CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER

Zooplankton
Sheet 147

INSECTA
HEMIPTERA: HETEROPTERA
Gerridae
Genus *Halobates*

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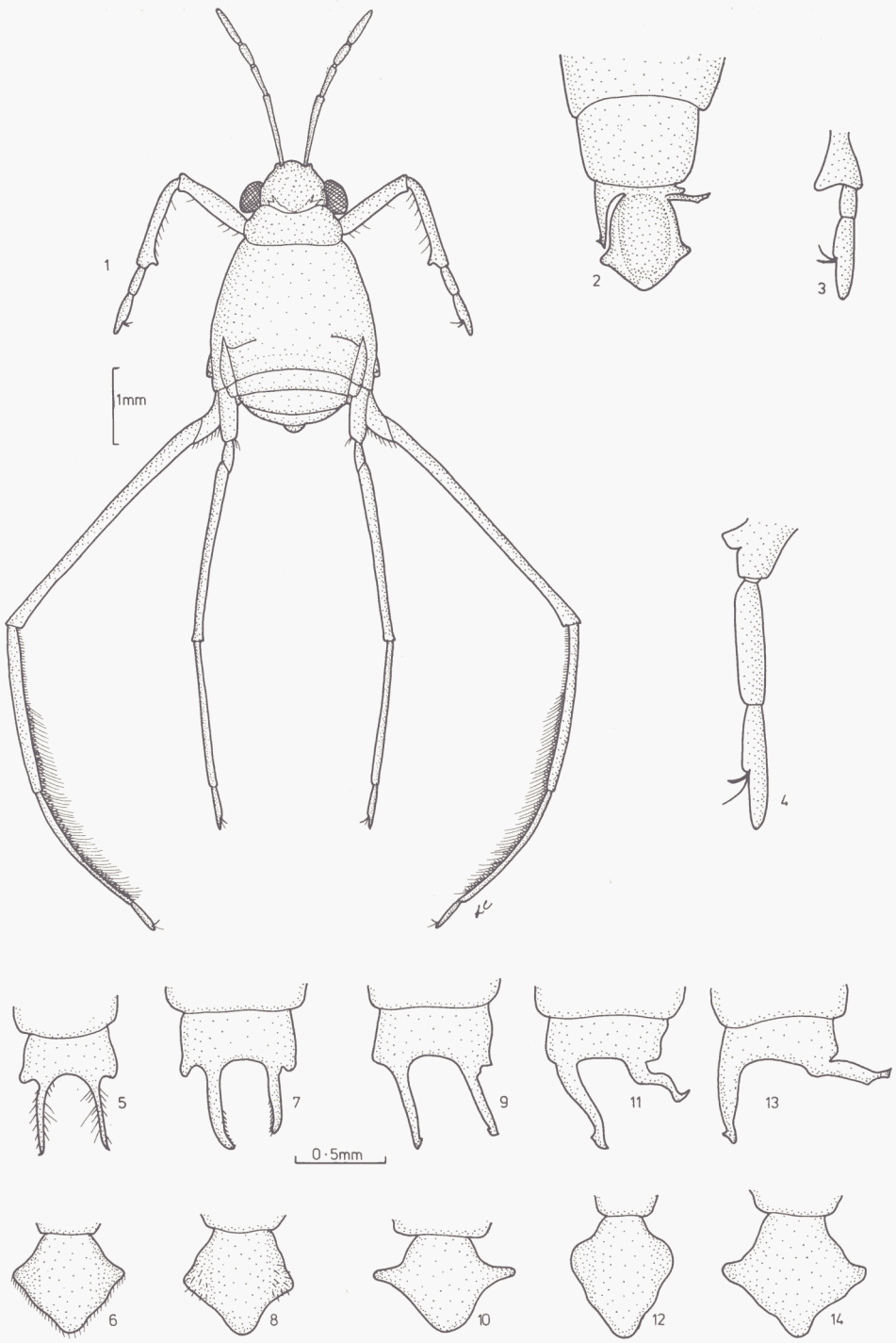

Figure 1–14. 1. *H. micans* female, dorsal view, showing basic structures; 2. *H. micans* male, ventral view, showing modifications of genital segments; 3. *H. sericeus* female front tarsal segments; 4. *H. splendens* male showing front tarsal segments; 5–6. *H. sericeus* male showing styliform processes and shape of 9th tergum; 7–8. *H. germanus* male, as above; 9–10. *H. sobrinus* male, as above; 11–12. *H. splendens* male, as above; 23–14. *H.micans* male, as above.

