

# OCEAN-STRIDERS FROM MELANESIA

(HEMIPTERA : GERRIDAE, HALOBATES SPP.)

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## RÉSUMÉ

*L'auteur donne une liste des stations, avec une carte des localités, où ont été recueillis des Halobates, au cours des croisières « Bora », « Saint Vincent » et « Cyclone ». Les spécimens sont identifiés autant que possible du point de vue de l'espèce, du stade et du sexe. L'auteur examine brièvement la distribution et la biologie de chacune des espèces mentionnées.*

## ABSTRACT

*The Halobates samples collected during the cruises « Bora », « Saint Vincent » and « Cyclone » were identified to species, sex and developmental stage. A list of stations from which each species was collected is presented, together with a map of their localities. A brief discussion on the distribution and biology of each species is appended.*

## INTRODUCTION

A series of oceanographic cruises in the Pacific Ocean between longitudes 160° E and 180° E, latitudes 10° N and 25° S, were organized by Office de la Recherche Scientifique et Technique Outre-Mer at Noumea, New Caledonia, during the period from November 1965 to September 1967. The objectives included studies of the fauna, the influence of equatorial currents on the seasonal variation of zooplankton and micronekton from 0 to 1,200 meters, and the seasonal and geographical variations in hydrological features and in primary and secondary production. During these cruises a number of *Halobates* specimens were collected, which were sent to me for study. They were identified to species, sex and instar; their distribution was plotted in relation to location and date of sample. These data are summarized here, along with a short discussion on the biology of these unusual marine insects.

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### MATERIAL AND METHOD

The material used in this study were collected on board R/V CORIOLIS during the cruises BORA, CYCLONE, and SAINT VINCENT.

There were four «Bora» cruises, each of about 1-month duration, initiated at 3-month intervals. Date and duration given below:

- «Bora I» : Nov 26 to Dec 22 1965
- «Bora II» : Mar 3 to Apr 5 1966
- «Bora III» : Jun 9 to July 15 1966
- «Bora IV» : Sept 19 to Oct 17 1966.

*Halobates* was collected only during «Bora IV», since this was the only cruise during which neuston tows were made to collect surface organisms. Only mid-water tows were conducted on the other three cruises.

Cruise «Saint Vincent» was a 2-day cruise to test some equipment and methodology off the main reef of New Caledonia. It provided three *Halobates* samples.

The six «Cyclone» cruises were planned to survey a rather restricted area along the 170° E parallel, between 0° and 6° S. The dates and durations of these cruises are given below:

- «Cyclone I» : Nov 14-Dec 7 1966
- «Cyclone II» : Mar 14-Apr 6 1967
- «Cyclone III» : May 3-May 6 1967
- «Cyclone IV» : June 13-June 14 1967
- «Cyclone V» : July 19-July 22 1967
- «Cyclone VI» : Sept 2-Sept 4 1967

*Halobates* specimens were collected on four of these six cruises: I, IV, V, and VI, mostly in neuston tows. However, two samples on cruise IV and one sample on cruise V were collected by the mid-water trawl (IKMT 10), probably as it broke the surface.

Figure 1 shows the localities where *Halobates* species have been collected during the above mentioned cruises.

The specimens of *Halobates* were identified to species and separated to sex (adults and fifth instar nymphs) and to developmental stages.

### RESULTS

In all, 17 samples of *Halobates* were collected during the «Bora» cruises, all from «Bora IV»; 44 samples were collected during the «Cyclone» cruises; and 3 samples were collected during the «Saint Vincent» cruise.

Three *Halobates* species are represented in these collections: *H. micans*, *H. sericeus*, and *H. germanus*. These have all been reported from the Pacific Ocean by previous investigators (Herring, 1961; Savilov, 1967). —A list of new records of these species, with the station numbers in the present series, is given below.

*Halobates sericeus*: — Bora IV: 1 A.  
 Saint Vincent: 29.  
 Cyclone I: 2, 4, 9.

*Halobates germanus*: — Bora IV: 3 A, 11 A, 2 B, 3 B, 5 B, 4 B.  
 Saint Vincent: 3, 25.  
 Cyclone I: 14, 15.  
 Cyclone IV: 22.

*Halobates micans*: — Bora IV: 8 A, 9 A, 10 A, 6 B, 7 B, 8 B, 25.  
 Cyclone I: 18, 13, 15, 18, 19, 20, 21, 23, 24, 25, 29, 30, 39.  
 Cyclone IV: 1, 8, 9, 15, 16, 17, 18.  
 Cyclone V: 3.  
 Cyclone VI: 3, 5, 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18.

