

ATOLL RESEARCH BULLETIN

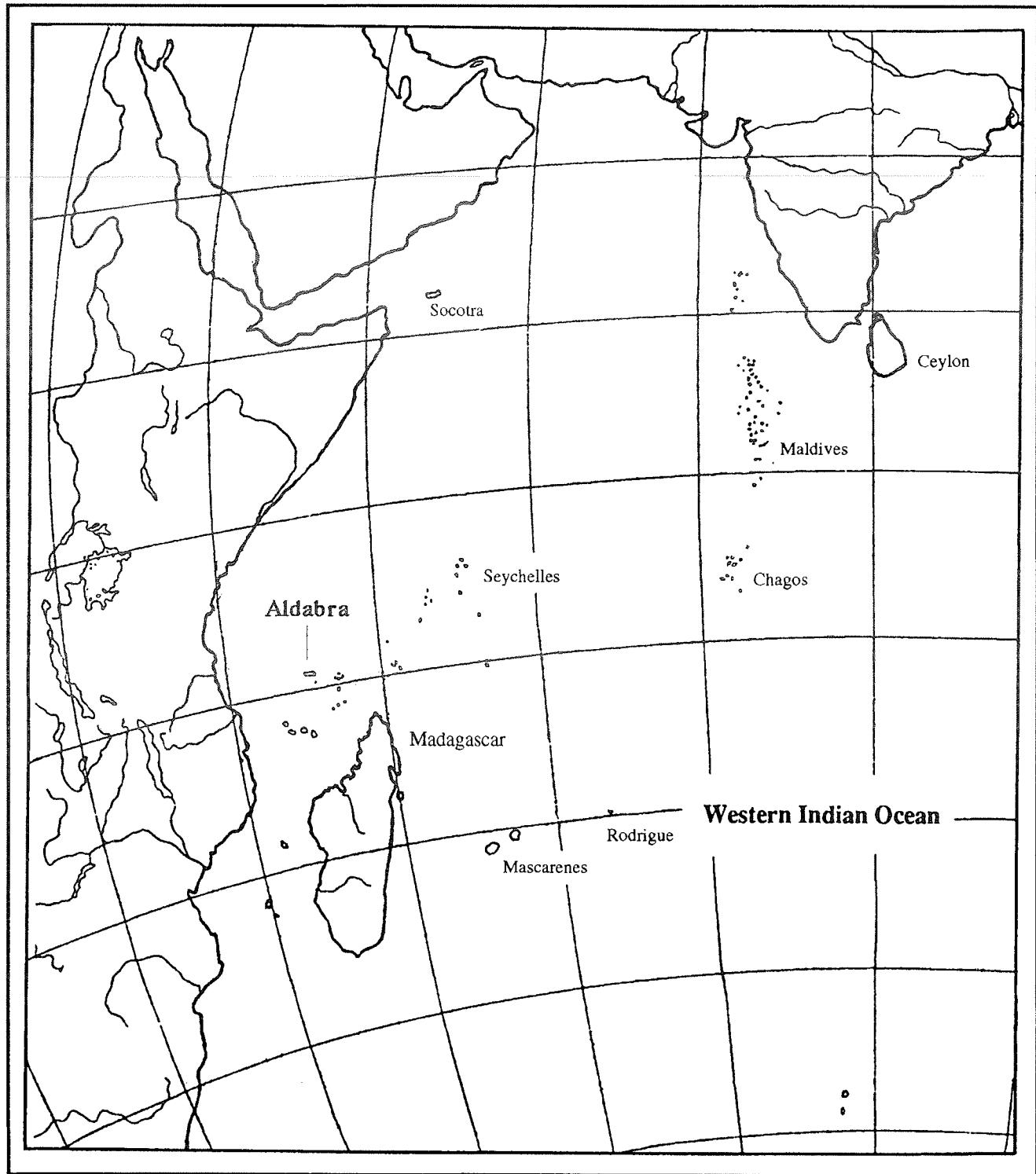
NO. 381

**THE HETEROPTERA OF ALDABRA ATOLL AND NEABY ISLANDS,
WESTERN INDIAN OCEAN, PART 2. FRESHWATER HETEROPTERA
(INSECTA): CORIXIDAE, NOTONECTIDAE, VELIIDAE,
GERRIDAE AND MESOVELIIDAE**

BY

DAN A. POLHEMUS

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ABSTRACT

Five species of freshwater Heteroptera are now recorded from Aldabra Atoll. Two of these species, *Micronecta praetermissa* and *Anisops vitrea* are subaquatic species living below the water surface, while the remaining three, *Mesovelia vittigera*, *Limnogonus cereiventris* and *Microvelia diluta diluta* inhabit the water surface. The latter species also inhabits saline limestone sinkholes that are flooded on a daily basis by tidal fluxes. A key to all these freshwater species is provided, accompanied by discussions of their habitat preferences and maps detailing their distributions on Aldabra.

INTRODUCTION

This is the second in a series of reports on Heteroptera fauna of Aldabra and nearby Indian Ocean atolls, and deals with those species of Heteroptera occurring in freshwater habitats. The diverse marine Heteroptera fauna of Aldabra was treated in a previous report (Polhemus, 1990), which also contained a detailed description of the atoll and its physical setting. The aim of these reports is to provide accurate information on the taxonomic composition, local distribution, and behavior of the Aldabran Heteroptera fauna that may be used by subsequent researchers at the Aldabra Research Station, particularly ecologists who need reliable taxonomic information on which to base their studies. It is further hoped that these contributions will be of use to entomologists and zoogeographers concerned with the distribution of insects in the Indian Ocean region as a whole.

The collections which form the basis for this report were made on Aldabra between March 9 and March 25, 1989, and during a one day stop on Cosmoledo Atoll on March 27, 1989, as part of a continuing research effort sponsored by the Smithsonian Institution's Aldabra Program in cooperation with the Seychelles Islands Foundation. The work on Aldabra was based primarily out of the research station on Picard Island, but an attempt was made to secure collections from most areas of the atoll. The collections from Cosmoledo were made primarily near the Johannes Point settlement on Menai Island, at the western end of the atoll. Given the relatively short time spent on these islands it is likely that further additions to their heteropteran faunas will be made by future collectors, and the present work should by no means be viewed as comprehensive. This report will, however, provide an updated basis from which subsequent workers may proceed.

