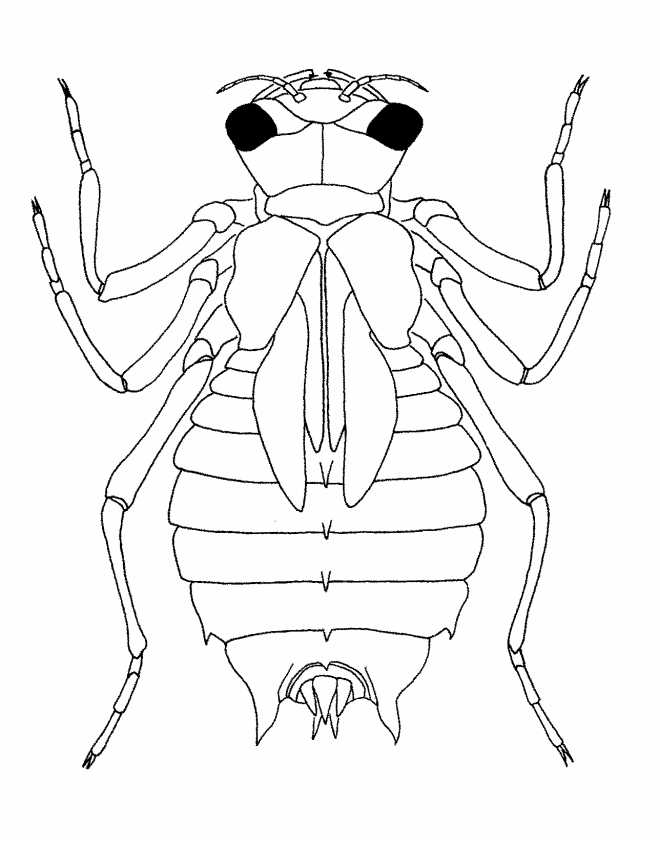
CHAPTER 5

ODONATA
(Dragonflies & Damselflies)



Citation:

Bouchard, R.W., Jr. 2004. Guide to aquatic macroinvertebrates of the Upper Midwest. Water Resources Center, University of Minnesota, St. Paul, MN. 208 pp.

5 ORDER ODONATA
Dragonflies & Damselflies

Most people are familiar with large dragonflies observed flying over ponds, marshes, and fields. Less well known are the aquatic larvae of these insects. Odonates are most abundant and diverse in lentic (standing) waters, but many species also occur in lotic (flowing) waters. All adult and larval odonates are predatory. Most Odonata larvae are sit-and-wait predators, which means they remain motionless until an insect or small fish approaches the larva. When a prey item comes close, the larva rapidly extends its labium (lower lip) and grasps the prey. The adults feed on arthropods such as other insects (including other dragonflies and damselflies) and spiders. Adult odonates, especially dragonflies, are strong fliers and catch much of their prey on the wing.

Odonata Morphology

Odonate larvae possess a characteristic labium (lower lip), which forms an extendable mask-like or scoop-like appendage that covers other mouthparts. Mature larvae possess two pairs of wing pads. The legs of odonates terminate in two claws. Odonata can be divided into two distinct groups or suborders: 1) Dragonflies (Anisoptera) and 2) Damselflies (Zygoptera). Damselfly larvae are usually more slender than dragonflies and their abdomen terminates in three caudal filaments (gills) resembling leaves (Fig. 5.1). Dragonflies are much more robust with an abdomen terminating in five points consisting of a pair of cerci, a pair of paraprocts, and a single epiproct (Figs. 5.2, 5.3).

In both damselflies and dragonflies the shape of the lower lip (labium) can be a diagnostic character for separating families (Figs. 5.4, 5.5, 5.6). The shape of antennal segments is also an important character in identification of odonates.