The number of specimens in each sample varied from one to 31. They consisted of adults, nymphs of various stages, and several cast skins. The adult males of the three species are easily distinguishable by the structure of their external genitalia (HERRING, 1961); the females are more difficult to separate since the external genitalia are evidently not specifically modified. The nymphs are extremely difficult to separate into species, not only because they differ from the adults in their colour pattern but also because they lack all the specific characters found in the adults. In this study, it was assumed that nymphs collected with adults of a single species belonged to the same species. The body length and width and the various leg segments were measured for each instar. It was found that whereas the body length measurements were variable between specimens of the same instar, leg measurements, especially those of the femora of the middle leg, were rather constant. The mid-femoral length was therefore chosen for the separation of different instars of the same species. Furthermore, it was found that for each instar the mid-femoral lengths differed from species to species. It was thus possible to separate nymphs of different species by measuring their mid-femur segments and comparing these with recorded lengths of known species. Sexes are not separable in the nymphs until they reach the fifth instar. At this stage the sexes can be distinguished by the form of the 7th abdominal ventrite, which is divided in the female, but undivided in the male.

TABLE I

Numbers of different stages of *Halobates* species, listed by month of collection

Species	Month	No. of Collections	Stages of Development						
			I	II	III	IV	V	♂	♀
<i>H. sericeus</i>	Sept. 66	1	0	0	1	2	0	0	4
	Nov. 66	4	0	0	0	10	9	7	16
<i>H. germanus</i>	Sept. 66	6	0	0	1	5	11	2	3
	Nov. 66	4	0	0	1	2	8	8	5
	June 67	1	0	0	0	0	1	0	0
<i>H. micans</i>	Sept. 66	9	0	1	7	3	7	12	21
	Oct. 66	1	0	0	0	1	0	0	0
	Nov. 66	12	5	7	2	7	4	10	15
	Dec. 66	1	0	0	1	3	0	0	0
	June 67	7	0	2	8	3	9	5	5
	July 67	1	0	0	0	0	0	1	1
	Sept. 67	18	0	1	4	13	13	18	33

The data for insects of each instar and of each species are summarized in Table I and discussed separately below:—

*H. sericeus* was collected only during September and November 1966 from five stations. Adults and nymphs (3rd-5th instars) were found in both.

*H. germanus* was collected from 11 stations, during September and November 1966, and June 1967. All stages from 3rd instar to adult were found in September and November but in the June collection I found only one specimen, a 5th instar nymph.

*H. micans* the commonest of the three species, was collected from 49 stations from September to December 1966, and in June, July and September 1967. A total of 222 specimens were collected including nymphs of all stages. Although 1st instar nymphs were found only in November, they may occur all the year around, as do the later instars (see Table I).

## DISCUSSION

As shown in fig. 1, the samples studied in this paper all came from a rather restricted area along 170° E between 0° and 20° S. *H. sericeus* was collected only from south of 15° S and *H. germanus* mostly from south of 10° S, whereas *H. micans* seems to occur mainly between the equator and 10° S. These zones are all within the ranges for these three species as presented by Savilov (1967), who indicated that *H. micans* occurs in warmer tropical waters than the other two species.

Specimens of *Halobates* have been observed to feed on all sorts of floating organisms such as *Physalia*, *Porpita* and *Vellela* (HERRING, 1961; SAVILOV, 1968; etc.). Whether there are any differences in diet among the various species or from instar to instar we do not know. Herring (1961) found that captive specimens of the oceanic species of *Halobates* fed readily on pieces of sea anemone but took no interest in land insects, which probably constitute the main food of coastal *Halobates* species.

The life histories of oceanic *Halobates* have not yet been studied, since no one has been successful in rearing any species under laboratory conditions. In *Metrocoris tenuicornis*, a related freshwater gerrid, the duration of each of the five nymphal stages was 5-10 days and the total period required for the development from the egg to the adult stage was about 60 days (CHENG, 1966). HERRING (1961) found that 56 days were required for the coastal species *H. hawaiiensis*. Undoubtedly this period is variable and depends on environmental factors such as temperature and food. The corresponding generation times of the oceanic species of *Halobates* are not known. We do not even know whether there is one or more than one generation per year. Some gerrid species in temperate countries have only one or two, but tropical species, which are able to reproduce all the year round, may have five or six generations a year (CHENG, 1966). From the data on *H. micans* in this study, it appears that nymphs are found at all times of the year, although in September there was a much higher percentage of adults (over 60 %) than in June (31 %). However, the number of samples collected during each month was not large enough for any firm conclusions to be drawn.