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The last monograph of any scope to deal with the freshwater Heteroptera fauna on the atolls of the western Indian Ocean was that of Distant (1913), based on collections made by J. C. F. Fryer during the Percy Sladen Trust expeditions from 1908 to 1909. Many of Distant's taxonomic names and interpretations are now dated, and no publications dealing with the freshwater Heteroptera of this region have appeared since.

In reporting distributional data I have used the French names for the individual islands and channels of Aldabra and Cosmoledo atolls, since these are the names most commonly employed by the local Seychellois population. The French names have the following English equivalents that will be found on certain maps: Picard = West Island; Grande Terre = South Island, Malabar = North Island; Grande Passe = Main Channel; Passe Houareau = Eastern Channel; Passe Femme and adjacent passes = Western Channels. A detailed map of Aldabra showing these and other localities may be found in Stoddart and Westoff (1979).

The synonymies given under individual species are nomenclatural only. All specimens, unless otherwise noted, were collected by the author and are deposited in the National Museum of Natural History, Washington, D. C. CL numbers following collecting localities refer to a sequential numbering system used by the author to cross reference ecological data.

FRESHWATER HABITATS ON ALDABRA

The only permanent and unfailing source of fresh water on Aldabra Atoll is Wilson's Well, located on Grande Terre island near the head of Takamaka Arm. In addition, on the flat limestone surfaces or "platin" that occur widely across the atoll there are numerous shallow limestone pans or "bassins" that fill with water on a seasonal basis after the passage of convectional storms. The ponds formed in these bassins can persist for many weeks at a time, particularly during the months of March and April in the relatively rainy period between the northwest and southeast monsoons. Amid the rougher and more heavily weathered microkarst surfaces of the atoll there are also many smaller cavities that fill with water during the rainy months and are exploited by various aquatic insects, notably mosquitos. Finally, the construction of shelter huts and rain cisterns at various points around the atoll has provided many new and relatively permanent freshwater container habitats that did not previously exist.

The five species of freshwater aquatic Heteroptera present on Aldabra have taken advantage of all of the potential habitats noted above. The relative absence of permanent freshwater aquatic environments has dictated that these aquatic species be dispersive opportunists which can diapause in the egg stage during dry periods and then quickly hatch and develop to exploit those bodies of standing water that do become available after the rains. The presently known Aldabran water bugs are thus adaptable generalists of African, Malagasy or Asian affinities with broad distributions in the Indo-Pacific or western Indian Ocean regions. All appear to utilize temporary freshwater pools, and none appear to be exclusively confined to the one area of permanent fresh water at Wilson's Well on Grande Terre Island.

During the period in which the collections for the present study were made Aldabra received unusually consistent afternoon rains from convectional storms, and as a result the freshwater habitats were numerous and extensive. At Wilson's Well the broad limestone basin surrounding the vertical well shaft had flooded to a depth of over a meter, partially inundating the surrounding clumps of sedges and giving the area the appearance of a reed lined pond. This favorable circumstance had been readily exploited by numerous species of Odonata and aquatic Coleoptera, which cohabited the pond with the five aquatic Heteroptera species discussed herein.

In addition to the permanent water source at Wilson's Well, two other large

temporary pools were also sampled during the course of this study. The first was at Takamaka Grove, a half hour's walk south of Wilson's Well in the central portion of Grande Terre island. This pool was large and roughly circular, being perhaps 15 meters across and a meter deep, and lay in a rugged limestone basin with low cliffs approximately 1.5 meters high along the eastern side. Adjoining these cliffs was the Takamaka Grove itself, a stand of large and apparently quite old takamaka trees (*Calophyllum inophyllum*). On the western side the shore was composed of lower, smoother limestone eroded into numerous small potholes and set with clumps of the sedge *Fimbristylus cymosa*. The surrounding country was also dotted with many small rain filled potholes plus one broad but very shallow expanse of water in a limestone pan at Bassin Ibis. These more ephemeral habitats contained few aquatic insects outside of mosquito larvae and *Microvelia*, in contrast to the pool at the grove which supported a diverse aquatic insect fauna.

A second large temporary pool was found several hundred meters inland from the camp at Cinq Cases, on the eastern tip of Grande Terre island. This was a broad expanse of water in a shallow limestone basin with low vertical sides no more than half a meter high. The water at this locality was almost entirely unshaded, and the extreme heat and glare during the daylight hours appeared to prevent most aquatic Heteroptera species here from venturing into the central section of the pool. They congregated instead along the margins, where some degree of protection was offered by small rock overhangs and clumps of the sedge *Fimbristylus ferruginea*. The pool substrate was composed of a thick layer of green, flocculant ooze suspended above the limestone floor, and the water contained numerous shells from dead giant tortoises which had fallen in and drowned while attempting to drink. Despite these conditions, this pool contained a rich freshwater aquatic biota, including all the species of freshwater aquatic Heteroptera presently known from Aldabra.

SYSTEMATICS

KEY TO THE ADULTS OF SPECIES OF FRESHWATER HETEROPTERA OCCURRING ON ALDABRA AND COSMOLEDO ATOLLS

1. a. Antennae shorter than head, inserted beneath eyes, not plainly visible from above; bugs living below the water surface (figs. 6, 7).....(Nepomorpha)..2
 - b. Antennae longer than head, inserted forward of the eyes, plainly visible from above; bugs living on the water surface (figs. 8-10).....(Gerromorpha)..3
2. a. Beak triangular, very short, unsegmented, appearing as apex of head; front tarsus with a single segment, scooplike, fringed with stiff setae to form a rake; small brown species with body dorsoventrally flattened (fig. 6).....*Micronecta praetermissa* Poisson
 - b. Beak cylindrical, longer than above, segmented, not appearing as apex of head; front tarsus not scooplike or fringed with stiff setae; larger pale colored species with body cylindrical (fig. 7).....*Anisops vitrea* Signoret
3. a. Claws on all legs inserted at tips of tarsi (fig. 9).....*Mesovelia vittigera* Horváth
 - b. Claws of at least front tarsus inserted before apex.....4
4. a. Small species, legs short, with hind femur not surpassing apex of abdomen (fig. 8).....*Microvelia diluta diluta* Distant
 - b. Much larger species, legs long, with hind femur greatly exceeding apex of abdomen (fig. 10).....*Limnogonus cereiventris* (Signoret)

CORIXIDAE

Micronecta praetermissa Poisson
Figs. 1, 6

Micronecta praetermissa Poisson 1938. Rev. Entomol., 5: 138. Type locality: Madagascar (Antanambé).