CLASS *INSECTA*, ORDER *HETEROPTERA*, FAMILY *GERRIDAE*

Introduction

The insecta, which are so successful on land and in freshwater habitats, have only a few representatives in the open ocean, namely members of the genus *Halobates*, in the family Gerridae. The gerrids, commonly known as pond-skaters or water-striders, are very common and familiar insects on freshwater lakes, ponds, streams and even temporary pools. The best known freshwater genus is *Gerris*. Several related genera, found in the brackish waters of mangrove swamps, lagoons and other near-shore marine environments, include *Rheumatobates*, *Asclepios* and the majority of *Halobates* species.

The genus *Halobates*, with 40 described species, is exclusively marine, but only five of these are commonly found in the open ocean: *H. micans* Eschscholtz, *H. sericeus* Eschscholtz, *H. germanus* White, *H. sobrinus* White and *H. splendens* Witlaczil. A detailed taxonomic review of this genus, with a key to the 38 species described prior to 1961, was published by HERRING (1961). More recently, information on the the biology, ecology and distribution of the oceanic species has been summarized by CHENG (1973a, 1973b, 1974), who also reported on some studies on net avoidance in relation to sampling of the marine pleuston (CHENG 1973c, CHENG and ENRIGHT 1973). A comparative study of their lipids and those of their brackish and freshwater relatives was reported by LEE and CHENG (1974).

Biology and distribution

The basic structure of an adult *Halobates* is illustrated in Figure 1. Unlike some of its freshwater relatives, the marine gerrid has no wings at any phase in its life. It has a pair of anteriorly directed antennae, and three pairs of legs. The front legs are rather stout and are mainly used for grasping prey and holding it during feeding. The middle legs are the longest, and bear a fringe of long hairs on the tibia and first tarsus. This pair evidently provides the main propelling force in skating, while the hind legs aid in steering. All three pairs of legs may also be used in cleaning the other appendages and the body surface of the insect. The eyes are very well developed. The thorax and abdomen are very much shorter than are those of the freshwater *Gerris*. The body surface is covered by very fine, water repellent hairs which trap and retain a layer of air (CHENG 1973d). This thin layer of air, which gives the insect a characteristic "silvery" look in its natural environment, also enables it to float, or to respire while submerged.

The distribution of all the pelagic *Halobates* is basically tropical. Only one species, *H. micans*, is found in the Atlantic, Pacific and Indian Oceans. This is the only species known from the Atlantic. *H. germanus* is found in both the Indian and Pacific Oceans, while the three remaining common pelagic *Halobates*, *H. sericeus*, *H. sobrinus* and *H. splendens*, are known only from the Pacific. Maps in CHENG (1973a) illustrate the known distributions of all five species, as compiled from records in the literature and from original unpublished data and field collections made during various expeditions of the Scripps Institution of Oceanography.

The entire life history of these insects takes place on the surface of the ocean. Analysis of admittedly limited data from the Atlantic Ocean did not indicate any definite breeding season (CHENG 1973b). The eggs, about 1 mm in length, are laid on floating objects: seabird feathers, seeds, wood, lumps of tar, pieces of plastic, seaweed etc. (see CHENG 1973b). They are orange in colour when alive, though they go white when preserved with formalin. They may take up to one month to hatch. The first instar nymphs are very similar to the adults in morphology, though smaller in size, and are pale brown (rather than dark grey) in colour. They go through five moults before reaching the adult stage. We have no idea how long a generation normally takes; probably a minimum of two months (CHENG 1973a). The sexes are not distinguishable externally until the last nymphal stage, in which the eighth abdominal ventrite is divided in the female but entire in the male (CHENG 1973a).