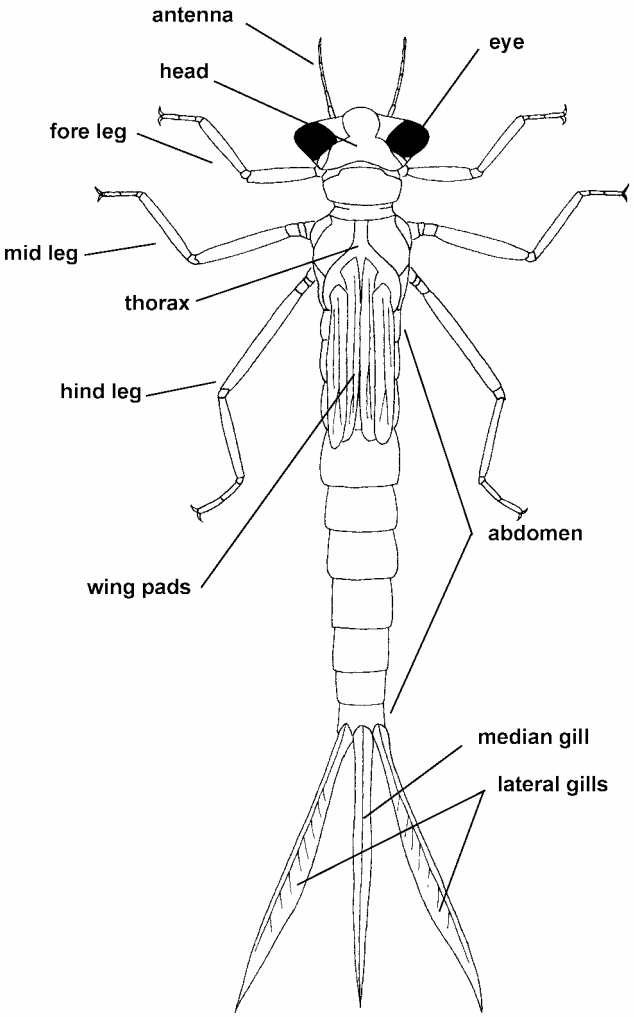


Figure 5.1: Dorsal view of damselfly larva.