Discussion: This tiny waterboatman has a wider distribution in the western Indian Ocean than has previously been realized. In addition to the present specimens from Aldabra, I have collected this species in the dry forest regions of southern and western Madagascar (near Tulear and Morondava), and seen additional specimens from Zanzibar in the Hungerford collection at the University of Kansas. On Aldabra individuals of this species occurred abundantly in the large limestone pool inland from Cinq Cases camp on Grande Terre island, where they swam amid the flocculant green ooze on the pool bottom. Populations were also present in similar large pools at Wilson's Well and Takamaka Grove. It appears that on Aldabra *M. praetermissa* requires bigger pools of this type which persist for a long period of time, since it was not found in smaller, more temporary habitats such as rain filled pockets in the microkarst.

Known distribution: Madagascar, Zanzibar, Aldabra.

Material examined: ALDABRA ATOLL, **Grande Terre**: freshwater pool nr. Cinq Cases, water temp. 29° C., 13 March 1989, CL 8029; pool at Wilson's Well, water temp. 29° C., 23 March 1989, CL 8038; large pool at Takamaka Grove, water temp. 32° C., 23 March 1989, CL 8039.

NOTONECTIDAE

Anisops vitrea Signoret
Figs. 2, 7

Anisops vitreus Signoret (1860) 1861. Ann. Entomol. Soc. France, 8 (3): 972. Type locality: Madagascar.

Anisops aldabrana Distant 1913. Trans. Linn. Soc. London, Ser. 2, 16: 138. Type locality: Aldabra, Ile Michel. Syn. by Brooks 1951: 449.

Discussion: This small backswimmer was commonly encountered in freshwater pools on Grande Terre, and several specimens were also taken in a rain pool on Picard. In favorable situations this species often occurs in enormous schools, and individuals are easily observed as they hover just below the water surface.

Known distribution: Madagascar, Reunion, Mauritius, Aldabra.

Material examined: ALDABRA ATOLL, **Grande Terre**: freshwater pool nr. Cinq Cases, water temp. 29° C., 13 March 1989, CL 8029; pool at Wilson's Well, water temp. 29° C., 23 March 1989, CL 8038; large pool at Takamaka Grove, water temp. 32° C., 23 March 1989, CL 8039. **Picard**: temporary rain pool on trail to Bassin Cabri, 20 March 1989.

VELIIDAE

Microvelia diluta diluta Distant
Figs. 3, 8

Microvelia diluta Distant 1909. Ann. Mag. Nat. Hist., ser. 8, vol 3: 500.
Type locality: Bengal, Calcutta.

Discussion: *Microvelia diluta* is a widespread species in the Oriental region, and is also found on Aldabra and the Comores. We have no records of this species from Africa.

At my request a series of specimens from Aldabra was kindly compared by Dr. N. M. Andersen of the Zooligisk Museum, Copenhagen to the type series of *Microvelia diluta nioumbadjoui*, described by Poisson (1958) from Grande Comore. Dr. Andersen in his reply letter states that the Aldabra specimens clearly belong to the *M. diluta* group, but are smaller and less pilose than the Comores subspecies, being more similar instead to specimens of *diluta* from mainland Asia. In addition, it is Dr. Andersen's opinion that *M. diluta* as presently interpreted may in fact be a complex of closely related species. Pending resolution of this problem it seems most expedient for the present to treat the Aldabra and Cosmoledo populations as belonging to the nominate subspecies.

This resourceful species was encountered in nearly every freshwater habitat on the atolls of the Aldabra Group. It frequently colonized the plastic barrels used as rainwater cisterns at the small camps scattered about Aldabra, and was extremely common on the large freshwater pool at Takamaka Grove. At this latter locality it formed aggregations of 50-100 individuals which crowded around food items on the surface. These groups were constantly shifting and moving, with the individuals on the outside margins attempting to force their way toward the center. This same locality was also inhabited by large gyrinid beetles, which were observed pursuing and apparently preying upon the *Microvelia*. At similar pools near Cinq Cases and Wilson's Well *M. diluta* was also present, but in much lower numbers, and did not exhibit the same aggregating behavior as seen at Takamaka Grove.

In addition to these freshwater localities, *M. diluta* was also found in saline habitats, being present in several limestone sinkholes behind the research station on Picard Island. These sinkholes were filled with salt water on a daily basis during the influx of the high tide, at which time the insects were observed running on the water surface. At low tide the sinkholes were devoid of water with only damp rock and sand on the bottom, and by climbing down into several of these cavities it was found that individuals of *M. diluta* simply waited on the moist sinkhole floor for the return of the tidal flow. The water in these sinkholes was clearly saline, as evidenced by the fact that chitons were inhabiting the sides of the chambers, and this tolerance for salt water may explain the wide distribution of *M. diluta* on many isolated islands in the Indian and Pacific oceans. Although several species of Microveliinae are known to inhabit mangroves in West Africa (Linnavouri, 1977), this is apparently the first record of Microveliinae from salt water habitats in the Indian Ocean (for further discussion see Polhemus, 1991).

Miyamoto (1953) provided a life history study for this species accompanied by detailed figures of all life stages.

Known distribution: Numerous authors have noted that this species is widely distributed across the Indo-Pacific region, but no paper that I have seen gives a precise definition of the range. I have examined specimens from Guam, New Guinea, Formosa, the Philippines, India, Ceylon and Aldabra. Additional literature records include Sumatra; this species is not recorded from Africa, Madagascar, or the Mascarenes, although a

subspecies is present on the Comores (see discussion above).

