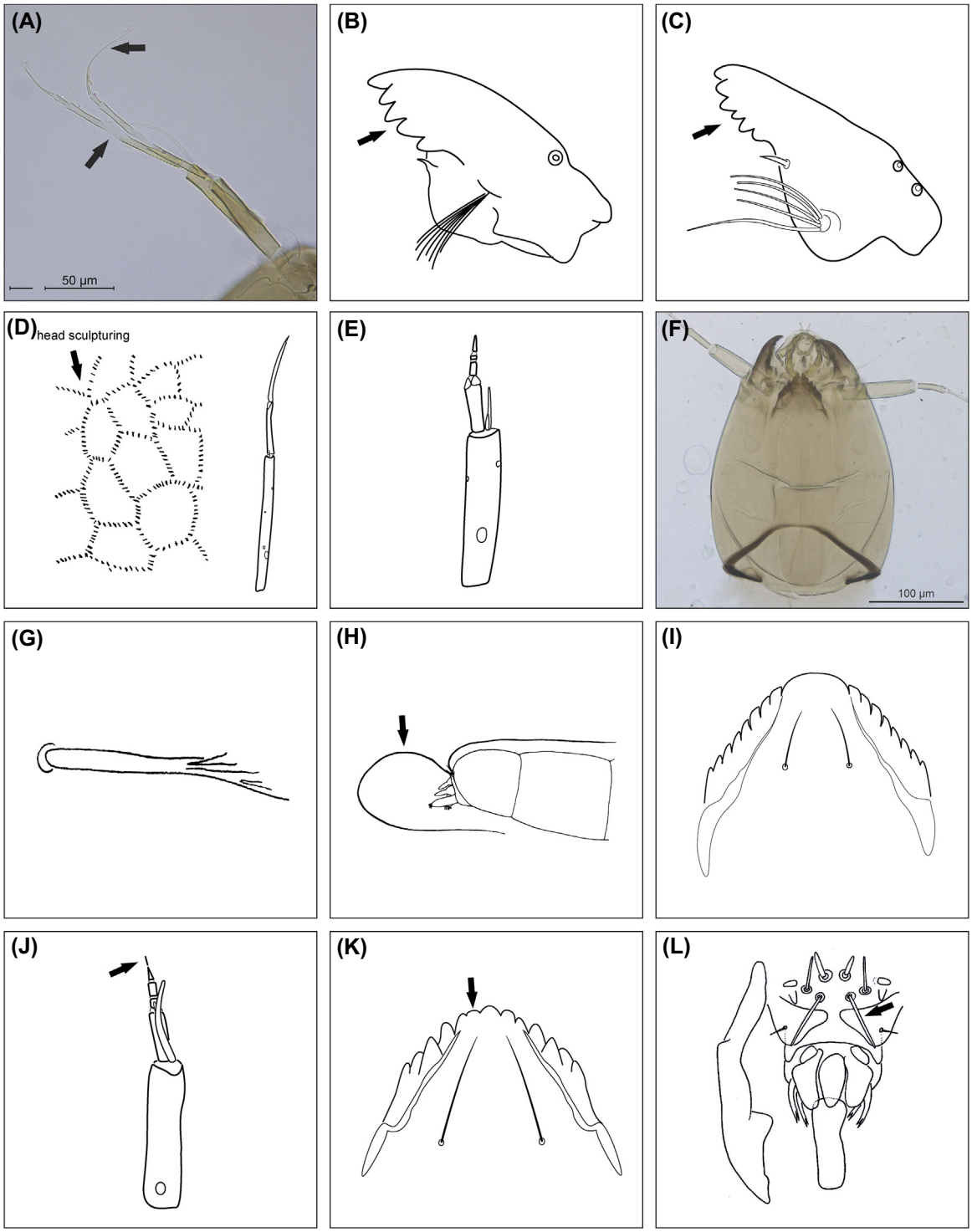

FIGURE 16.2.18 Chironomidae larva: (A, C) *Lopescladius* sp.; (B) *Stictocladius* sp.; (D) *Corynoneura* sp.; (E) *Ubatubaneura* sp.; (F) *Thienemanniella* sp.; (G) *Ubatubaneura* sp.; (H) *Pseudorthocladius* sp.; (I) *Orthocladius* sp.; (J) *Parakiefferiella* sp.; (K) *Orthocladius* sp.; (L) *Synorthocladius* sp.

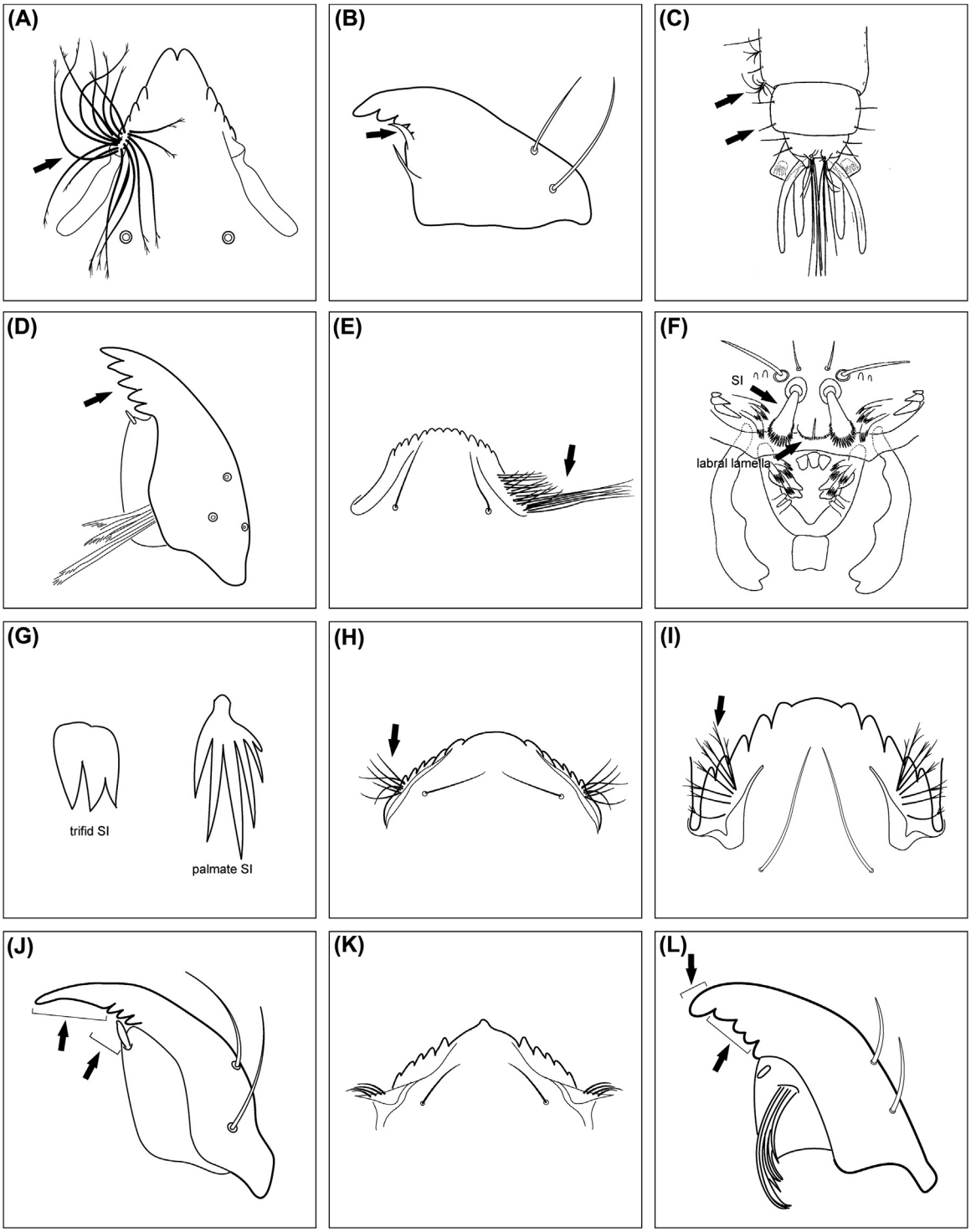

FIGURE 16.2.19 Chironomidae larva: (A–C) *Synorthocladius* sp; (D–F) *Diplocladius* sp.; (G, J, K) *Psectrocladius* sp.; (H) *Paracladius* sp.; (I) *Botryocladius* sp.; (L) *Rheocricotopus* sp.