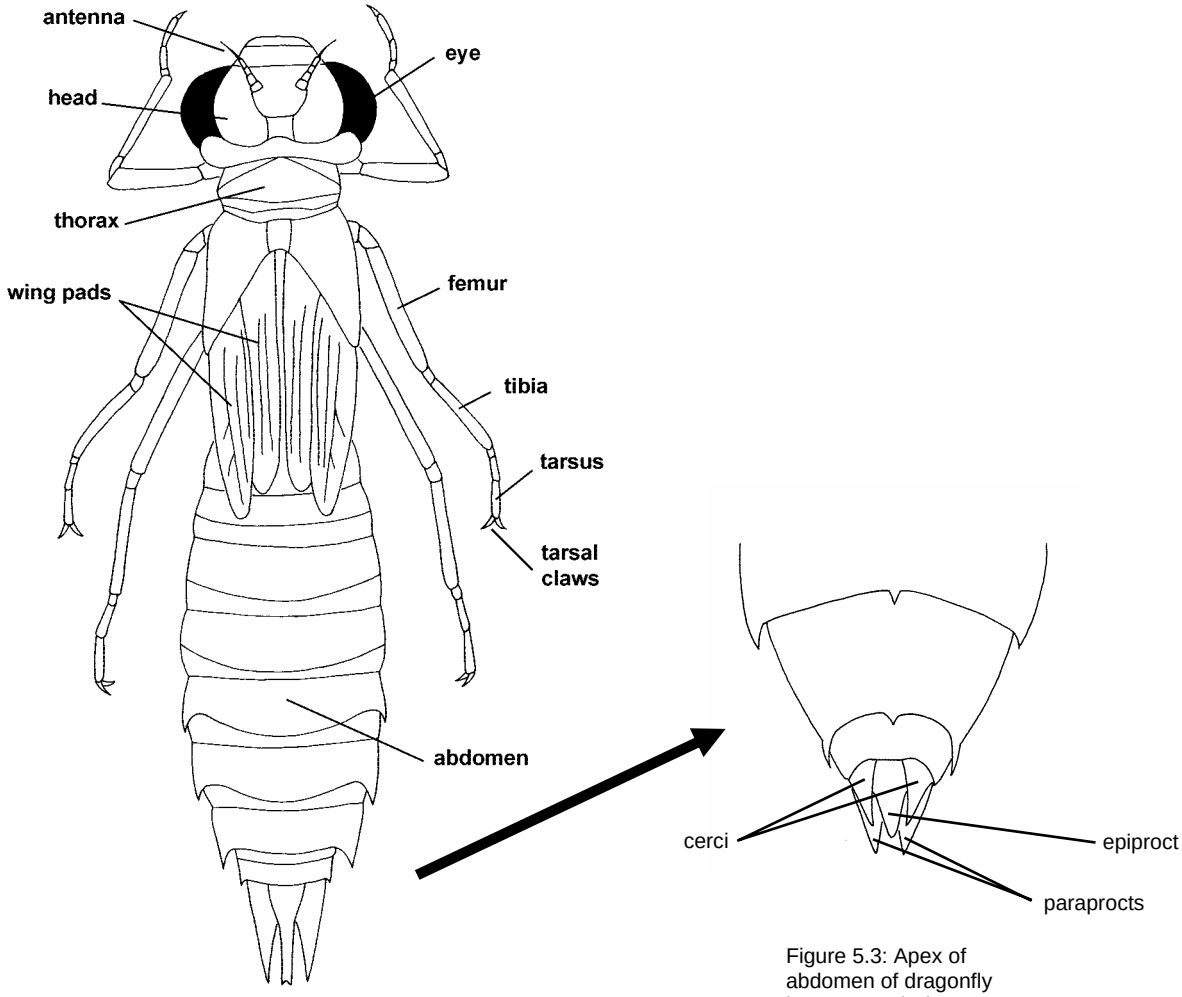


Figure 5.2: Doral view of dragonfly larva.

Figure 5.3: Apex of abdomen of dragonfly larva, Dorsal View.

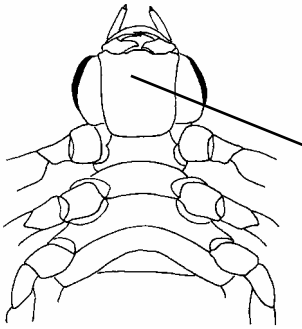


Figure 5.4: Head and thorax of *Progomphus* sp. larva, Ventral View.

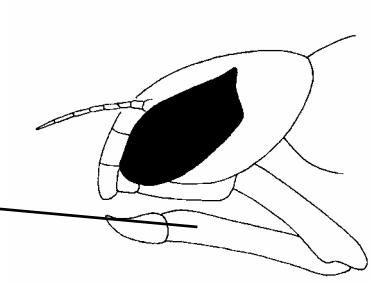


Figure 5.5: Head of generalized Aeshnidae larva, Lateral View.

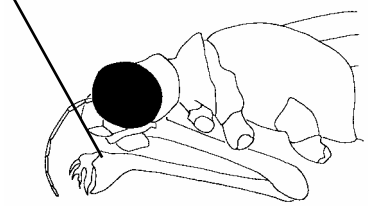


Figure 5.6: Head and thorax of Lestidae larva, Lateral View.

Key to Odonata Families (Larvae)

1. Abdomen ending in three leaf-like gills (these gills are fragile and are sometimes broken off and lost) (Fig. 5.7) - **Zygoptera (Damselflies)** 2

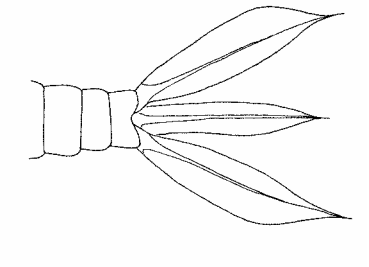


Figure 5.7: Apex of abdomen of *Argia extranet* (Coenagrionidae) larva, Dorsal View.

1'. Abdomen ending in five points (Fig. 5.8) - **Anisoptera (Dragonflies)**.....4

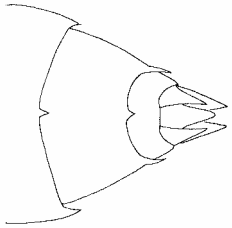


Figure 5.8: Apex of abdomen of *Dromogomphus* sp. (Gomphidae) larva, Dorsal View.