Material examined: ALDABRA ATOLL, Picard: abandoned concrete water reservoir at Aldabra Research Station, 17 March 1989, CL 8019; small tidally flooded limestone sinkhole behind Aldabra Research Station, water temp. 27° C., 10 March 1989, CL 8026; small tidally flooded sinkhole near Bassin Cabri, 17 March 1989; temporary rain pool on trail to Bassin Cabri, 20 March 1989; covered freshwater cistern at Aldabra Research Station, 20 March 1989, CL 8019. Grande Terre: freshwater pool near Cinq Cases, water temp. 29° C., 13 March 1989, CL 8029; pool at Wilson's Well, water temp. 29° C., 23 March 1989, CL 8038; large pool at Takamaka Grove, water temp. 32° C., 23 March 1989, CL 8039. Malabar: water barrel at Camp Gionnet, Anse Coco, 16 March 1989, CL 8035; water barrel at Middle Camp, nr. Passe Houareau, 19 March 1989, CL 8036; small rain pool in limestone near Middle Camp, 19 March 1989, CL 8036.

COSMOLEDO ATOLL, Menai: large partially uncovered freshwater cistern at Johannes Point settlement site, 27 March 1989, CL 8041; rain pools along old road near Johannes Point, 27 March 1989, CL 8041; tidally flooded limestone sinkhole near Johannes Point, 27 March 1989, CL 8041.

GERRIDAE

Limnogonus cereiventris (Signoret) Figs. 4, 10

Gerris cereiventris Signoret 1862. Note Reunion, Ann. J: 30.

Type locality: Madagascar.

Limnogonus cereiventris Bergroth 1893. Rev. d'Ent., 12: 203.

Tenagogonus cereiventris Stal 1866. Hem. Afr., 4: 262.

Gerris (Lamprotrechus) leptocerus Reuter 1883. Ofv. Finsk. Vet.-Soc. Förh., 25: 40. Type locality: Guinea. Reduced to subspecies of *cereiventris* by Poisson 1948: 99.

Gerris aegyptiaca Puton 1890. Rev. d'Ent., 9: 228. Type locality: Egypt. Syn. with *leptocerus* by Horváth 1926: 1.

Limnogonus dolosus Bergroth 1893. Rev. d'Ent., 12: 203. Type locality: Seychelles. Syn. by Kirkaldy 1899: 102.

Limnogonus aegyptiacus Bergroth 1893. Rev. d'Ent., 12: 210.

Tenagogonus bottegoi Carlini 1895. Ann. Mus. Civ. Stor. Nat. Giacomo Doria, 15: 121. Type locality: Somalia. Syn. with *aegypticus* by Kirkaldy 1908: 21.

Limnogonus leptocerus Horvath 1913. J. Proc. Asia. Soc. Bengal, 9: 478.

Limnogonus cereiventris leptocerus Poisson 1948. Mem. Inst. Sci. Mad. (A), 1: 99. Syn. with *cereiventris cereiventris* by Andersen 1975: 65.

Discussion: *L. cereiventris* is a species of African affinities with a wide distribution on the islands of the western Indian Ocean. It is an easily recognizable component of the Aldabran fauna, being the only freshwater gerrid on the island, and during the present survey was seen only at several large freshwater pools on Grande Terre. This species was not encountered on Cosmoledo.

The complicated synonymy of *L. cereiventris* is treated in detail by Andersen (1975), and the synonymy listed above is nomenclatural only. The abdominal structures and details of the genitalia of both sexes were figured by Andersen (1975).

Known distribution: Africa, Madagascar, Comores, Reunion, Mauritius, Rodriguez, Seychelles (Mahe, Silhouette, Praslin, La Digue), Coetivy, Aldabra.

Material examined: ALDABRA ATOLL, Grande Terre: freshwater pool nr. Cinq Cases, water temp. 29° C., 13 March 1989, CL 8029; pool at Wilson's Well, water temp. 29° C., 23 March 1989, CL 8038; large pool at Takamaka Grove, water temp. 32° C., 23 March 1989, CL 8039.

MESOVELIIDAE

Mesovelia vittigera Horváth Figs. 5, 9

Mesovelia vittigera Horváth 1895. Revue d'Ent., 14: 160. Type locality: Egypt.

Mesovelia orientalis Kirkaldy 1901. Ann. Mus. Civ. Genov. (2), 20: 808. Type locality: Sumatra. Syn. by Horváth 1915: 551. Resurrected from synonymy by Horváth 1924: 135 (but interpretation not accepted by subsequent authors, eg., Andersen and Polhemus 1980: 390).

Mesovelia proxima Schouteden 1905. Ann. Soc. Ent. Belg., 69: 388. Type locality: Belgian Congo. Syn. by Horváth 1915: 551.

Discussion: A very widely distributed and adaptable species, found at Aldabra in the large freshwater pools on Grande Terre island. The coloration is usually greenish in life, fading to tan or brown after death. Individuals of this species can move across the water surface with extreme rapidity, and are often difficult to capture.

Known distribution: Widespread throughout the Eastern Hemisphere (for detailed distribution see Horváth, 1915).

Material examined: ALDABRA ATOLL, Grande Terre: freshwater pool nr. Cinq Cases, water temp. 29° C., 13 March 1989, CL 8029; pool at Wilson's Well, water temp. 29° C., 23 March 1989, CL 8038; large pool at Takamaka Grove, water temp. 32° C., 23 March 1989, CL 8039.