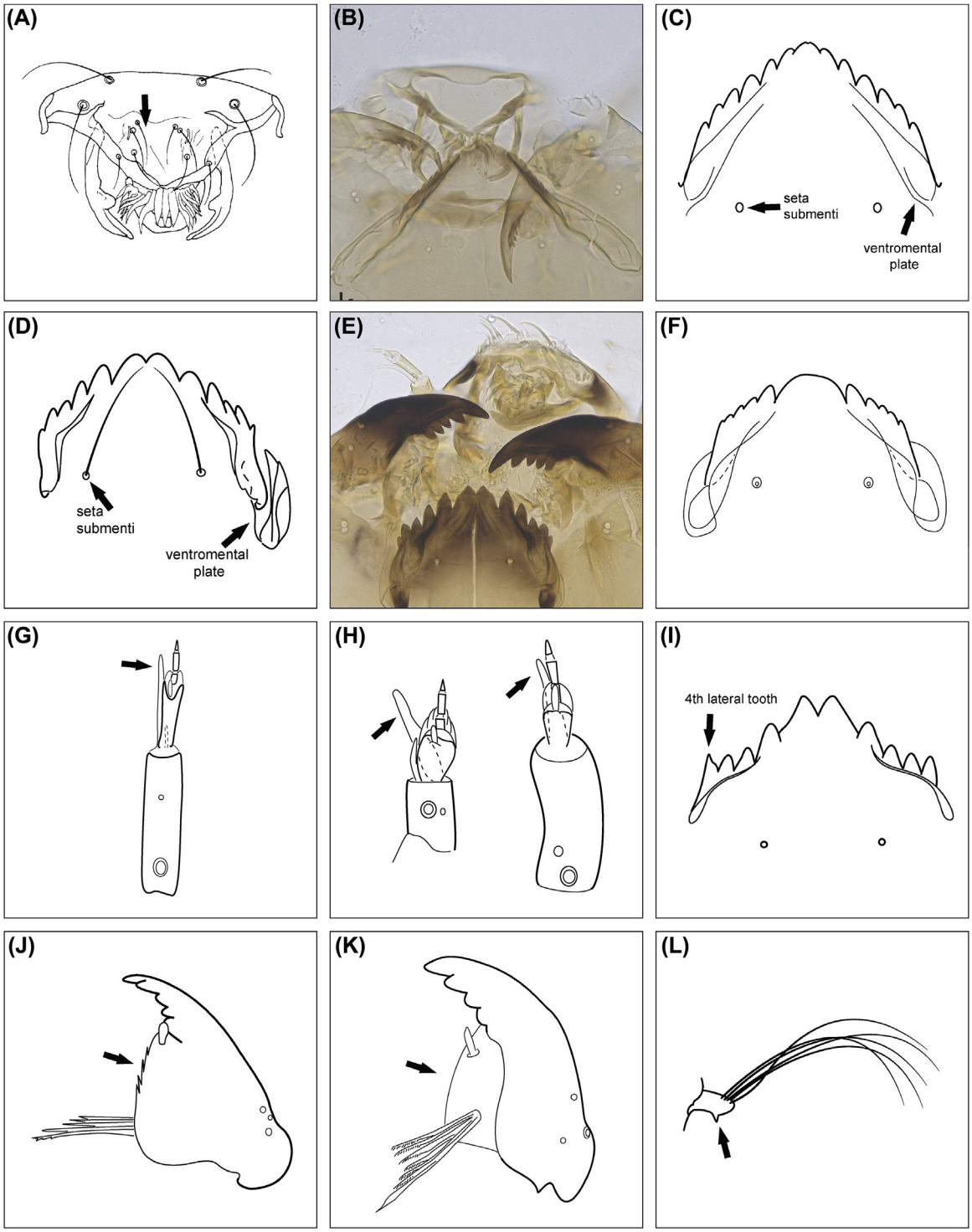

FIGURE 16.2.20 Chironomidae larva: (A, B) *Nanocladius* sp.; (C) *Parakiefferiella* sp.; (D, E, G) *Parametriocnemus* sp.; (F, H) *Paraphaenocladius* sp.; (I) *Paratrissocladius* sp.; (J) *Eukiefferiella* sp.; (K, L) *Paracricotopus* sp.

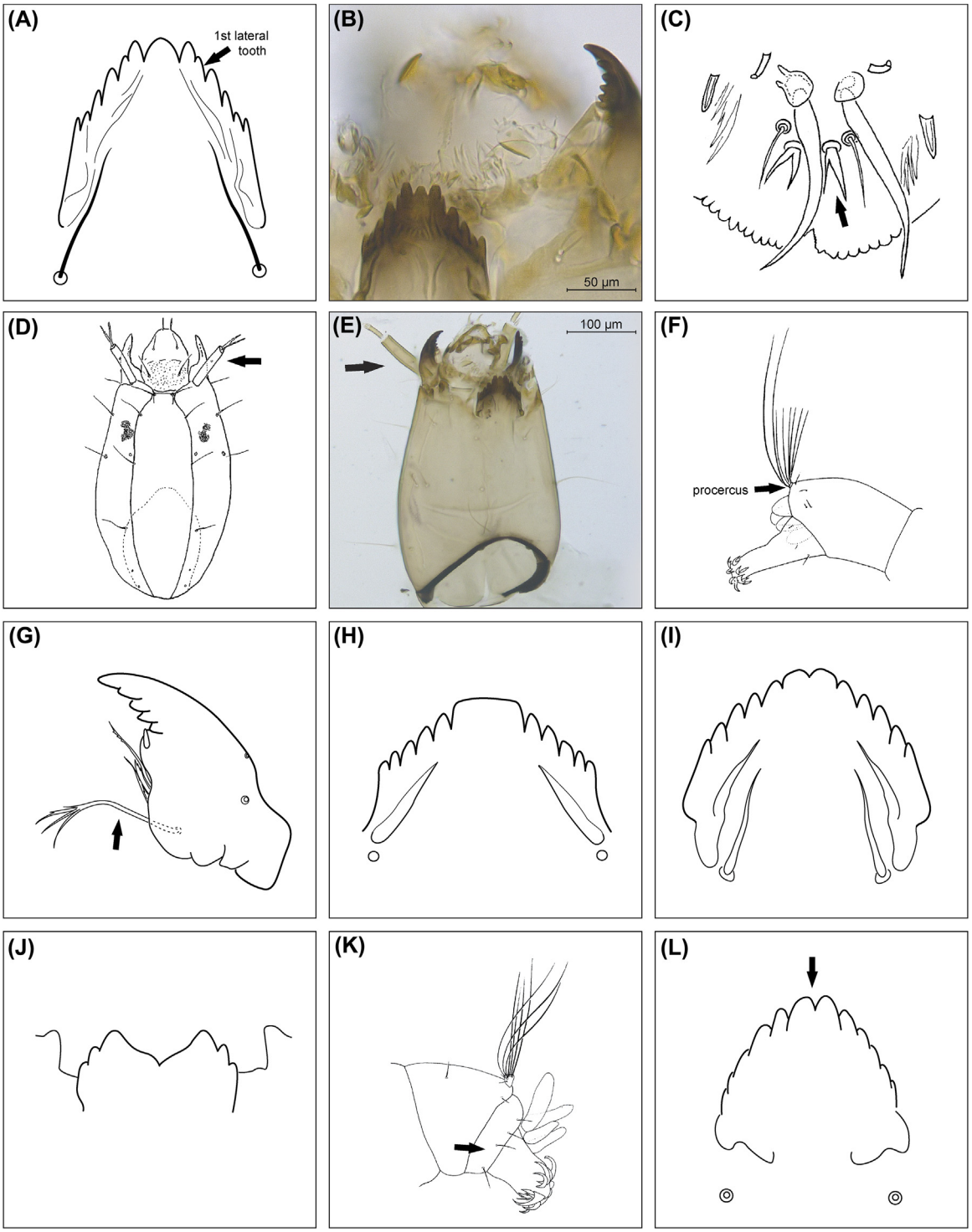

FIGURE 16.2.21 Chironomidae larva: (A, C, D) *Tempisquitoneura* sp.; (B, E) *Onconeura* sp.; (F–H) *Cardiocladius* sp.; (I) *Eukiefferiella* sp.; (J) *Austrobrillia* sp.; (K) *Cricotopus* sp.; (L) *Limnophyes* sp.

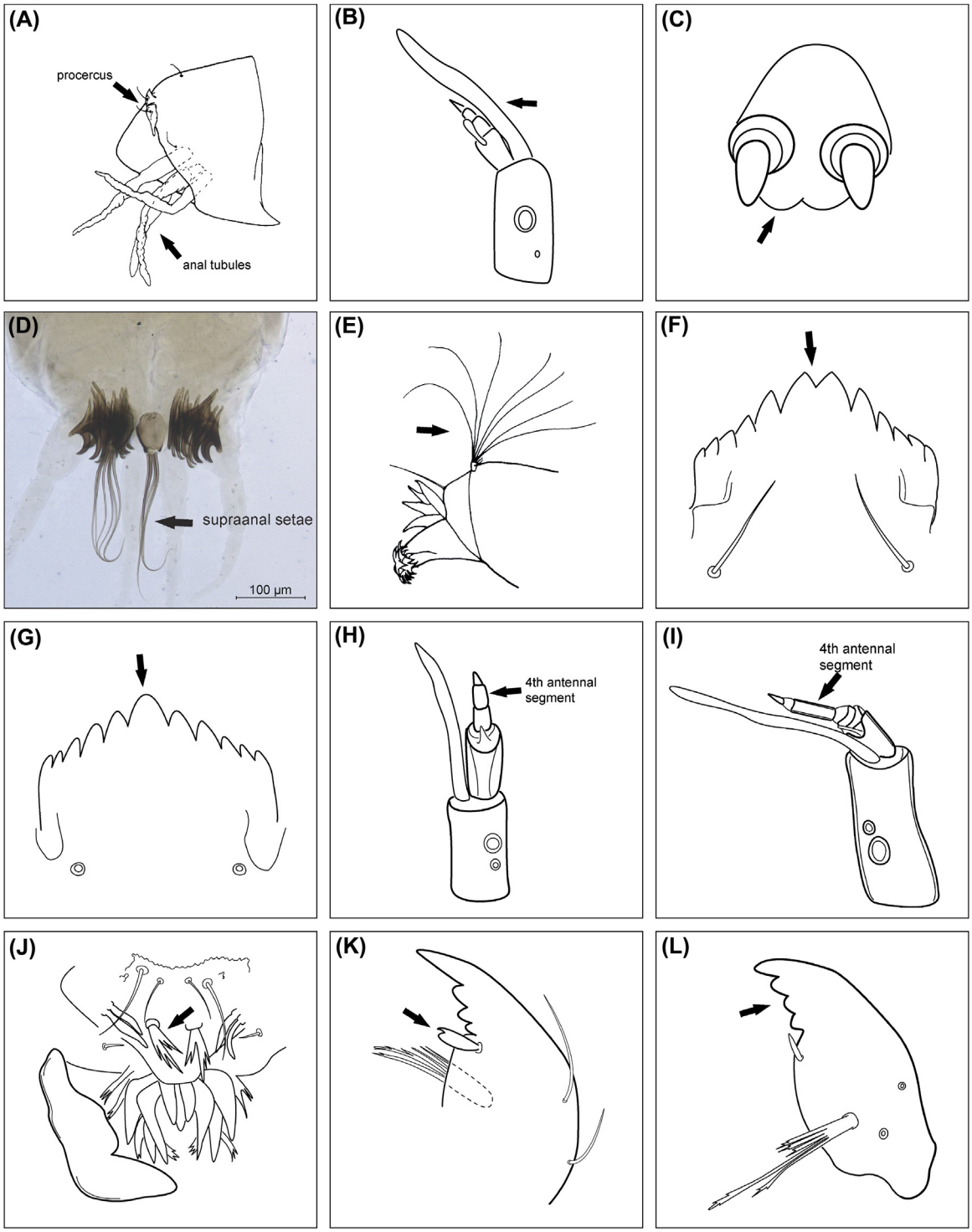

FIGURE 16.2.22 Chironomidae larva: (A, B) *Georthocladius* sp; (C, D) *Metriocnemus* sp.; (E) *Thienemannia* sp.; (F) *Phytotelmatocladius* sp.; (G, I) *Gynocladius* sp.; (H) *Gravatamberus* sp.; (J, K) *Parapsectrocladius* sp; (L) *Limnophyes* sp.