The adult females of all *Halobates* species are very similar in appearance (Fig. 1) and are difficult to distinguish morphologically except by comparing the ratios of the lengths of various segments of their appendages. The males, however, have modified genital segments (Fig. 2) which are visibly and specifically distinct from one another. Table 1 gives the size and length ratios of key characters of representative adult specimens of each species. An original key for the identification of adults of the five common pelagic species is given below.

KEY TO THE FIVE PELAGIC SPECIES OF *HALOBATES*

1. 4th antennal segment twice as long as 2nd; 2nd front tarsus more than twice as long as 1st (Fig. 3). Male styliform process more or less symmetrical (Fig. 5): 9th tergum without pronounced lateral process (Fig. 6) ..... *sericeus*
   4th antennal segment up to 1.5 times the length of 2nd; 2nd front tarsus equal to or no more than twice the length of 1st (Fig. 4) 2
2. Hind tibia about 2/3 the length of mid tibia 3
   Hind tibia almost as long as or longer than mid tibia 4
3. 2nd front tarsus more than 1.5 times the length of 1st; hind femur less than twice the length of hind tibia. Male styliform processes unequal in length (Fig. 7); posterior lateral corner of the 9th tergum with a group of stiff bristles (Fig. 8) ..... *germanus*
   2nd front tarsus less than 1.5 times the length of 1st; hind femur about twice the length of hind tibia. Male styliform processes asymmetrical, with left process curved outwards (Fig. 9); 9th tergum with pronounced lateral processes, without bristles (Fig. 10) .... *sobrinus*
4. 2nd front tarsus equal to or shorter than 1st; 1st mid tarsus about 6 times as long as 2nd. Male styliform processes asymmetrical, left process curved outwards (Fig. 11); 9th tergum without lateral processes (Fig. 12) ..... *splendens*
   2nd front tarsus about 1.5 times the length of 1st; 1st mid tarsus only about 4 times as long as 2nd. Male styliform processes asymmetrical, left process bent almost at right angles outwards (Fig. 13); 9th tergum with lateral processes (Fig. 14) ..... *micans*

Tabel 1. Size of adult *Halobates* and length ratios of key characters.

Species	Sex	Size (mm)		Antenna[1]				Front Tarsus	Tibia	Mid Tarsus	Hind Leg
		Length[2]	Width[3]	I :	II :	III :	IV	t_2:t_1	Hind:Middle	t_1:t_2	Femur:Tibia
sericeus	♂	3.4	1.5	2.85	1.00	0.85	2.07	2.33	0.87	6.33	1.85
	♀	3.3	1.7	2.88	1.00	0.94	2.11	2.58	0.78	8.00	1.82
micans	♂	4.5	2.1	3.10	1.00	0.71	1.42	1.59	0.96	4.00	1.21
	♀	3.6	2.3	2.88	1.00	0.68	1.60	1.60	0.95	4.00	1.29
germanus	♂	4.0	1.8	2.81	1.00	0.62	1.29	1.87	0.67	3.57	1.96
	♀	3.4	1.9	2.70	1.00	0.70	1.41	1.60	0.68	4.16	1.85
splendens	♂	4.9	2.3	2.93	1.00	0.71	1.43	0.95	0.98	6.71	1.21
	♀	4.3	2.4	2.92	1.00	0.67	1.57	1.00	0.95	6.00	1.13
sobrinus	♂	4.3	2.0	2.80	1.00	0.80	1.50	1.30	0.69	3.44	2.02
	♀	3.9	2.4	2.48	1.00	0.72	1.37	1.38	0.66	3.44	1.96

[1] Small section between segments not included in measurements.

[2] Measured from tip of head to tip of abdomen.

[3] Measured at widest part of metathorax.

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