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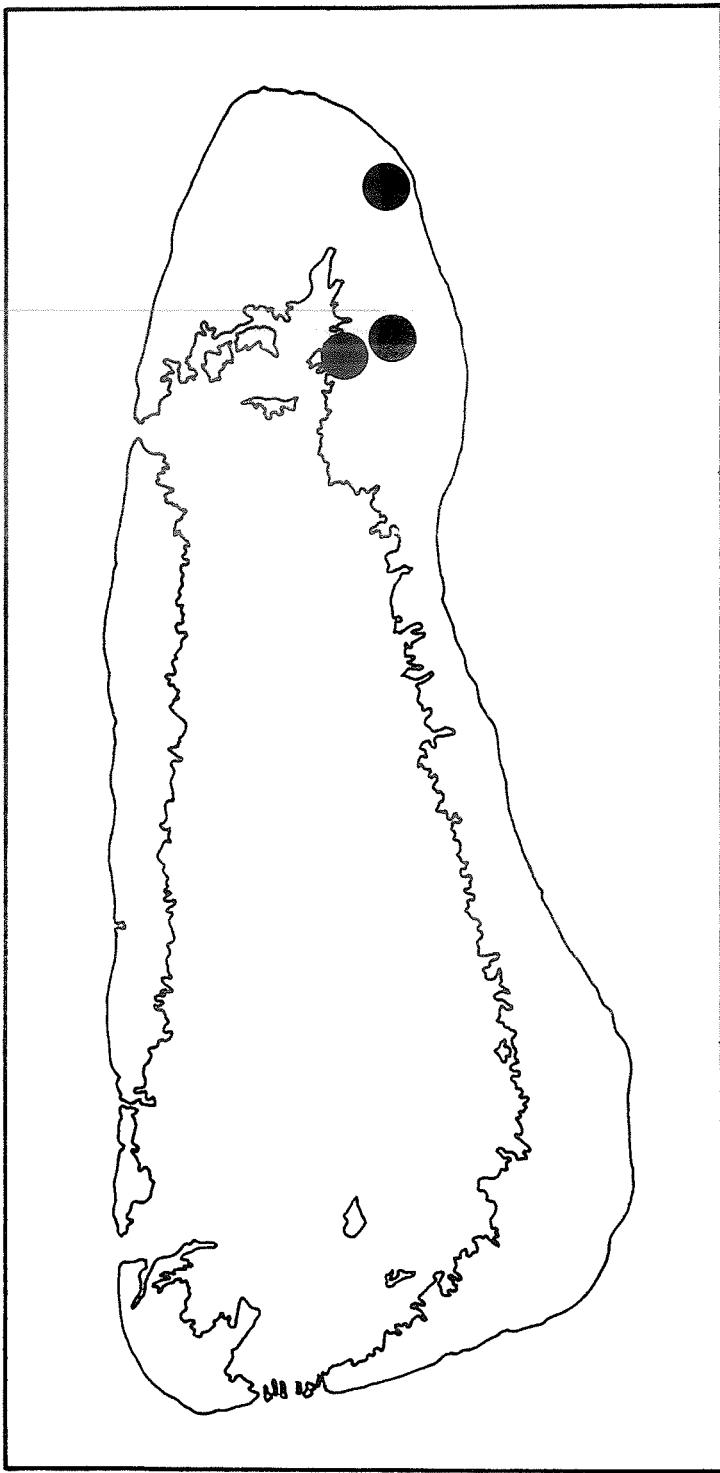


Figure 1. Distribution of *Micronecta praeternissa* on Aldabra Atoll.

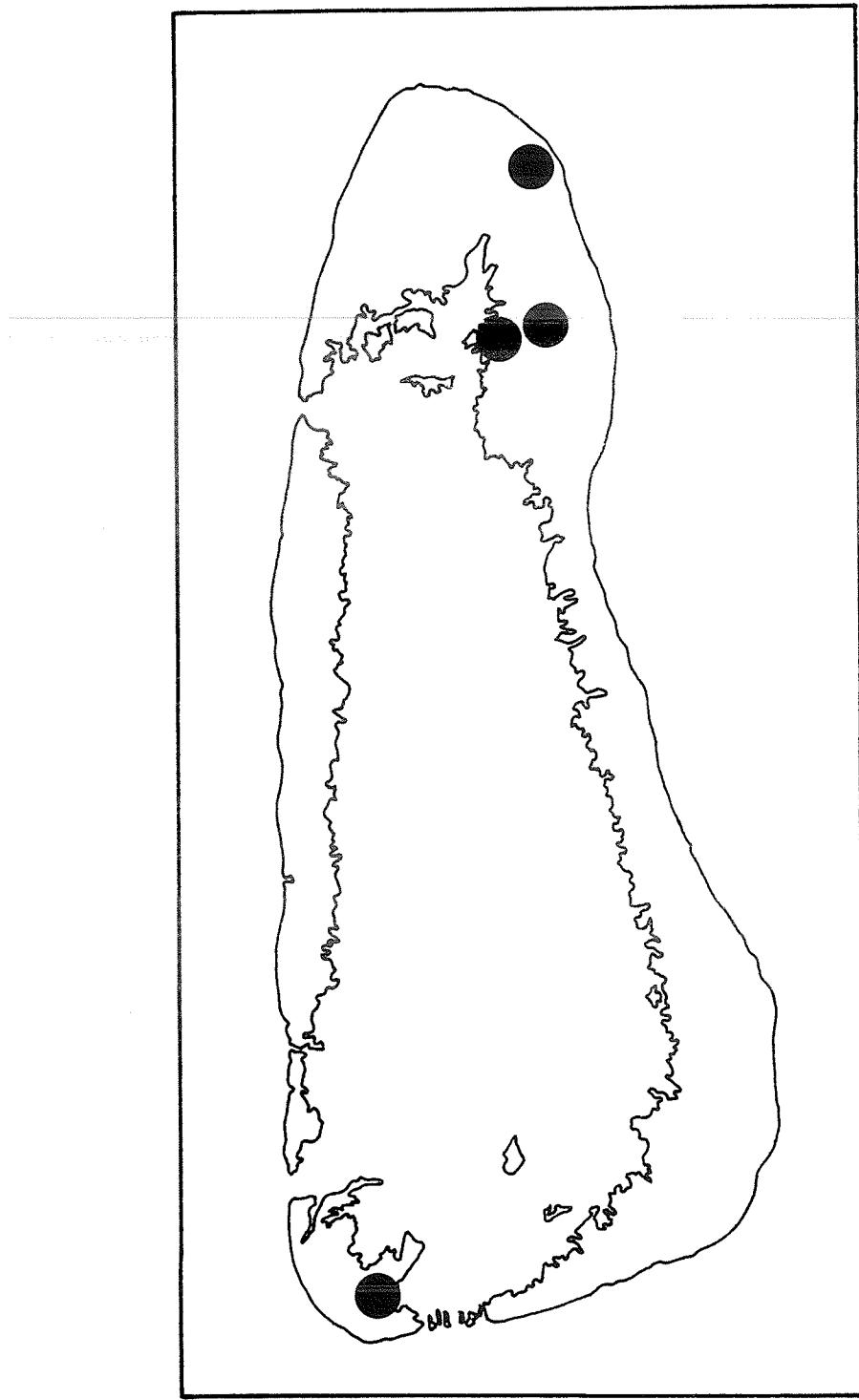


Figure 2. Distribution of *Anisops vitrea* on Aldabra Atoll.