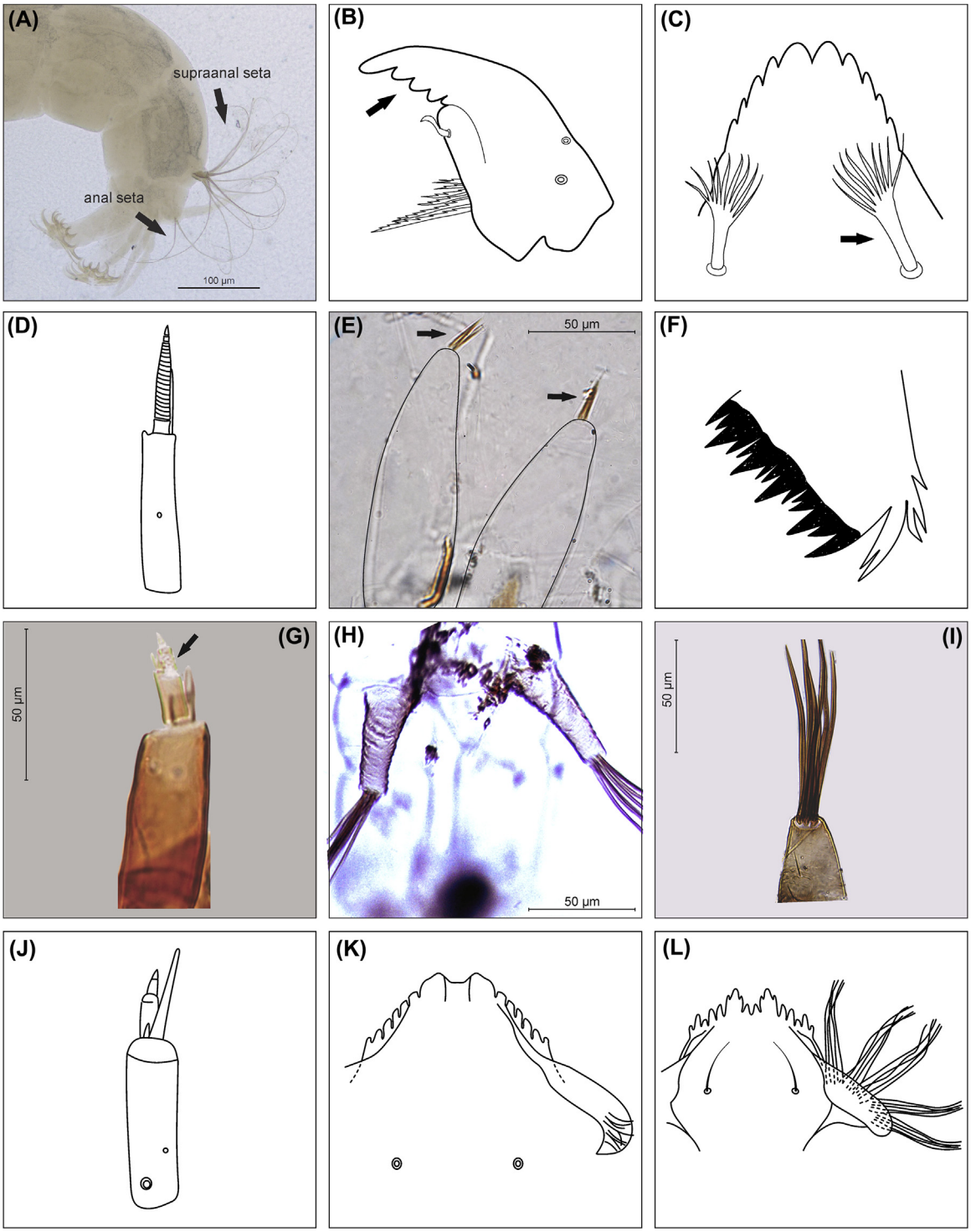

FIGURE 16.2.23 Chironomidae larva: (A) *Limnophyes* sp.; (B) *Compterosmittia* sp.; (C) *Pirara* sp.; (D, E) *Podonomopsis* sp.; (F) *Podochlus* sp.; (G, H) *Parochlus* sp.; (I) *Podonomus* sp.; (J, L) *Prodiamesa* sp.; (K) *Monodiamesa* sp.

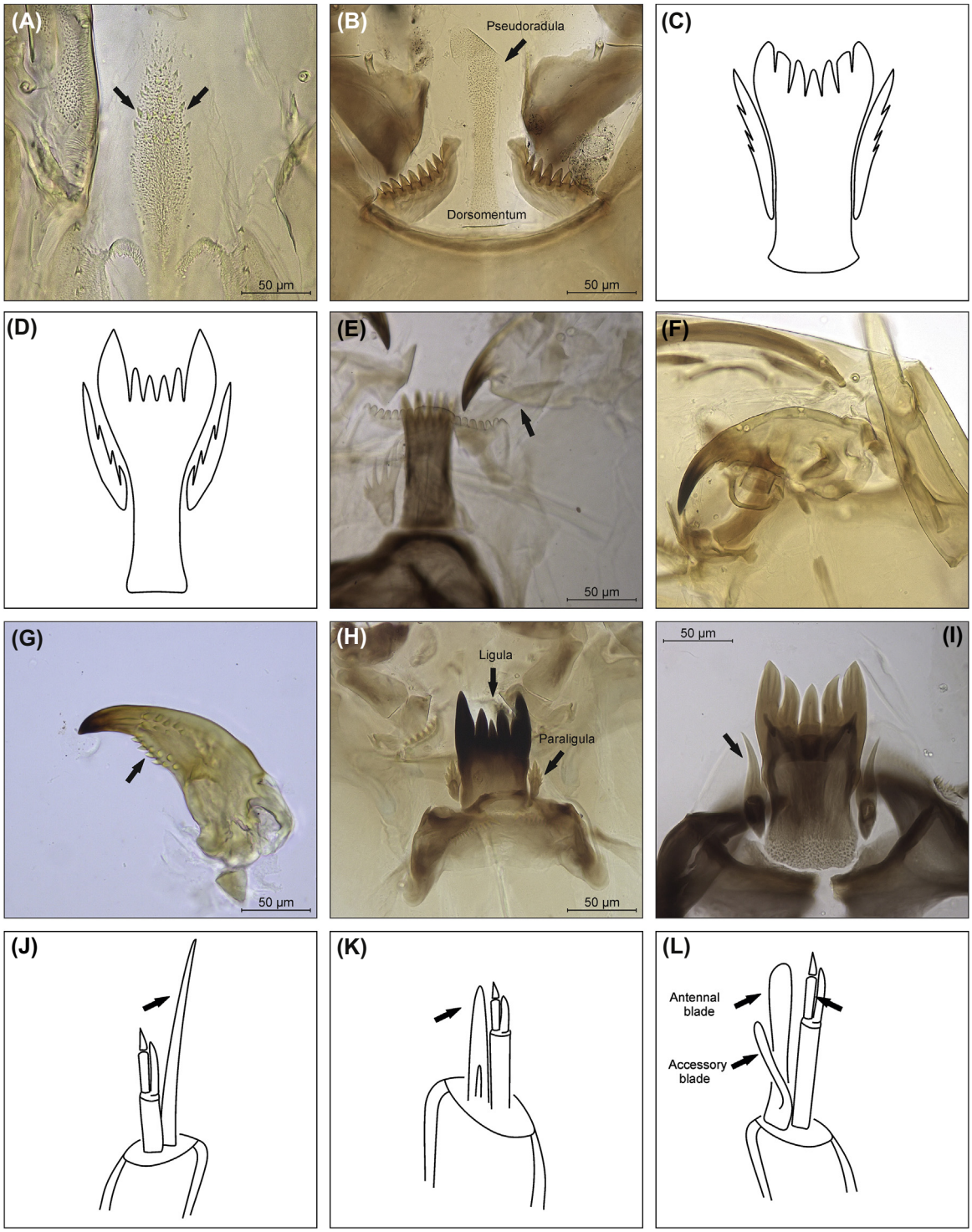

FIGURE 16.2.24 Chironomidae larva: (A, D) *Clinotanypus* sp.; (B, L) *Alotanypus* sp.; (C) *Coelotanypus* sp.; (E) *Tanypus* sp.; (F) *Brundiniella* sp.; (G) *Fittkauimyia* sp.; (H, J) *Djalmabatista* sp.; (I) *Apsectrotanypus* sp.; (K) *Procladius* sp.

