

# UNCORRECTED PAGE PROOFS

pedipalps long and leglike; propeltidium with one pair of eyes.

Most of the 900 or so species of solpugids (or solfugids) live in tropical and subtropical desert environments of America, Asia, and Africa. In contrast to many arachnids, they are often daytime hunters, hence the common name “sun spiders.” They are also known as “wind spiders” because the males run at high speeds, “like the wind.”

Some solpugids are only a few millimeters long, but many reach lengths of up to 7 cm. The feeding habits of many solpugids are unknown. Among those that have been studied, most are omnivorous, but they frequently show a preference for termites or other arthropods. Lacking poison, they rip their live prey apart with their strong chelicerae.

**Order Uropygi.** Whip scorpions and vinegaroons (Figure 19.4A,B). Prosoma elongate and covered by a carapace-like shield; opisthosoma segmented and divided; mesosoma broad with two pairs of book lungs; metasoma short with long, whiplike telson; first walking legs elongate and multiarticulate distally; with one pair of median and four or five pairs of lateral eyes.

Whip scorpions are moderately large arachnids reaching lengths of up to 8 cm. There are fewer than 100 known species of living uropygids, most of which occur in Southeast Asia; a few are known from the southern United States and parts of South America, and some probably introduced species occur in Africa. With the exception of a few desert species, whip scorpions live under rocks, in leaf litter, or in burrows in relatively humid tropical and subtropical habitats. The telson is sensitive to light, and most uropygids are negatively phototactic and active only at night.

The elongate first walking legs are held forward as “feelers,” aiding the animals in their nocturnal hunting excursions. They feed on various small invertebrates by grasping prey with the pedipalps and grinding it with the chelicerae.

Whip scorpions possess a pair of repugnatorial glands that open near the anus. When a uropygid is threatened by a potential predator, it raises the opisthosoma and sprays an acidic liquid from by these glands on the would-be attacker. Some forms (e.g., *Mastigoproctus*) produce a secretion high in acetic acid, earning them the common name “vinegaroons.”

## The Chelicerate Bauplan

Looking over the taxonomic summaries above will give you a good sense of diversity within the Chelicerata. This section covers the general biology and structure of members of this class, with an emphasis on the xiphosurans, spiders, and scorpions. We hope to convey an impression not only of diversity but also of unity within

this group and to reinforce the concept of the evolutionary plasticity of the arthropod bauplan in general.

The chelicerate body is typically divided into two main regions, the prosoma and the opisthosoma (Figures 19.1, 19.2, 19.5, 19.6); a discrete head is not recognizable. The prosoma includes a presegmental acron and six segments; the opisthosoma includes up to twelve segments and a postsegmental, postanal telson. As in other arthropod groups, these basic body regions have undergone various degrees of specialization and tagmosis. In most chelicerates the entire prosoma is fused and covered by a carapace-like shield. However, in certain groups (e.g., schizomids, palpigrades, solpugids, and opilionids) the prosoma is divided into three parts: a **proterosoma**, comprising the acron and the first four segments, all fused and covered by a carapace-like shield (often called the **propeltidium**); and two free segments (often called the **mesopeltidium** and **metapeltidium**). The opisthosoma may be undivided, as it is in spiders, or divided into an anterior mesosoma and posterior metasoma, as it is in many other living arachnids and in the eurypterids.

The appendages further distinguish the chelicerates from other arthropods. There are no antennae, but all six segments of the prosoma usually bear appendages. The first pair of appendages are embryologically postoral, often pincer-like, chelicerae. During embryogeny, the chelicerae migrate to a position lateral to the mouth, or even preoral, in adults of most groups; here they serve as fangs or grasping structures during feeding. The chelicerae are followed by a pair of postoral pedipalps, which are usually elongate or, more rarely, in the form of pincers. The pedipalps are usually sensory in function, but in some groups (e.g., scorpions) they aid in feeding and defense. The remaining four segments of the prosoma typically bear the walking legs.

The numbers of segments and appendages on the opisthosoma vary. In general, appendages are absent or very reduced, although in the horseshoe crabs they persist as large platelike limbs, called **gill books**, that function in locomotion and gas exchange. In most chelicerates the opisthosomal limbs are greatly reduced and persist only as specialized structures, such as the silk-producing spinnerets of spiders or the pectines of scorpions.

In summary, then, we may define the Chelicerata as cheliceriform arthropods in which the body is divided into two regions (or two tagmata), a prosoma and an opisthosoma, and in which the first two pairs of appendages are chelicerae and pedipalps and the remaining four pairs are walking legs. Evolutionarily, this bauplan has been a highly successful one.

As mentioned earlier, the great success of spiders seems to have been due in large part to the evolution of complex behaviors associated with silk and web production. Because we are paying special attention to members of the order Araneae in this chapter, and because silk production is so important to nearly all facets of their lives, we present a special section on spider silk and its uses.