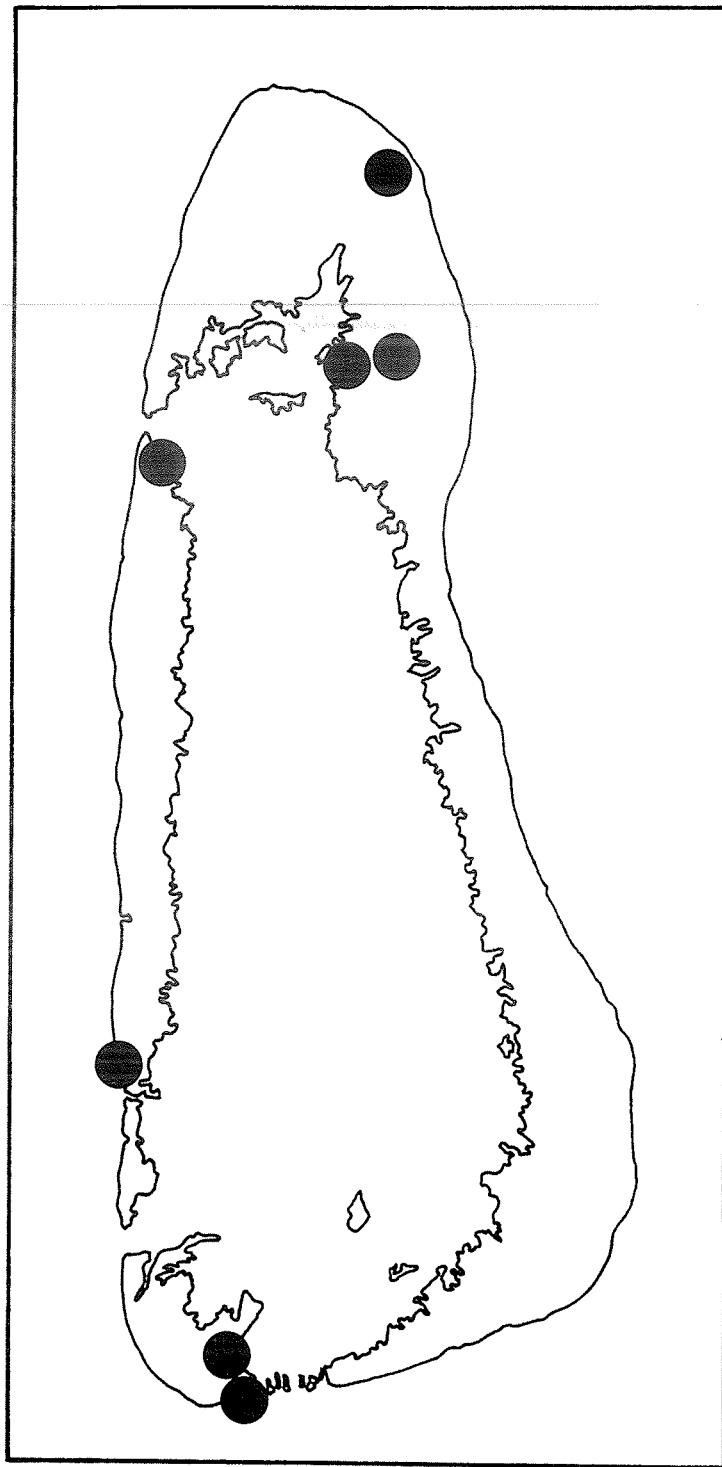


Figure 3. Distribution of *Microvelia diluta diluta* on Aldabra Atoll.