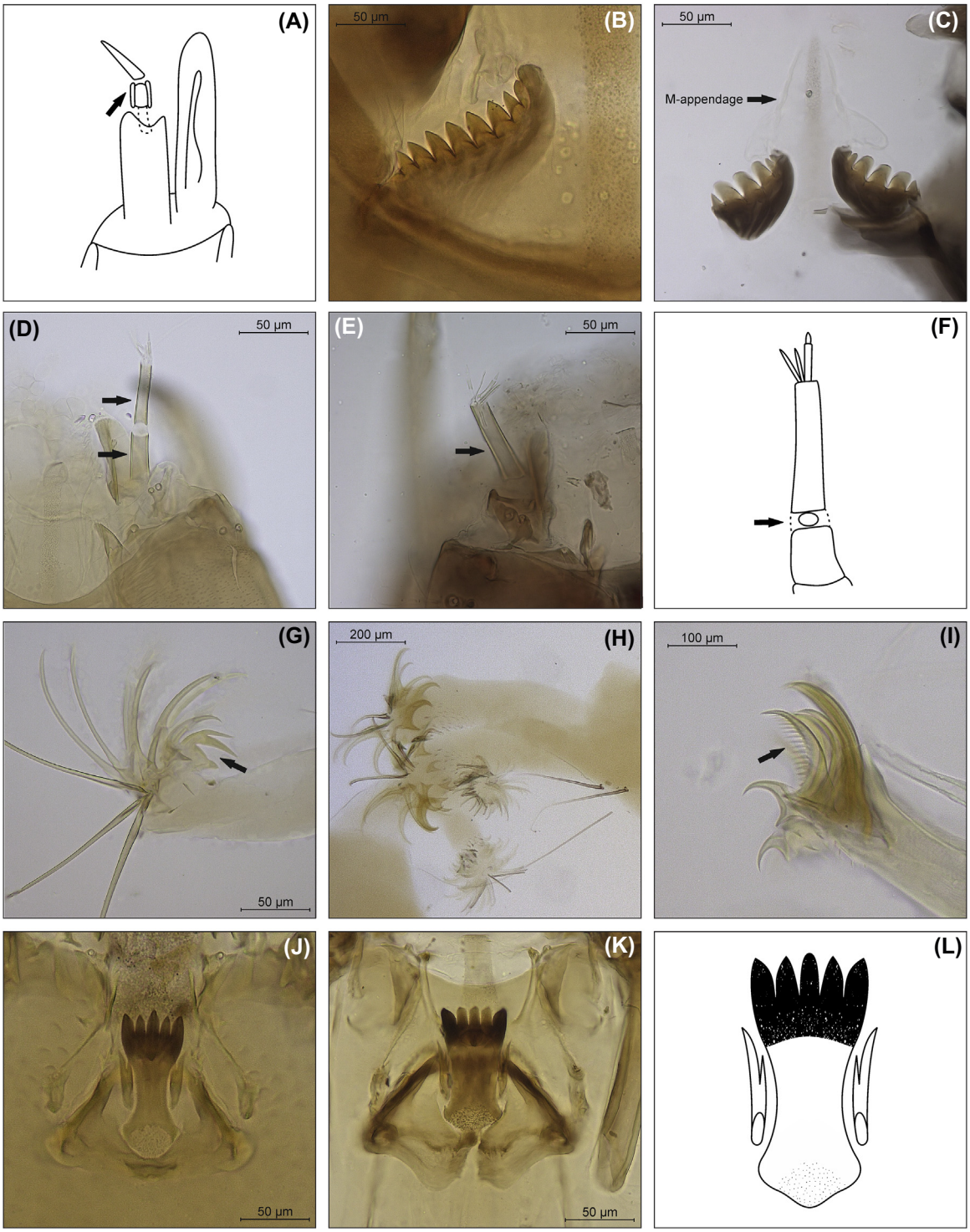

FIGURE 16.2.25 Chironomidae larva: (A) *Brundiniella* sp.; (B) *Macropelopia* sp.; (C) *Apsectrotanypus* sp.; (D) *Ablabesmyia* sp.; (E) *Metapelopia* sp.; (F) *Zavrelimyia* (*Paramerina*) sp.; (G, J) *Labrundinia* sp.; (H) *Pentaneura* sp.; (I) *Nilotanypus* sp.; (K) *Denopelopia* sp.; (l) *Zavrelimyia* (*Zavrelimyia*) sp.

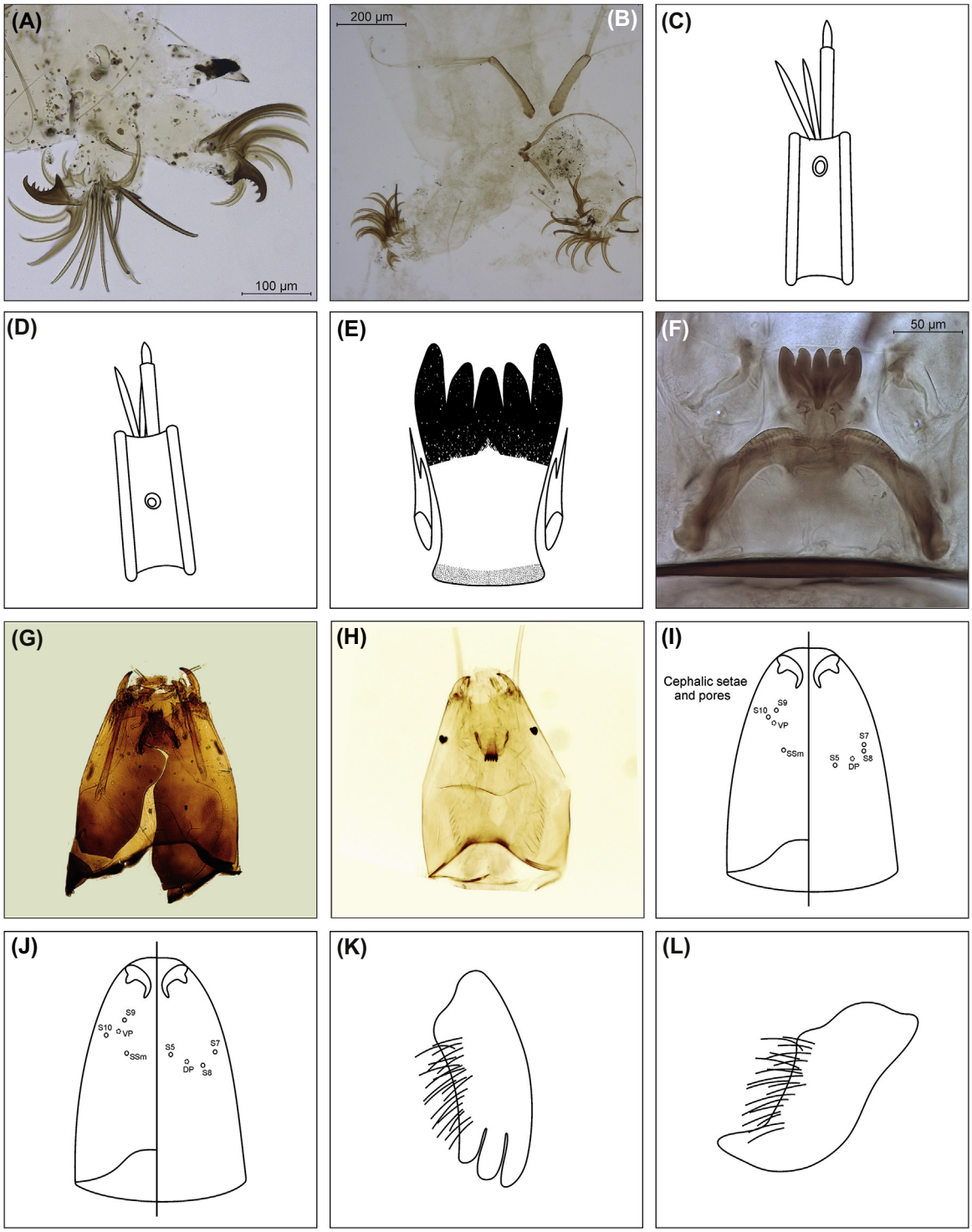

FIGURE 16.2.26 Chironomidae larva: (A) *Monopelopia* sp.; (B) *Hudsonimyia* sp.; (C) *Thienemannimyia* sp.; (D, E, H) *Larsia* sp.; (F, G) *Hudsonimyia* sp.; (I) *Pentaneura* sp.; (J) *Parapentaneura* sp.; (K) *Telmatogeton* sp.; (L) *Thalassomyia* sp.

Tanypodinae: Clinotanypodini: Genera

1 Ligula with seven teeth (rarely six or eight) (Fig. 16.2.24 C), first inner tooth strongly bent toward outer tooth; mandible slightly hooked; dorsal anterior margin of body segment 4 with a pair of sclerotized hooks ..... *Coelotanypus*
1' Ligula with six teeth (rarely five or seven) (Fig. 16.2.24 D), first inner tooth slightly bent toward outer tooth; mandible strongly hooked; body segment 4 without sclerotized hooks ..... *Clinotanypus*

Tanypodinae: Procladiini: Genera

1 Antennal blade extending well beyond apex of flagellum (Fig. 16.2.24 J); ligula with four or five teeth ..... *Djalmabatista*
1' Antennal blade about as long as flagellum (Fig. 16.2.24 K); ligula with five teeth ..... *Procladius*

Tanypodinae: Macropelopiini: Genera

1 Third antennal article shorter, about as long as wide (Fig. 16.2.25 A); ventrolateral mandibular setae 2 and 3 branched 2
1' Third antennal article at least twice as long as wide (Fig. 16.2.24 L); ventrolateral mandibular seta all simple ..... *Alotanypus*
2(1) Apex of dorsomental plates not medially pointed, well separated pseudoradula 3
2' Apex of dorsomental plates with pointed medial extension, reaching almost to pseudoradula ..... *Brundiniella*
3(2) Dorsomentum with four large teeth and one small tooth (Fig. 16.2.25 C); ligula with inner lateral teeth curve outward 4
3' Dorsomentum with six to eight large inner teeth and one small tooth (Fig. 16.2.25 B); ligula with inner lateral teeth directed forward ..... *Macropelopia*
4(3) Ventral cephalic setae S10 simple ..... *Apsectrotanypus*
4' Ventral cephalic setae S10 branched ..... *Paggipelopia*

Chironomidae: Chironominae: Tribes

This subfamily has the most described species. This group is dominant in tropical and subtropical lowlands, with immature stages adapted to a wide range of habitats, including brackish and marine (Ashe et al., 1987). Larvae utilize a wide array of foods, including aquatic plants, dead wood and leaves, and organic-enriched sediments. Several species, belonging to genera such as *Chironomus* Meigen, *Endotribelos* Grodhaus, and *Polypedilum* Kieffer, have hemoglobin, which may contribute to their dominance where oxygen concentrations are often low due to higher temperatures. The group can be distinguished based on the larval synapomorphy of ventromental plate associated with silk extrusion. The reduction or loss of this trait in the *Stenochironomus* Kieffer complex is confirmed as secondary (Cranston et al., 2012). Chironominae is subdivided into three tribes: Chironomini, Pseudochironomini, and Tanytarsini. It is important to mention that several morphotypes without generic status have been described in the *Harnischia* complex, and they were not included in the key.