Suborder Zygoptera (Damselflies)

2(1). Antennal segment 1 longer than remaining segments combined (Fig. 5.9) ....**Calopterygidae *p. 70***

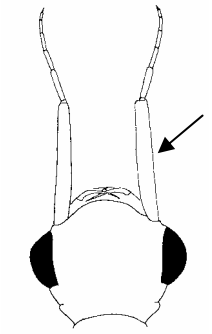


Figure 5.9: Head of *Calopteryx* sp. (Calopterygidae) larva, Dorsal View.

2'. Antennal segment 1 similar to remaining segments (Fig. 5.10).....3

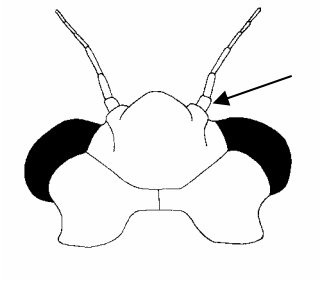


Figure 5.10: Head of *Amphiagrion* sp. (Coenagrionidae) larva, Dorsal View.

3(2'). Basal (lower) portion of labium (lower lip) greatly narrowed (spoon-shaped) (Figs. 5.11, 5.12) ..... **Lestidae *p. 71***

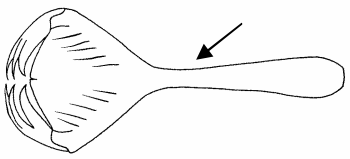


Figure 5.11: Prementum of *Lestes rectangularis* (Lestidae) larva, Dorsal View.

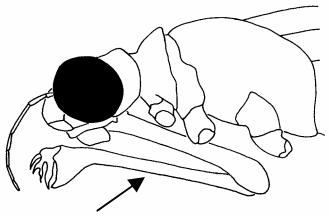


Figure 5.12: Head and thorax of Lestidae larva, Lateral View.

3'. Basal (lower) portion of labium (lower lip) not greatly narrowed (quadrate) (Fig. 5.13) .... **Coenagrionidae *p. 70***

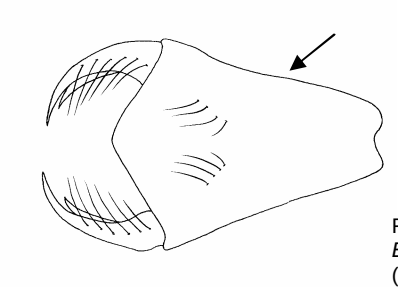


Figure 5.13: Prementum of *Enallagma civile* (Coenagrionidae) larva, Dorsal View.

Suborder Anisoptera (Dragonflies)

4(1'). Prementum and palpal lobes of labium (lower lip) flat (Fig. 5.14) 5

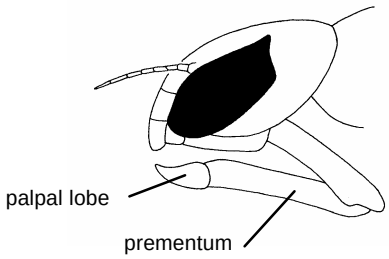


Figure 5.14: Head of generalized Aeshnidae larva, Lateral View.

4'. Prementum and palpal lobes of labium (lower lip) scoop- or spoon-shaped (Fig. 5.15).... 6

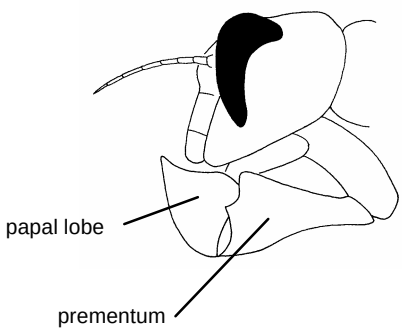


Figure 5.15: Head of generalized Libellulidae larva, Lateral View.

5(4). Antennae 4 segmented; 3rd antennal segment often large (Fig. 5.16) .**Gomphidae *p. 72***

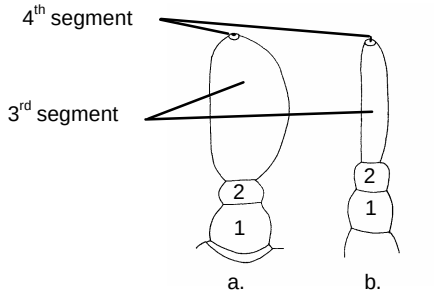


Figure 5.16: Antennae of a) *Octogomphus specularis* and b) *Dromogomphus* sp. (Gomphidae) larva.