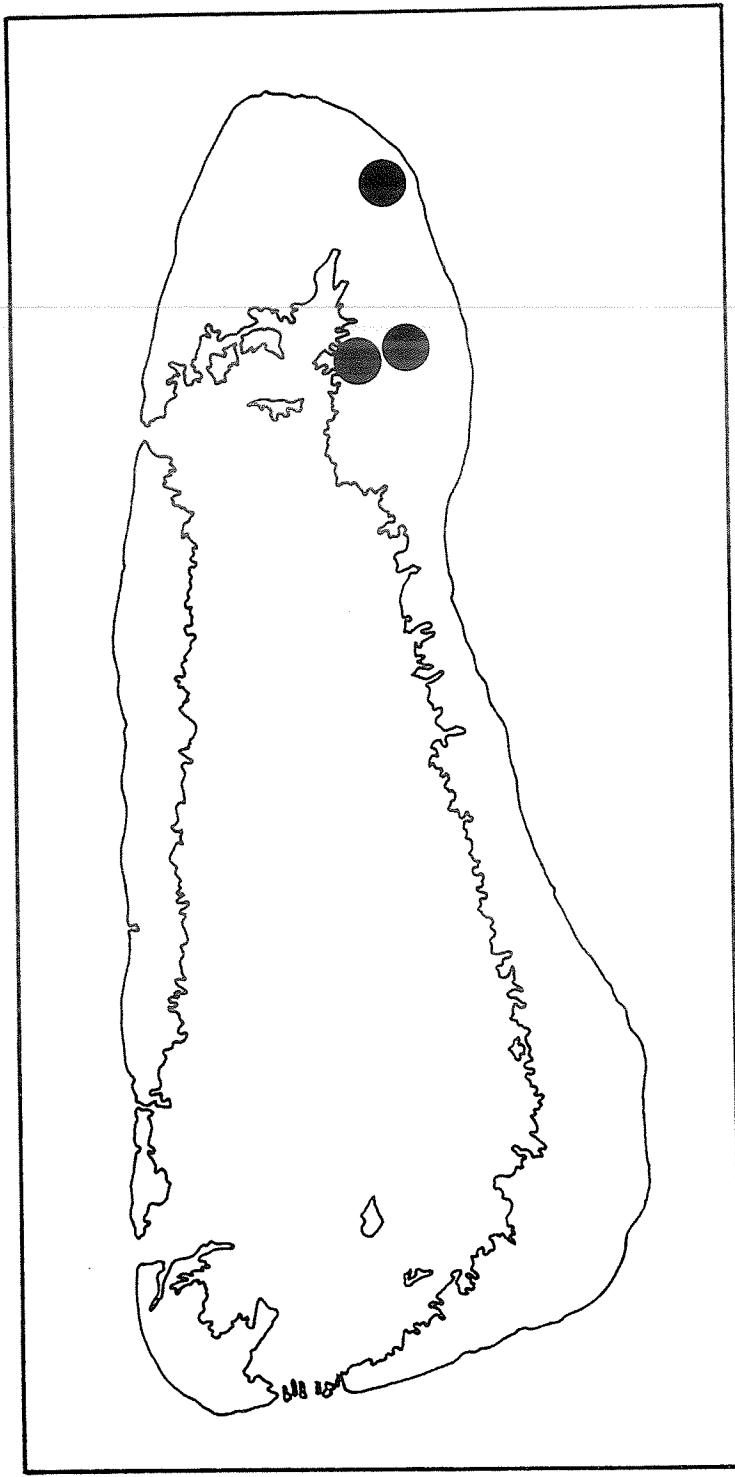


Figure 4. Distribution of *Limnogonus cereiventris* on Aldabra Atoll.

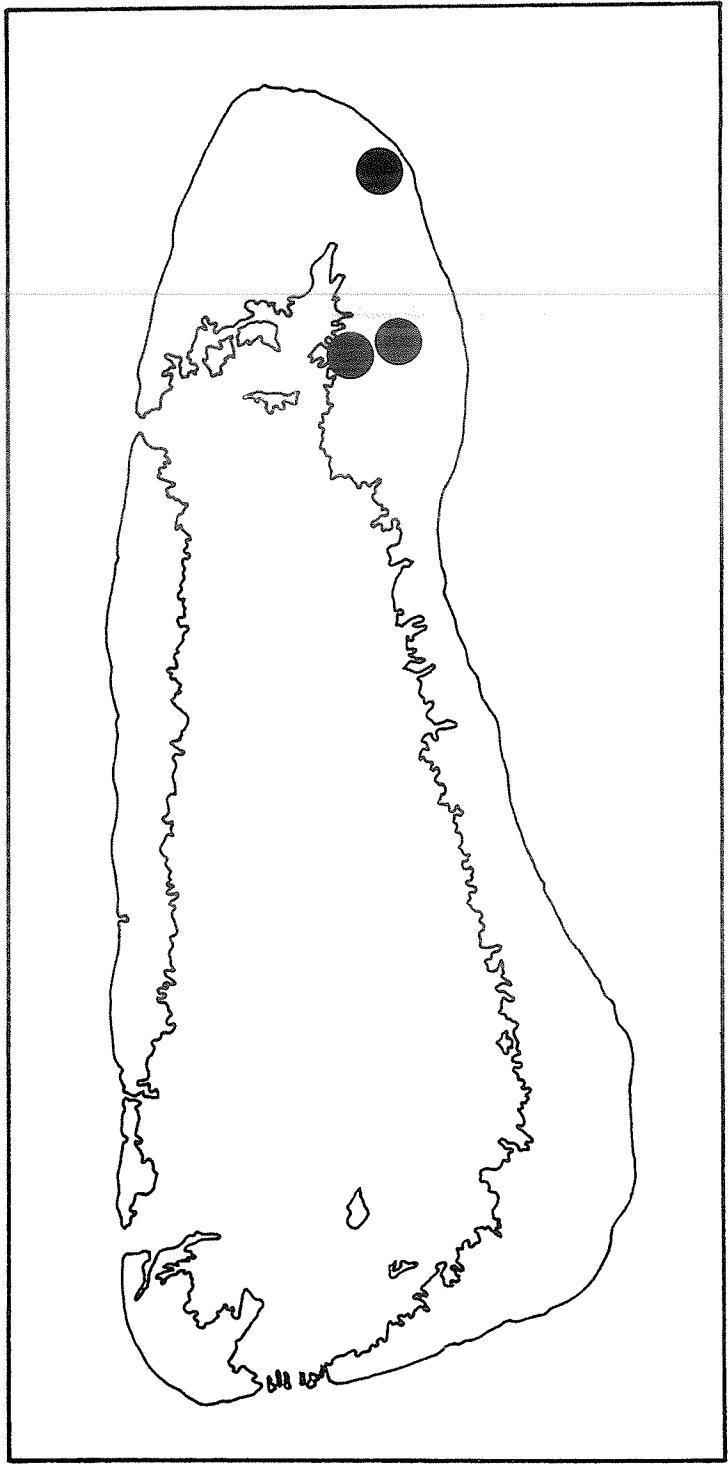


Figure 5. Distribution of *Mesovelia vittigera* on Aldabra Atoll.