1 Antennae not mounted on distinct elongated base (Fig. 16.2.6 H), Lauterborn organs not mounted on pedicels 2
1' Antennae mounted on distinct elongated base (Fig. 16.2.6 G), Lauterborn organs usually well developed and often mounted on short to long pedicels ..... **Tanytarsini [p. 691]**
2(1) SI plumose or fringed (Fig. 16.2.8 I), SII never blade-like; pecten epipharyngis as a wide, multitoothed comb or as three separated small plates, toothed apically (occasionally smooth); mandible usually with dorsal tooth; maxillary palps usually reduced 3
2' SI and SII simple (Fig. 16.2.8 H), SII often large and blade-like; pecten epipharyngis rounded or subtriangular, consisting of a single plate or scale, which may be simple, serrated, notched, or toothed; mandible without dorsal tooth; maxillary palps often very long, as long as the half of the first antennal article ..... **Chironomini [p. 692]** (in part)
3(2) Ventromental plates bar-like in near contact medially (Fig. 16.2.10 I); seta submentalis dorsal, on the same side of mandible as seta interna (Fig. 16.2.10 J) ..... **Pseudochironomini [p. 694]**
3' Ventromental plates variable in shape (Fig. 16.2.10 K); seta submentalis ventral, on the opposite side of mandible from seta interna (rarely absent) (Fig. 16.2.10 L) ..... **Chironomini [p. 692]** (in part)

Chironomidae: Chironominae: Tanytarsini: Genera

1 Ventromental plates narrow, separated medially by at least the width of the three median teeth (Fig. 16.2.6 I); Lauterborn organs not mounted on long pedicels; larvae build transportable cases (Fig. 16.2.6 J) 2
1' Ventromental plates wide, almost touching each other medially (Fig. 16.2.6 K); Lauterborn organs mounted on long pedicels; if larvae in cases, cases not transportable 5
2(1) One of the Lauterborn organs at the base of antennal article 2 and the other placed apically (Fig. 16.2.6 L) 3
2' Both Lauterborn organs at apex of antennal article 2 (Fig. 16.2.7 A) 4
3(2) Premandible with four teeth (Fig. 16.2.7 B) ..... *Zavrelia*
3' Premandible with two to three teeth (Fig. 16.2.7 C) ..... *Stempellinella*
4(2) Antennal base with palmate process (Fig. 16.2.7 D); frontoclypeal setae simple or bifid (Fig. 16.2.7 D) ..... *Stempellina*
4' Antennal base with simple spur (Fig. 16.2.7 E); frontoclypeal setae branched (Fig. 16.2.7) ..... *Constempellina*

5(1) Premandible with three to five main teeth (Fig. 16.2.7 F) 6
5' Premandible with two main teeth (Fig. 16.2.7 G) 9
6(5) Lauterborn organs on distinct pedicels (Fig. 16.2.7 A); larvae living in freshwater 7
6' Lauterborn organs small, sessile (Fig. 16.2.7 H); larvae living in marine habitats ..... *Pontomyia*
7(6) Antennal article 2 longer than 3, Lauterborn organs usually small, on long pedicels (Fig. 16.2.7 J) 8
7' Antennal article 2 as long or shorter than antennal article 3, Lauterborn organs large, almost as large as their pedicels (Fig. 16.2.7 I) ..... *Cladotanytarsus*
8(7) Pedicels of Lauterborn organs usually with basal half more sclerotized or annulated (Fig. 16.2.7 A) ..... *Tanytarsus* (*Caladomyia*)
8' Pedicels of Lauterborn organs uniformly sclerotized (Fig. 16.2.7 J) ..... *Tanytarsus* s. str.
9(5) Pecten epipharyngis as one plate with three to five lobes (Fig. 16.2.7 K) 10
9' Pecten epipharyngis as one or three plates with several apical teeth (Fig. 16.2.7 L) 11
10(9) Lauterborn organs on pedicels longer than flagellum (Fig. 16.2.8 A); mandible with distinct outer hump ..... *Sublettea*
10' Lauterborn organs sessile or on pedicels shorter than flagellum (Fig. 16.2.8 B); mandible without outer hump... *Paratanytarsus* (in part)
11(9) Lauterborn organs on short pedicels, not surpassing the flagellum (Fig. 16.2.8 C) 12
11' Lauterborn organs on longer pedicels (Fig. 16.2.8 D) 13
12(11) Mentum with four or five pairs of lateral teeth (Fig. 16.2.8 E); Lauterborn organs on moderately long pedicels ..... *Neozavrelia*
12' Mentum with five pairs of lateral teeth (Fig. 16.2.8 F); Lauterborn organs on short pedicels ..... *Rheotanytarsus*
13(11) Pedicels 3−5× longer than combined length of antennal articles 3−5 (Fig. 16.2.8 G) ..... *Micropsectra*
13' Pedicels slightly longer than combined length of antennal articles 3−5 (Fig. 16.2.8 D) ..... *Paratanyarsus* (in part)

Chironomidae: Chironominae: Chironomini: Genera

1 SI and SII simple (Fig. 16.2.8 H), SII often large and laminate; pecten epipharyngis rounded or subtriangular, consisting of a single plate or scale, which may be simple, serrated, notched, or toothed; mandible without dorsal tooth; maxillary palps often very long, as long as the half of the first antennal article, *Harnischia* complex 2
1' SI plumose or fringed (Fig. 16.2.8 I), SII never laminate; pecten epipharyngis as a wide, multitoothed comb or as three separated small plates, toothed apically (occasionally smooth); mandible usually with dorsal tooth; maxillary palps usually reduced 13
2(1) Mentum concave with one large pale tooth (Fig. 16.2.8 J), or with a median large break between the dark lateral teeth (Fig. 16.2.9 A).. 3
2' Mentum convex or linear (Fig. 16.2.8 K) 5
3(2) Antenna with five to six articles (Fig. 16.2.9 B); mentum with four to five pairs of lateral teeth (Fig. 16.2.8 J) 4
3' Antenna with seven articles (Fig. 16.2.8 L); mentum with seven pairs of lateral teeth (Fig. 16.2.9 A) ..... *Demicryptochironomus*
4(3) S I minute, less than 1/5 length of S II (Fig. 16.2.9 C); pecten epipharyngis as a weakly trilobed scale; premandible without brush (Fig. 16.2.9 D); lateral teeth of mentum obliquely arranged ..... *Gillotia*
4' S I at least ½ as long as S II (Fig. 16.2.9 E); pecten epipharyngis as a deeply trilobed scale; premandible with brush (Fig. 16.2.9 F); lateral teeth of mentum not obliquely arranged ..... *Cryptochironomus*
5(2) Antenna with five articles (Fig. 16.2.9 G) 6
5' Antenna with six to seven articles (Fig. 16.2.9 H) 11
6(5) Pecten epipharyngis not scaliform undivided, or partially divided into two to three lobes or teeth, often greatly reduced; anterior margin of ventromental plate smooth (Fig. 16.2.9 J) 7
6' Pecten epipharyngis with numerous transparent teeth; anterior margin of ventromental plate serrated or sinuate (Fig. 16.2.9 I) ..... *Parachironomus*
7(6) Premandible apically bifid (Fig. 16.2.9 K) 8
7' Premandible with three or more teeth (Fig. 16.2.9 L) 10
8(7) Antennal blade shorter than flagellum; mentum with single median tooth (occasionally notched, appearing trifid) (Fig. 16.2.9 J) 9
8' Antennal blade as long or longer than flagellum; mentum with median tooth trifid (Fig. 16.2.10 A) ..... *Microchironomus*
9(8) First antennal article short, 2−2.5× longer than wide (Fig. 16.2.9 G); median tooth broadly rounded or laterally notched, extending far forward of lateral teeth ..... *Cryptotendipes*
9' First antennal article longer than previous (Fig. 16.2.10 B); median tooth broad notched, may be double, not extending far forward of lateral teeth; mentum appearing rounded ..... *Cladopelma*
10(7) Antennal articles 2 and 3 subequal (Fig. 16.2.10 C); ventromental plates weakly striated ..... *Harnischia*
10' Antennal article 2 much longer than 3 (Fig. 16.2.10 D); ventromental plates coarsely striated ..... *Paracladopelma*
11(5) Antenna with six articles; mandible without modified inner teeth (Fig. 16.2.10 F) 12
11' Antenna with seven articles; mandible with modified inner teeth (Fig. 16.2.10 E) ..... *Robackia*
12(11) Mentum with median teeth paler than lateral teeth, with two or three notches (Fig. 16.2.10 G) ..... *Pelomus*
12' Mentum with median tooth paler or not, not notched (Fig. 16.2.10 H) ..... ? *Saetheria*
13(1) Mentum with median tooth or teeth deeply recessed (Fig. 16.2.11 E) 14
3' Mentum with median tooth or teeth not deeply recessed (Fig. 16.2.10 K) 315
14(13) Antennae with five articles (Fig. 16.2.11 F); mandible with slender seta subdentalis, seta interna and pecten mandibularis present; mentum with median tooth broad and extended (Fig. 16.2.11 G) ..... *Hyporhygma*
14' Antennae with six articles (Fig. 16.2.11 H); mandible with enlarged seta subdentalis, seta interna and pecten mandibularis absent; mentum with median tooth deeply divided (Fig. 16.2.11 E) ..... *Fissimentum*
15(13) Mentum concave with 8−10 teeth (Fig. 16.2.11 I); ventromental plates with obscure striae (Fig. 16.2.11 I); larvae mining in dead, submerged wood or in submerged leaves 16