5'. Antennae 6-7 segmented with all antennal segments similar (Fig. 5.17).....**Aeshnidae *p. 71***

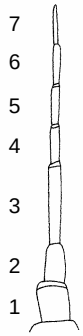


Figure 5.17: Antennae of *Aeshna umbrosa* (Aeshnidae) larva.

6(4'). Palpal lobes with large irregular teeth (Fig. 5.18).....**Cordulegastridae *p. 72***

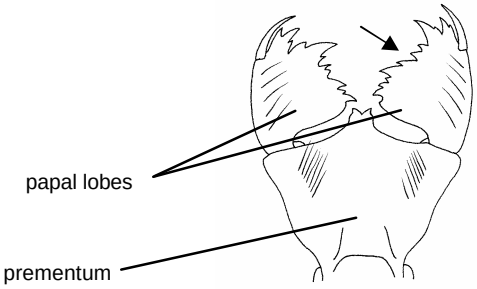


Figure 5.18: Prementum of *Cordulegaster* sp. (Cordulegastridae) larva, Dorsal View.

6'. Palpal lobes with small rounded, regularly spaced teeth (Fig. 5.19) ...**Libellulidae *p. 73***

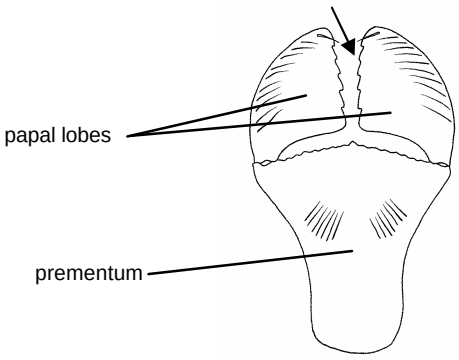


Figure 5.19: Prementum of *Plathemis* sp. (Libellulidae) larva, Dorsal View.

Odonata Family Descriptions

SUBORDER ZYGOPTERA (Damselflies)

Calopterygidae

Common Name: Broad-Winged Damselflies
Feeding Group: Predators
Tolerance: 5 (Moderate)
Habitat: These damselflies are most commonly found at the edges of streams with slow flowing water where they cling to root masses, overhanging grasses, and twigs.
Size: Large (30-40 mm)
Characteristics: Antennal segment one longer than remaining antennal segments put together; prementum with diamond shaped medial cleft; prementum and palpal setae absent; middle gill shorter than lateral gills; gills triangular in cross section; no veins visible in gills.
Notes: Broad-winged damselfly adults are most commonly observed along shaded woodland streams. They are striking with iridescent green or blue bodies and black wings.

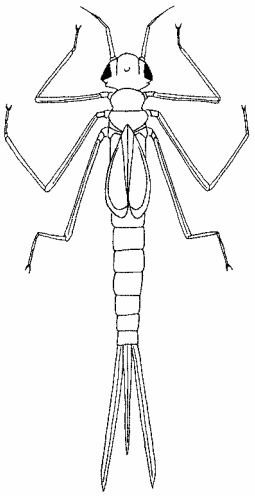


Figure 5.20: *Calopteryx maculata* (Calopterygidae) larva, Dorsal View.

Coenagrionidae

Common Name: Narrow-Winged Damselflies
Feeding Group: Predators
Tolerance Value: 9 (High)
Habitat: Narrow-winged damselflies are found in a wide range of habitats including ponds and flowing waters. These damselflies are most common in vegetation at the margins of lakes and in wetlands. Some species are found in streams clinging to rocks and vegetation.
Size: Medium to large (15-32 mm)
Characteristics: Most are slender like other damselfly larvae (although some are short and stocky); all antennal segments are approximately the same length; prementum triangular and stout without medial notch; usually 3-5 premental setae on each side of midline; 1-7 raptorial setae on each palpal lobe; palpal lobes terminating in 1-2 hooks; all gills the same length; veins in gills radiate diagonally from medial line.
Notes: Coenagrionids are the most diverse and abundant family of damselflies in the Upper Midwest.