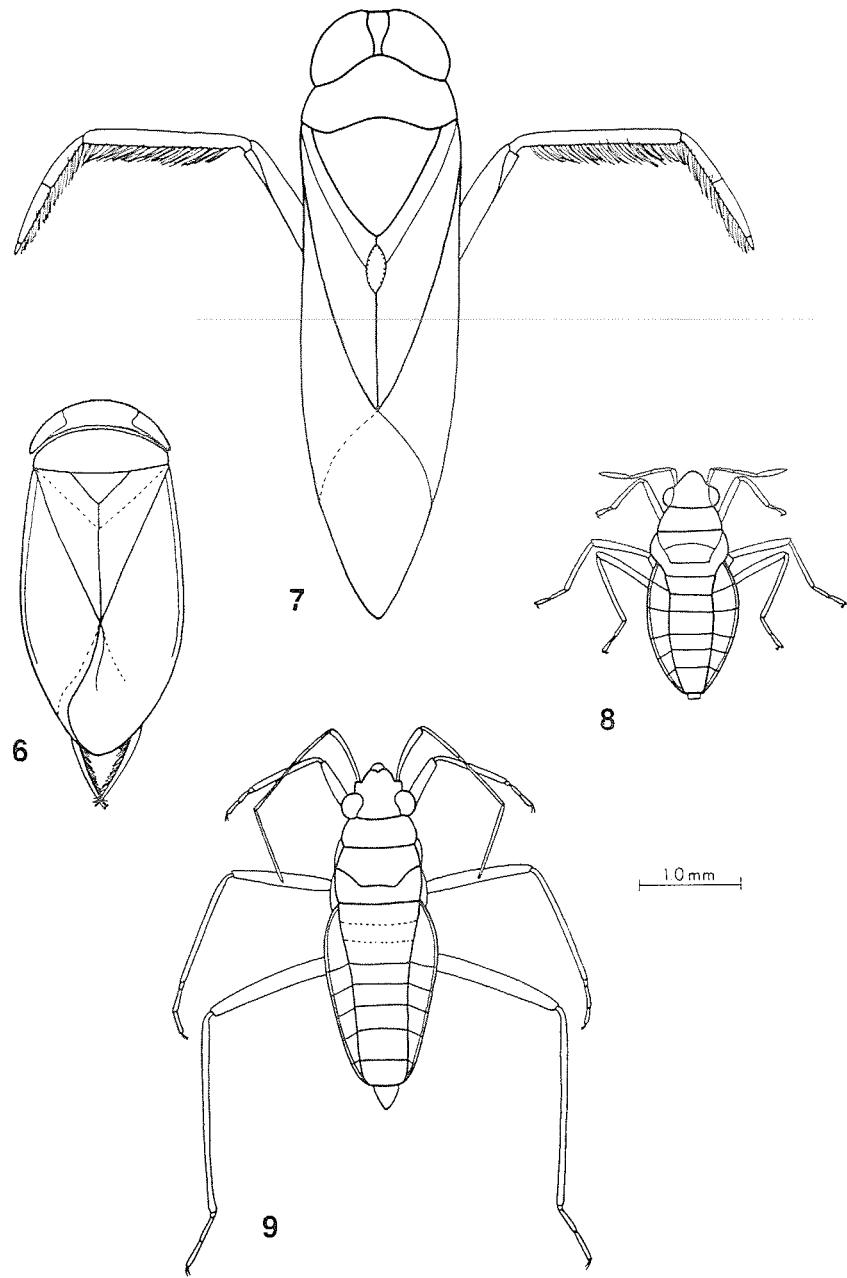


Figure 6: *Micronecta praetermissa* Poisson, dorsal habitus

Figure 7: *Anisops vitrea* Signoret, dorsal habitus

Figure 8: *Microvelia diluta diluta* Distant, dorsal habitus

Figure 9: *Mesovelia vittigera* Horváth, dorsal habitus

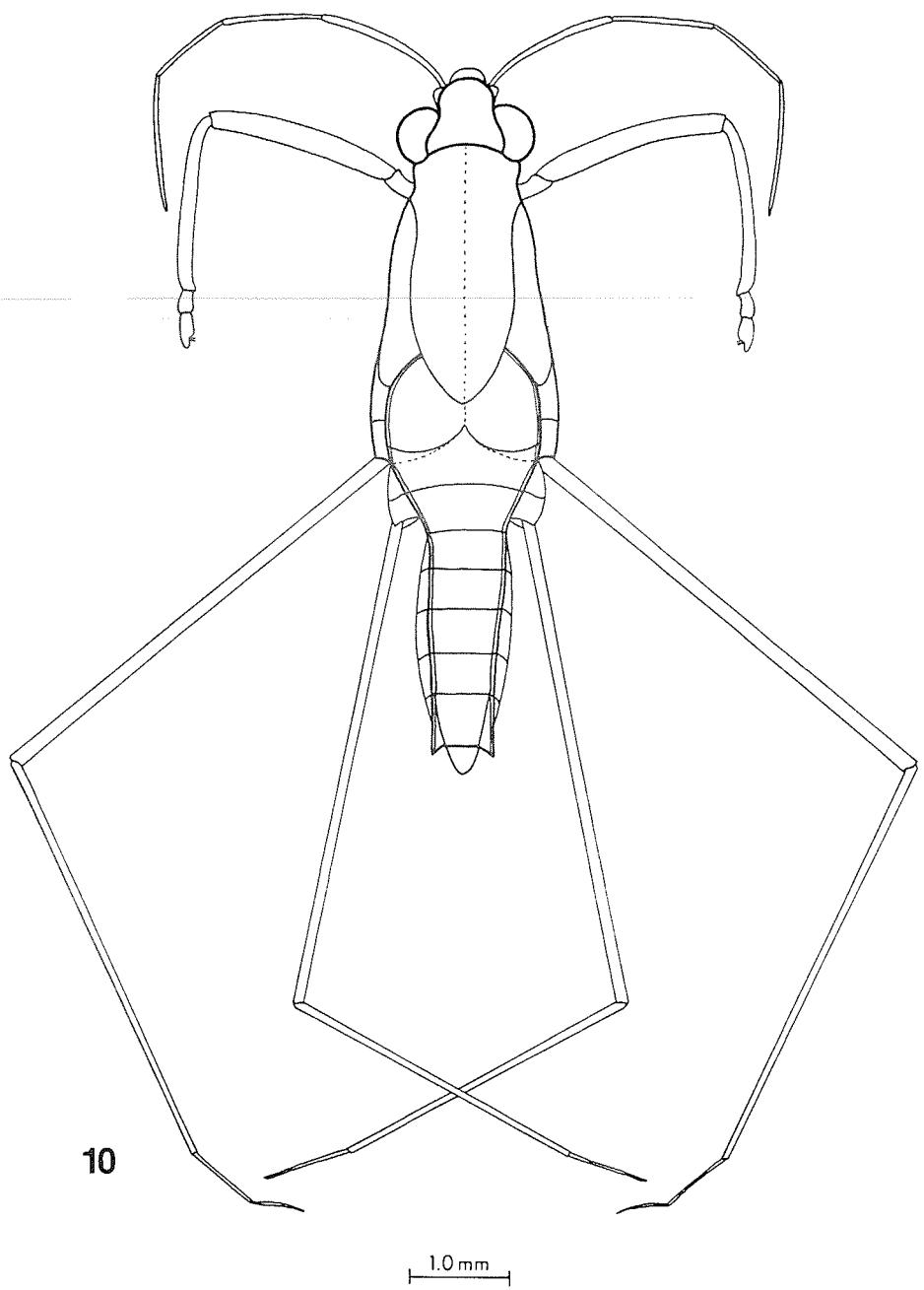


Figure 10: *Limnogonus cereiventris* (Signoret), dorsal habitus