15' Mentum variable; ventromental plates usually with numerous striae (Fig. 16.2.11 J); larvae in a variety of habitats 17
16(15) Antennal blade extends to apex of article 2; mentum with 8–10 teeth (Fig. 16.2.11 K) ..... *Xestochironomus*
16' Antennal blade surpass apex of article 2; mentum with 10–12 teeth (Fig. 16.2.11 I) ..... *Stenochironomus*
17(15) Antenna with six articles with alternate Lauterborn organs at apex of articles 2 and 3 (Fig. 16.2.11 L); ventromental plates triangular (Fig. 16.2.12 A); larvae with body segment 11 with dorsal hump (Fig. 16.2.12 B) 18
17' Antenna and ventromental plates with another character combination; larva with segment 11 without dorsal hump 19
18(17) Seta submenti simple; hump on segment 11 anteriorly directed (Fig. 16.2.12 B) ..... *Zavreliella*
18' Seta submenti plumose; hump on segment 11 posteriorly directed (Fig. 16.2.12 C) ..... *Lauterborniella*
19(17) Larva with one or two pairs of ventral tubules on abdominal segment 8 (Fig. 16.2.12 D) 20
19' Larva without ventral tubules on abdominal segment 8 (Fig. 16.2.12 E) 23
20(19) Larva with one pair of ventral tubules (Fig. 16.2.12 F) 21
20' Larva with two pairs of ventral tubules (Fig. 16.2.12 G) 22
21(20) Mentum with median tooth simple, robust (Fig. 16.2.12 H); ventromental plates narrow, curved, medially separated by at least $^1/_3$ of the mentum width ..... *Dicrotendipes* (in part)
21' Mentum with median tooth trifid, crenulate (Fig. 16.2.12 I); ventromental plates wide as mentum, separated medially only by the width of median mental tooth (rarely meeting medially) ..... *Kiefferulus*
22(20) Seta subdentalis with ventral margin fringed or toothed (Fig. 16.2.12 J); ventromental plates curved medially, almost touching (Fig. 16.2.12 K) ..... *Goeldichironomus* (in part)
22' Seta subdentalis simple; ventromental plates medially not curved, well separated (Fig. 16.2.10 K) ..... *Chironomus* (in part)
23(19) Mentum with an even number of teeth (Fig. 16.2.12 L) 24
23' Mentum with an odd number of teeth (Fig. 16.2.13 A) 35
24(23) Antenna with five articles (Fig. 16.2.13 B) 25
24' Antenna with six articles (Fig. 16.2.13 C) 29
25(24) Mentum with median teeth higher or subequal to the first lateral teeth (Fig. 16.2.11 J) 26
25' Mentum with median teeth lower than the first lateral teeth (Fig. 16.2.13 D) 28
26(25) Mentum with all teeth subequal (Fig. 16.2.12 L) 27
26' Mentum with median teeth higher than the first lateral teeth (Fig. 16.2.11 J) ..... *Polypedilum* (in part)
27(26) Ventromental plates long with anterior margin smooth (Fig. 16.2.12 L) ..... *Polypedilum* (*Asheum*)
27' Ventromental plates shorter with anterior margin sinuate (Fig. 16.2.13 E) ..... *Polypedilum* (in part)
28(25) Frontal apotome (on anterior part of head, in dorsal view) separated from clypeus (Fig. 16.2.13 F) ..... *Endotribelos* (in part)
28' Frontal apotome fused to clypeus (frontoclipeal apotome) (Fig. 16.2.13 G) ..... *Phaenopsectra*
29(24) Mentum with two median teeth (Fig. 16.2.13 H) 30
29' Mentum with four median teeth (Fig. 16.2.13 I) 32
30(29) Mentum with median teeth pale, bearing six pairs of lateral teeth, third lateral tooth smaller than second lateral tooth (Fig. 16.2.13 H) 31
30' Mentum with all teeth even colored, bearing seven pairs of lateral teeth, third lateral tooth larger than second lateral tooth (Fig. 16.2.13 J) ..... *Sigmoitendipes*
31(30) Mentum with two recessed, small median teeth, second lateral teeth usually much higher than median teeth, fused to first lateral tooth (Fig. 16.2.13 K); ventromental plates trapezoid ..... *Oukuriella* (in part)
31' Mentum with two large median teeth, second lateral teeth subequal to median teeth, not fused to first lateral teeth; ventromental plates not trapezoid (Fig. 16.2.13 H) ..... *Apedilum*
32(29) Pecten epipharyngis divided in three plates (Fig. 16.2.14 A), toothed or not 33
32' Pecten epipharyngis undivided and toothed (Fig. 16.2.13 L) ..... *Claudiotendipes*
33(32) Mentum with median teeth pale or dark, lower than or subequal to second lateral teeth, second pair of lateral teeth higher than remaining lateral teeth (Fig. 16.2.13 I) 34
33' Mentum with four median teeth, with at least the outer pair of the median teeth higher than the remaining lateral teeth (Fig. 16.2.14 B) ..... *Stictochironomus*
34(33) S I plumose with separate bases; mentum with median teeth darkened, central pair of the four median lower and more slender than outer median teeth (Fig. 16.2.14 C) ..... *Omisus*
34' S I with bases fused; mentum with median teeth pale, central pair of the four median teeth equal to or higher than outer median teeth (Fig. 16.2.13 I) ..... *Paratendipes*
35(23) Mentum with median tooth mostly pale (Fig. 16.2.14 D) 36
35' Mentum with all teeth even colored (Fig. 16.2.14 E) 38
36(35) Frontal apotome not narrowed anteriorly; antenna elongated, with five to seven articles; mandible with one to two dorsal teeth; mentum with median tooth shorter than first lateral teeth 37
36' Frontal apotome strongly narrowed anteriorly; antenna short with six articles; mandible without dorsal tooth; mentum with median tooth broad and higher than first lateral teeth (Fig. 16.2.14 D) ..... *Paralauterborniella*
37(36) Antennae with five to seven articles; mandible with double dorsal tooth, seta subdentalis enlarged; pecten epipharyngis in three plates distally toothed (Fig. 16.2.14 F) ..... *Beardius*
37' Antennae with six articles; mandible with dorsal tooth simple, seta subdentalis slender; pecten epipharyngis in three smooth plates (Fig. 16.2.14 G) ..... *Oukuriella* (in part)
38(35) Mentum and mandible not as previous (Fig. 16.2.14 I) 39
38' Mentum with deeply recessed middle tooth (Fig. 16.2.14 H); mandible without seta interna and pecten mandibularis ..... *Kribiodorum*
39(38) Mandible with apical tooth shorter, dorsal tooth present (Fig. 16.2.14 K); usually larger larva 40

39'	Mandible with apical tooth very slender and long, dorsal tooth absent (Fig. 16.2.14 J); small larva	*Nilothauma*
40(39)	Labral sclerite 1 (on the head, dorsal view) absent (Fig. 16.2.14 L)	41
40'	Labral sclerites 1(on the head, dorsal view) present (Fig. 16.2.15 A)	42
41(40)	Frontal apotome separated from clypeus (Fig. 16.2.14 L); mentum with one median simple tooth, slightly notched or not (Fig. 16.2.15 B)	*Endotribelos* (in part)
41'	Frontal apotome fused to clypeus (frontoclipeal apotome) (Fig. 16.2.15 C); mentum with median tooth trifid. (Fig. 16.2.15 D)	*Chironomus* (in part)
42(40)	Labrum without setal brushes; larvae in a variety of habitats	43
42'	Labrum with large setal brushes on each side (Fig. 16.2.15 E); larvae mining in sponges	*Xenochironomus*
43(42)	Ventromental plates almost touching each other medially (Fig. 16.2.15 G)	44
43'	Ventromental plates median separated (Fig. 16.2.15 F)	*Dicrotendipes* (in part)
44(43)	Seta subdentalis on mandible with ventral margin fringed; ventromental plates strongly curved medially (Fig. 16.2.15 G)	*Goeldichironomus* (in part)
44'	Seta subdentalis simple; ventromental plates not curved (Fig. 16.2.15 H)	*Axarus*

Chironomidae: Chironominae: Pseudochironomini: Genera

1	Pecten mandibularis weak or absent (Fig. 16.2.10 I); inner mandibular teeth and mentum darkened (Fig. 16.2.10 I)	2
1'	Pecten mandibularis present (Fig. 16.2.10 J); inner mandibular teeth and mentum pale yellow (Fig. 16.2.10 J)	*Aedokritus*
2(1)	S I arising from a common base Fig. 16.2.11 B)	3
2'	S I arising from separate bases (Fig. 16.2.11 A)	*Pseudochironomus*
3(2)	Mentum with second lateral tooth minute, fused to first lateral tooth (Fig. 16.2.11 C)	*Manoa*
3'	Mentum with second lateral tooth distinct, never fused to first lateral (Fig. 16.2.11 D)	*Riethia*

Chironomidae: Aphroteniinae: Genera

This subfamily comprises three species-poor genera distributed exclusively in the Southern Hemisphere (Cranston, 1995b) in areas that were formerly part of Gondwana (Ashe & O'Connor, 2009). *Aphroteniella* and *Paraphrotenia* are present in the Neotropical Region. The first is only known by the pupae of *Aphroteniella* sp. "Peulla," while the larva of *Paraphrotenia excelens* Brundin is the only known larva of the genus in the region. Larvae are strictly rheobiontic and confined to mountain streams, living usually in the thin algal layer on the surface of stones and blocks fully exposed to the current (Brundin, 1966). Cranston & Edward (1992) have reported larvae associated with sandy substrates, predominantly where fine particulate organic matter was deposited.

1	Head relatively large (close to 20% of body length); antenna as long as mandible; mandible large, with five well-developed, acute teeth plus three long teeth located in the lateral margin (Fig. 16.2.6 E); body not tuberculate	*Paraphrotenia*
1'	Head close to 10% of body length; antenna clearly shorter than the mandible; mandible large, with up to seven teeth: one to three outside the apical tooth plus three to four inner teeth (Fig. 16.2.6 F); body tuberculate	*Aphroteniella*

Chironomidae: Podonominae: Genera

This subfamily is distributed amphitropically. The group reaches its greatest diversity in the southern temperate belt, which comprises 84% of the world fauna (Sæther & Andersen, 2013a). Larvae are rheobiontic and cold-stenothermal, frequently associated with mosses in springs, brooks, and small streams (Epler, 2001); however, there have been reports of podonomines living in warm waters in Australia (Cranston & Edward, 1992). Podonominae is subdivided into two tribes: Boreochlini and Podonomini. So far, 90 valid species are known from the Neotropical and Antarctic regions (Ashe & O'Connor, 2009 and subsequent studies). Comments on the distribution of Podonominae in the Neotropical Region may be found in Siri & Donato (2012). Although immature stages for most Neotropical podonomines are known, larvae belonging to this subfamily are still understudied, with only a few associated at the species level. Within the genus *Podonomus*, usually two main larval morphotypes can be distinguished: (1) head slightly or not triangular, antenna half size of mandible; abdominal segments commonly with strong setae and (2) head broadly triangular, antenna as long as the mandible; abdominal segment without strong setae.