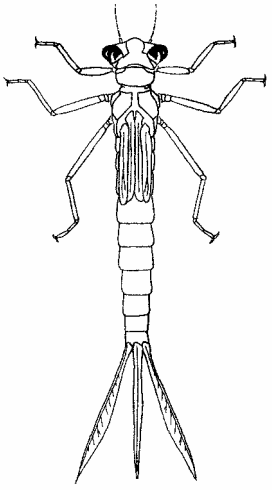


Figure 5.21: *Ishnura ramburii* (Coenagrionidae) larva, Dorsal View.

Lestidae

Common Name: Spread-Winged Damselflies
Feeding Group: Predators
Tolerance Value: 9 (High)
Habitat: These damselflies are most common in small ponds, bogs, wetlands, and sometimes in slow weedy streams.
Size: Large (22-38 mm)
Characteristics: These are long slender damselflies; all antennal segments similar; prementum with small triangular notch; prementum stalked and spoon shaped; 4-8 premental setae present; palpal lobes with 3-5 raptorial setae and trifid; all gills of similar length; veins visible in gills and perpendicular to medial line.
Notes: When collected the larvae of spread-winged damselflies sometimes flip about like a minnow. These damselflies are sometimes very abundant in temporarily wet habitats.

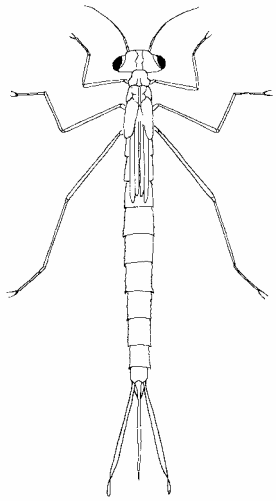


Figure 5.22: *Lestes vigilax* (Lestidae) larva, Dorsal View.

SUBORDER ANISOPTERA (Dragonflies)

Aeshnidae

Common Name: Darner Dragonflies
Feeding Group: Predators
Tolerance Value: 3 (Low)
Habitat: Darner dragonflies are most commonly collected in vegetation along the edges of lakes and ponds. They can also be found in some streams under logs and stones or in snags.
Size: Large (30-62 mm)
Characteristics: Prementum and palpal lobes are flattened; 6-7 antennal segments present with all segments of similar size and shape.
Notes: Unlike most other dragonfly larvae, which sit and wait for prey, aeshnid larvae stalk their prey.

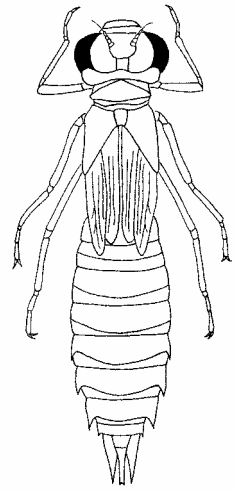


Figure 5.23: *Anax junius* (Aeshnidae) larva, Dorsal View.

Cordulegastridae

Common Name: Spike-Tail Dragonflies
Feeding Group: Predators
Tolerance Value: 3 (Low)
Habitat: These dragonflies are found buried in sand and silt in small woodland streams.
Size: Large (30-45 mm)
Characteristics: These larvae often appear hairy; prementum and palpal lobes large covering face up to antennal bases; palpal lobes triangular with large irregular teeth; antennae with seven segments.
Notes: Spike-tail dragonfly larvae bury themselves in sand and silt with only their eyes and the tips of their abdomen protruding from the substrate. They may remain buried and motionless for weeks waiting for prey.

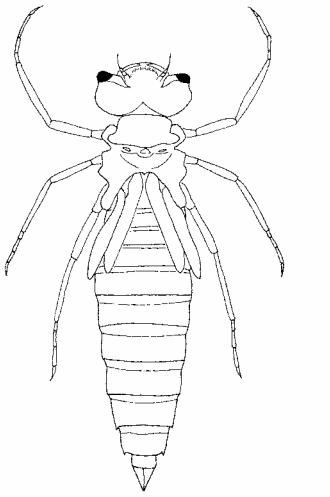


Figure 5.24: *Cordulegaster* sp. (Cordulegastridae) larva, Dorsal View.