It is also interesting to note that, in *H. micans*, the sex ratio departed considerably from equality. Of this species 75 females but only 46 males were collected, giving a sex ratio of 1.6:1. A similar sex ratio (100 ♀:67 ♂) was reported by Miyamoto and Senta (1960) for *H. micans* in Japanese waters. This higher proportion of females in the population may be due to their prolonged longevity, permitting them to lay their full complement of eggs. Since normally eggs are laid only on floating objects, and females may not encounter suitable substrates for egg laying until some days after egg maturation and mating, a prolonged adult female life would be important for the success of this species.

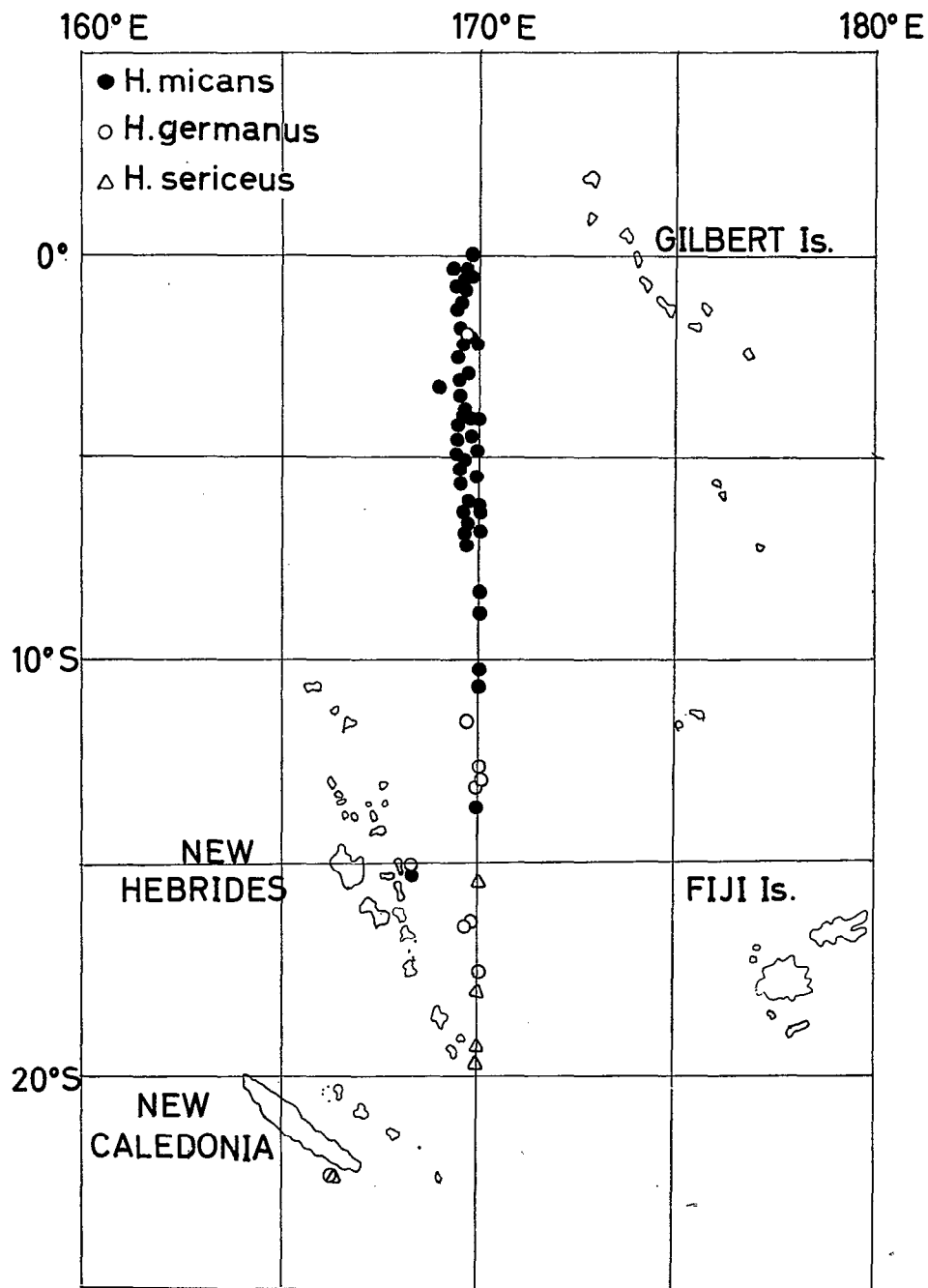


Fig. 1. — Distribution of *Halobates* species (*H. micans*, *H. germanus*, *H. sericeus*) along 170°E, collected during the cruises «Bora», «Saint-Vincent» and «Cyclone», organised by O.R.S.T.O.M., centre de Nouméa, New Caledonia.

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