1	Procercus not bulbous nor hyaline, with six to seven well-developed setae	2
1'	Procercus bulbous and hyaline, slightly darkened at the base, bearing very short setae (Fig. 16.2.23 E)	*Podonomopsis*
2(1)	Posterolateral border of segment 8 without comb of spines	3
2'	Posterolateral border of segment 8 with strong comb of spines (Fig. 16.2.23 F)	*Podochlus*
3(2)	Antennal article 2 (or 2 and 3) annulated (Fig. 16.2.23 G); procercus commonly unicolor, more or less long and narrow (Fig. 16.2.23 H)	*Parochlus*
3'	Antennal article 2 and 3 not annulated; procercus commonly dark, variable in length and width (Fig. 16.2.23 I); some species with very strong setae in the body	*Podonomus*

Chironomidae: Diamesinae: Tribes

This is the fourth largest subfamily. The group has worldwide distribution, occurring in all zoogeographic regions except the Antarctic and Oceania (Ashe & O'Connor, 2009). In general, larvae are cool-adapted, living in flowing water of circumpolar areas and mountain ranges, but some are found in springs and lakes (Epler, 2001). Three tribes, Harrisonini, Heptagyiini, and Lobodiamesini, occur in the in the Southern Hemisphere. The Heptagyiini and

Lobodiamesini are the only tribes in the Neotropical Region. Larval identification of Heptagyiini to generic level is considered relatively difficult; most species belonging to this tribe are known only from adults.

1 Antennal article 3 annulated (Fig. 16.2.15 I); procercus very reduced to absent, with at most four anal setae ..... Diamesini, one genus *Diamesa*

1' Antennal article 3 nonannulate (Fig. 16.2.15 K); procercus very reduced or absent, with at least five anal setae..... **Heptagyiini [p. 695]**

Chironomidae: Diamesinae: Heptagyiini: Genera

1 Occipital margin strongly developed (in the fourth instar larva), mentum with at least seven lateral teeth (Fig. 16.2.15 L)..... 2

1' Occipital margin moderately developed (in the fourth instar larva), mentum with less than seven lateral teeth (Figs. 16.2.16 A, C)..... 3

2(1) Occipital margin close to 30% of the head; lateral incisure of the occipital margin weak or absent; mentum with two slightly smaller but nonrecessed median teeth plus more than eight lateral teeth (Fig. 16.2.15 L)..... *Paraheptagyia*

2' Occipital margin 30% of head, lateral incisure of the occipital margin strong; mentum with seven to eight lateral teeth, the first lateral fused with the middle tooth like a "broad median tooth" (Fig. 16.2.16 B)..... *Reissmesa*

3(2) Lateral incisure of the occipital margin weak or absent; mentum with two slightly recessed median teeth plus six lateral teeth diminishing in size (Fig. 16.2.16 C)..... *Heptagyia*

3' Lateral incisure of the occipital margin well developed, mentum with a very broad middle tooth and five lateral teeth (Fig. 16.2.16 A)..... *Limaya*

Chironomidae: Prodiamesinae: Genera

This subfamily is small, comprising only four genera. Only *Monodiamesa* and *Prodiamesa* have been recorded in the Neotropical Region so far. Larvae seem to favor low to middle ranges of water temperature, and no species have been found in warm tropical waters (Ashe et al., 1987).

1 Ventromental plate narrow, with weak beard; mentum with a broad and concave median tooth (Fig. 16.2.23 K)..... *Monodiamesa mariae* Andersen, 1996

1' Ventromental plate broad, with strong beard, mentum with two small median teeth (Fig. 16.2.23 L)..... *Prodiamesa*

Chironomidae: Telmatogetoninae: Genera

This is a small subfamily, comprising two marine intertidal genera, with worldwide distribution (Cranston, 1995b). Larvae are nearly always associated with algae growing attached to rocks (Epler, 2001). According to Oliver (1971), larval *Telmatogetoninae* are euryhaline and often found in areas subject to direct freshwater runoff.

1 Area anterior to frontal apotome with two distinct sclerites; S3 placed on well-developed tubercle; premandible with three rounded apical teeth (Fig. 16.2.26 K)..... *Telmatogeton*

1' Area anterior to frontal apotome uniform, without delimited sclerites; S3 not on tubercle; premandible simple (Fig. 16.2.26 L)..... *Thalassomyia*

Chironomidae: Orthocladiinae: Genera

This subfamily is the second largest, with the greatest ecologic diversity (Ashe & Cranston, 1990). Several of the more primitive genera are aquatic, often rheophilous, while several genera are lentic. Some orthoclads exhibit hygropetric behavior in small standing waters, while several genera have developed semiterrestrial or fully terrestrial habits. Most larvae are scrapers, shredders, or collector-gatherers, while some taxa are predators (Epler, 2001). The monophyly of the subfamily remains uncertain, as no defining morphologic autapomorphies, in any life history stage, were found so far (Cranston et al., 2012). There is no accepted division of the subfamily into tribes. *Cricotopus* van der Wulp and *Orthocladius* van der Wulp have different larval types and are poorly studied in the Neotropical Region, and further studies are required to diagnose both genera. Additionally, the genus *Ferringtonia* Sæther & Andersen was not included in the key due to incomplete descriptions.

1 Anal end without procercus or, if present, without distinct anal setae and posterior parapods; anal setae present or absent; anterior parapods often partially fused..... 2

1' Procercus present, but may be reduced, with variable number of anal setae; anterior parapods nearly always fully separated (e.g., *Belgica*, which anterior parapods are apparently fused)..... 14

2(1) Pecten epipharyngis consisting of three scales; SI palmate only in *Smittia* (Fig. 16.2.16 E)..... 3

2' Each scale of pecten epipharyngis divided into two to three teeth, forming continuous row of about eight teeth; SI nearly palmate (Fig. 16.2.16 D)..... *Antillocladius*

3(2) Premandible with at most four teeth..... 4

3' Premandible with five teeth (Fig. 16.2.16 F)..... *Eretmoptera*

4(3') Preanal and anal segments and posterior parapods bent at right angles to axis of rest of body (Figs. 16.2.16 G, H)..... 5

4' Preanal and anal segments in same axis as rest of body (Fig. 16.2.16 I) 6
5(4) Posterior parapods divided into two parts, anterior part with small claws, posterior part bare (Fig. 16.2.16 H); anal tubules small or absent. Anal setae present ..... *Gymnometriocnemus*
5' Posterior parapods undivided, with or without claws (Fig. 16.2.16 G); anal tubules present; usually without anal setae ..... *Bryophaenocladius*
6(4) Anal tubules absent; mostly marine 7
6' Anal tubules present; never marine 8
7(6) Single pair of anal seta present (Fig. 16.2.16 I); SI and SII broad and apically feathered (Fig. 16.2.16 J) ..... *Clunio*
7' Two or three pairs, rarely 1, of anal setae present; SI feathered, SII always simple ..... *Thalassosmittia*
8(6) Mandibular teeth rounded or subtriangular (Fig. 16.2.17 A) 9
8' Mandible with spiniform teeth (Fig. 16.2.16 K); ectoparasitic on Ephemeroptera ..... *Symbiocladius*
9(8) SI and SII both bifid 10
9' SI bifid or not, SII never bifid 11
10(9) Posterior parapods with zero to five claws, claws 0–18 μm long (Fig. 16.2.16 L); mandible with three inner teeth (Fig. 16.2.17 A); antennal blade extending beyond flagellum (Fig. 16.2.17 B) ..... *Pseudosmittia*
10' Posterior parapods with 7–12 claws, claws 15–80 μm long; mandible with three or four inner teeth (Fig. 16.2.17 C); antennal blade not or only slightly extending beyond flagellum ..... *Allocladius*
11(9) Mentum different, beard absent 12
11' Mentum with broad flat median tooth and with five pairs of lateral teeth; large ventromental beard of many setae extending at least to margin of head (Fig. 16.2.17 D) ..... *Barbadocladius*
12(11) Mandible with three inner teeth; anterior parapods fused; posterior parapods present; anal tubules short, without constrictions 13
12' Mandible with two inner teeth (Fig. 16.2.17 E) or, when with three, without posterior parapods; anterior parapods separate; anal tubules long, with many constrictions (Fig. 16.2.17 F) ..... *Georthocladius*
13(12) Mandible without seta interna (Fig. 16.2.17 G); SI simple (Fig. 16.2.17 H) ..... *Mesosmittia*
13' Mandible with seta interna (Fig. 16.2.17 I); SI plumose (Fig. 16.2.16 E) ..... *Smittia*
14(1) Mentum not as previous; mandibular seta interna present or not 15
14' Mentum with 16–20 dark, equal-sized median and five pairs of slightly larger, lateral teeth (Fig. 16.2.17 J); mandibular seta interna absent (Fig. 16.2.17 K); larvae phoretic on catfish ..... *Ichthyocladius*
15(14) Antenna length ≥0.5× head length, or if shorter, then head capsule elongated, at least 1.5× as long as wide 16
15' Antenna length <0.5× head length 20
16(15) Antenna terminal article flagelliform or filiform; second antennal article partly unsclerotized (Figs. 16.2.17 L, 18 A) 17
16' Antenna with normal, short terminal article, but may have short filiform extension; if second antennal article partly unsclerotized, Lauterborn organs alternate 18
17(16) SI simple or with a few apical teeth; mandible with three to four inner teeth (Fig. 16.2.18 B) ..... *Stictocladius*
17' SI bifid; mandible with five inner teeth (Fig. 16.2.18 C) ..... *Lopescladius*
18(16) Antenna with five distinct articles, at most as long as head, usually shorter; head capsule without surface sculpturing (Figs. 16.2.18 E–F) 19
18' Antenna with four articles, usually longer than head; head capsule sometimes with surface sculpturing (Fig. 16.2.18 D) ..... *Corynoneura*
19(18) Posterior parapod subbasal seta apically split (Fig. 16.2.18 G) ..... *Ubatubaneura*
19' Posterior parapod subbasal seta simple ..... *Thienemanniella*
20(15) No anal seta as long as ¼ body length 21
20' Anal setae as long as ¼ body length (Fig. 16.2.18 H) ..... *Pseudorthocladius*
21(20) Mentum with no more than 15 teeth 22
21' Mentum with at least 16 teeth (Fig. 16.2.18 I) ..... *Orthocladius* (*Mesorthocladius*/*Euorthocladius*) (in part)
22(21) Beard present beneath or adjacent to ventromental plates (may be only a few setae and may require observation at 1000× magnification) 23
22' Beard absent (one to four weak setae present in some *Orthocladius*) 31
23(22) Antenna with four or five distinct articles, if minute sixth visible (some *Botryocladius*), then premandibular brush moderately developed 24
23' Small, setaform sixth antennal article usually distinct (Fig. 16.2.18 J); premandibular brush absent ..... *Parakiefferiella* (in part)
24(23) Antenna with five articles, Lauterborn organs variable; mentum rarely with second pair of lateral teeth smaller than first or third 25
24' Antenna with four articles and poorly developed Lauterborn organs; mentum with second pair of lateral teeth smaller than first or third (Fig. 16.2.18 K) ..... *Orthocladius* (*Pogonocladius*) (in part)
25(24) SI simple, bifid, coarsely pectinate, palmate or plumose; mentum, beard and mandible not as previous; abdomen without alternating simple and plumose setae, but single pairs of tufts may be present posterolaterally 26
25' SI simple (Fig. 16.2.18 L); mentum with two median, equally sized, elongated teeth; beard well developed, radiating from common area (Fig. 16.2.19 A); seta interna absent; seta subdentalis large (Fig. 16.2.19 B); abdomen with alternating simple and plumose lateral setae (Fig. 16.2.19 C) ..... *Synorthocladius*
26(25) Mandible with three or fewer inner teeth or, when with four, apical tooth longer than combined width of four inner teeth or anal tubules absent; mentum, beard, and SI variable; if labral lamellae present, weakly developed and never apically pectinate 27
26' Mandible with four inner teeth, apical tooth short (Fig. 16.2.19 D); ventromental plates with dense beard (Fig. 16.2.19 E); SI plumose; labral lamellae well developed, apically pectinate (Fig. 16.2.19 F) ..... *Diplocladius*
27(26) SI usually bifid, occasionally simple, apically split into four or more short teeth, plumose or coarsely serrate; procercus with or without spurs 28