Gomphidae

Common Name: Club-Tail Dragonflies
Feeding Group: Predators
Tolerance Value: 1 (Low)
Habitat: Gomphid dragonflies are most common in flowing (lotic) habitats, but they can also be found around the edges of lakes and ponds. Most species are burrowers in sand or soft silt.
Size: Large (30-45 mm)
Characteristics: Prementum and palpal lobes of labium flattened (not scoop-shaped); four antennal segments; third antennal segment large and different from remaining segments usually cylindrical or nearly oval; fourth antennal segment very small; body shape variable from long and cylindrical to flattened and broad.
Notes: Many club-tail dragonfly larvae get dissolved oxygen while they are buried in the substrate by extending the tip of their abdomen above the substrate.

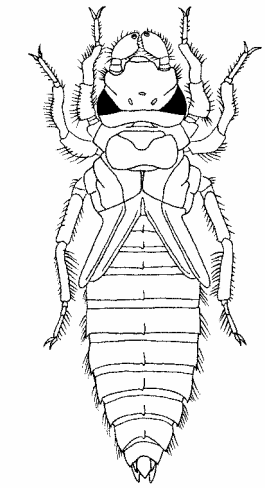


Figure 5.25: *Progomphus serenus* (Gomphidae) larva, Dorsal View.

Libellulidae

Common Name: Common Skimmer Dragonflies, Emerald Dragonflies, Green-Eyed Skimmers, Cruiser Dragonflies

Feeding Group: Predators

Tolerance Value: 7 (High)

Size: Medium to Large (18-42 mm)

Habitat: These dragonfly larvae are most commonly found at the edges of ponds and lakes. They are also found in wetlands and less commonly in edge habitats of streams and large rivers.

Characteristics: Antennae 6-7 segmented with all antennal segments similar; prementum and palpal lobes of labium spoon-shaped; palpal lobes with small rounded, regularly spaced teeth.

Notes: Many libellulid dragonfly larvae are well camouflaged either through their coloration or due to a layer of sediment on their bodies. These dragonflies are very common and widespread especially in lentic habitats. Some libellulid dragonfly larvae can be very tolerant of low levels of dissolved oxygen and are often found in warm lakes or ponds with large amounts of nutrients.

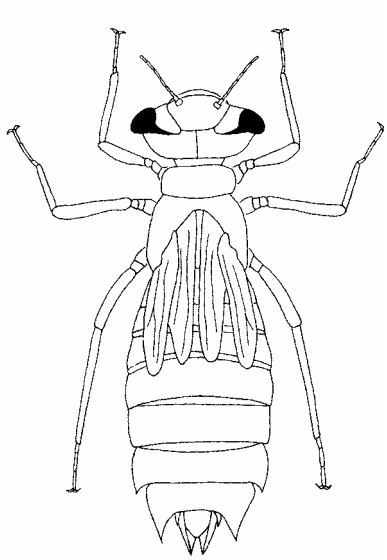


Figure 5.26: *Pachydiplax longipennis* (Libellulidae) larva, Dorsal View.

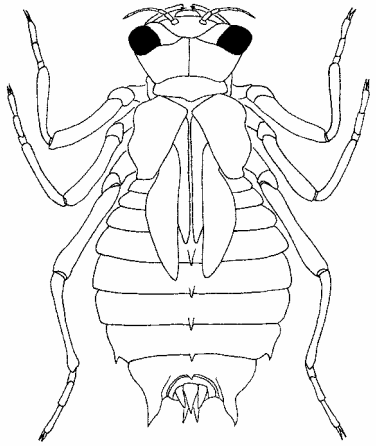


Figure 5.27: *Epicordulia* sp. (Corduliidae) larva, Dorsal View.

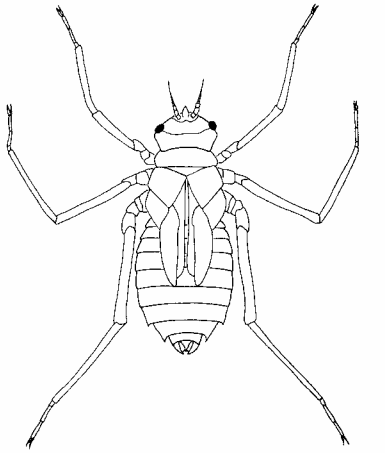


Figure 5.28: *Macromia magnifica* (Macromiidae) larva, Dorsal View.