27' SI broadly trifid, palmate or with four long, narrow teeth (Fig. 16.2.19 G); procercus with small to large spurs ..... *Psectrocladius* (in part)
28(27) Beard well developed; procercus usually with spurs, or anal tubules absent 29
28' Beard well developed to vestigial; procercus without spurs; anal tubules always present 30
29(28) Mentum with six lateral teeth; beard, if conspicuous, without broad and bifurcate setae (Fig. 16.2.19 H) ..... *Paracladius*
29' Mentum with five lateral teeth; beard of sparse to strong setae that may be broad and apically bifurcate (Fig. 16.2.19 I) ..... *Botryocladius*
30(28) Mandible apical tooth longer than combined width of three inner teeth (Fig. 16.2.19 J); ventromental plates large and triangular (Fig. 16.2.19 K); head capsule without ventral tubercle ..... *Psectrocladius* (*Monopsectrocladius*) (in part)
30' Mandible apical tooth less than or equal to combined width of three inner teeth (Fig. 16.2.19 L); if ventromental plates large and triangular, then head capsule with pair of ventral tubercles ..... *Rheocricotopus*
31(22) Ventromental plates well developed, extending beyond lateral margin of mentum 32
31' Ventromental plates absent or vestigial or, if present, not extending well beyond lateral margin of mentum or plates very thin 35
32(31) SI never simple; mentum not as previous; ventromental plate broader and less elongate; not phoretic on aquatic insects 33
32' All S setae simple (Fig. 16.2.20 A); mentum with small pair of median teeth, often well separated from the zero to six pairs of lateral teeth, which may be small and fused or closely adpressed to each other; ventromental plates long and elongate (Fig. 16.2.20 B); some species phoretic or parasitic on other aquatic insects ..... *Nanocladius*
33(32) Ventromental plates appear double (Figs. 16.2.20 D–F); seta submenti located well anterior to posterior margin of ventromental plates 34
33' Ventromental plates single; seta submenti located near posterior margin of ventromental plates or more posteriad (Fig. 16.2.20 C) ..... *Parakiefferiella* (in part)
34(33) Antenna with long basal article, antennal ratio >1.25; antennal blade shorter than flagellum (Fig. 16.2.20 G) ..... *Parametriocnemus*
34' Antenna with shorter basal article, antennal ratio 0.5–1.0; antennal blade shorter or longer than flagellum (Fig. 16.2.20 H) ..... *Paraphaenocladius*
35(31) Antenna with six to seven articles, terminal article vestigial, often setaform (Fig. 16.2.18 J); ventromental plates moderately developed 36
35' Antenna with five or fewer articles, last article not setaform; ventromental plates moderately developed to absent 37
36(35) Mentum with trifid median tooth, five pairs of lateral teeth, fifth lateral pair of teeth lower than fourth (Fig. 16.2.20 C) ..... *Parakiefferiella* (in part)
36' Mentum with bifid median tooth, four pairs of lateral teeth, fourth as high as third (Fig. 16.2.20 I) ..... *Paratrissocladius*
37(35) Abdomen with long simple setae, at least half as long as the segment bearing them 38
37' Abdomen without long simple setae, or if long setae present, they are arranged as pairs of single tufts, one on each side posterolaterally on body segments 40
38(37) SI simple or with indistinct apical dentations 39
38' SI bifid, with several apical teeth or plumose ..... *Metriocnemus* (in part)
39(38) Mandible medial margin with several spines (Fig. 16.2.20 J); procerci without spurs ..... *Eukiefferiella* (in part)
39' Mandible medial margin without spines (Fig. 16.2.20 K); procerci with spurs (Fig. 16.2.20 L) ..... *Paracricotopus*
40(37) Mentum with three median teeth and five pairs of lateral teeth, first pair of lateral teeth closely adpressed to outer median teeth (Figs. 16.2.21 A–B); antenna ¼–$^1/_3$ as long as head; SII strong, situated on tubercle; SI bifid (Fig. 16.2.21 C) 41
40' Mentum with one to two median teeth and two to five pairs of lateral teeth; antenna at most ¼ as long as head; SII not on tubercle; SI simple, serrate, plumose, or bifid 42
41(40) Antenna length ~¼× head capsule (Fig. 16.2.21 D); anterior parapods with two well-sclerotized, large, hook-like claws ..... *Tempisquitoneura*
41' Antenna length ~$^1/_3$ × head capsule (Fig. 16.2.21 E); anterior parapods without sclerotized claws ..... *Onconeura*
42(40) SI simple 43
42' SI bifid, serrate, pectinate, or plumose 49
43(42) Inner margin of mandible with spines (these may be small) 44
43' Inner margin of mandible smooth 47
44(43) Procercus at least as long as wide, setae about equally thick; seta interna of mandible usually divided to near base, if divided near apex mentum with four pairs of lateral teeth 45
44' Procercus reduced, with two setae thicker than the others on each procercus (Fig. 16.2.21 F); seta interna of mandible with long stalk that branches near apex (Fig. 16.2.21 G); mentum with five pairs of lateral teeth (Fig. 16.2.21 H) ..... *Cardiocladius* (in part)
45(44) Mentum with five pairs of lateral teeth 46
45' Mentum with four pairs of lateral teeth (Fig. 16.2.21 I) ..... *Eukiefferiella* (in part)
46(45) Anal setae much shorter than posterior parapods ..... *Cardiocladius* (in part)
46' Anal setae longer than posterior parapods ..... *Eukiefferiella* (in part)
47(43) Mentum with single or moderately developed bifid median tooth and at least five pairs of lateral teeth 48
47' Mentum with large bifid median teeth and only two lateral teeth (Fig. 16.2.21 J) ..... *Austrobrillia*
48(47) Body with posterolateral tufts (Fig. 16.2.21 K); mentum with single median tooth ..... *Cricotopus* (in part)
48' Body without posterolateral tufts; mentum with bifid median tooth (Fig. 16.2.21 L) ..... *Limnophyes* (in part)
49(42) SI serrate, apically fringed, pectinate, or plumose 50
49' SI bifid 59
50(49) Anal tubules short or normal, without numerous constrictions; procercus well developed to weak, but not vestigial; labral lamellae well developed, vestigial, or absent; blade shorter or longer than flagellum 51

50' Anal tubules very long, several times as long as posterior parapods, with many constrictions; procercus vestigial or consisting of two nearly contiguous, flat cones with basal, low plates, each with two to three setaform setae (Fig. 16.2.22 A); labral lamellae simple, rounded, weakly sclerotized; blade extending well beyond terminal antennal article (Fig. 16.2.22 B) ..... *Georthocladius* (*Atelopodella*)
51(50) Well-developed labral lamellae present (Fig. 16.2.22 C) 52
51' Labral lamellae absent or vestigial 53
52(51) Procerci well developed, at least twice as long as wide; supraanal setae shorter than anal tubules (Fig. 16.2.22 D) ..... *Metriocnemus* (in part)
52' Procerci weakly developed, about as long as wide; supraanal setae as long as or longer than anal tubules (Fig. 16.2.22 E) ..... *Thienemannia*
53(51) Antennal blade longer than flagellum; SI apically pectinate or plumose; mandible with four inner teeth 54
53' Antennal blade subequal in length to flagellum; SI serrate or palmate; mandible with three or four inner teeth 56
54(53) Mentum with single median tooth (Fig. 16.2.22 G) 55
54' Mentum with double median tooth (Fig. 16.2.22 F) ..... *Phytotelmatocladius*
55(54) Abdominal segments with one pair of setal tufts; fourth antennal article as long as the previous (Fig. 16.2.22 H) ..... *Gravatamberus*
55' Abdominal segments without distinct setae; fourth antennal article about twice as long as the previous (Fig. 16.2.22 I) ..... *Gynocladius*
56(53) Seta subdentalis relatively long and narrow, extending beyond internal margin of mandible 57
56' Seta subdentalis very short, not extending beyond internal margin of mandible ..... *Belgica*
57(56) SI serrate; Seta subdentalis narrow and simple 58
57' SI palmate, perhaps bifid, with each branch further divided into two to four lobes (Fig. 16.2.22 J); seta subdentalis subovoid, hooked (Fig. 16.2.22 K) ..... *Parapsectrocladius*
58(57) Mandible with three inner teeth (Fig. 16.2.22 L); supraanal setae length subequal to anal setae (Fig. 16.2.23 A) ... *Limnophyes* (in part)
58' Mandible with four inner teeth (Fig. 16.2.23 B); supraanal setae length $\sim^{1}/_{3}$ × anal setae ..... *Compterosmittia*
59(49) Setae submenti palmate, with seven to eight branches (Fig. 16.2.23 C); similar setae in maxilla ..... *Pirara*
59' Seta submenti not as previous ..... *Cricotopus*/*Orthocladius*

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