

# **HALOBATES (HETEROPTERA : GERRIDAE) FROM THE SEAS AROUND NOSY BE, MAGALASY**

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## RÉSUMÉ

*Trois espèces sont signalées : H. flaviventris, récoltée à la lumière au-dessus du plateau continental et du talus ; H. micans, capturée sur le plateau continental autour de Nosy Bé, et dans l'Océan Indien entre le nord de Madagascar et l'équateur ; H. germanus, capturée au large de Nosy Bé, généralement non loin du talus. Presque toutes les captures ont lieu en saison sèche (mai-novembre). L'auteur distingue les stades de développement et les sexes.*

## ABSTRACT

*Three species are noticed : H. flaviventris, collected in light-samples at night on the continental shelf and slope ; H. micans, collected on the shelf around Nosy Be, and in the Indian Ocean between north-Madagascar and equator ; H. germanus, collected off Nosy Be, generally not far from the continental slope. Almost all are sampled in the wet season (mai to november). Developmental stages and sex are identified.*

## INTRODUCTION.

The planktonic populations of the western Indian Ocean, particularly those of the Mozambique Channel, are almost completely unknown. Since one of the research stations of the Office de la Recherche Scientifique et Technique Outre-Mer of the Republic of France is located at Nosy Be, workers there are in a very convenient position to undertake studies on the plankton populations of that region. The first of their expeditions took place in 1959, and since then several other studies have been carried out. This paper deals with specimens of the oceanic insect *Halobates* collected in 27 of the

plankton tows taken at various times between 1963 and 1972.

## MATERIAL AND METHODS.

About one-half of the samples were collected in the Nosy Be area and the other half from the Indian Ocean at the northern end of Madagascar Island. The year, station numbers, locations, dates, and times of these collections are given in Table 1. Apart from three of the 1966 samples, which were caught by dip-netting animals attracted to lights at night, all of the specimens were collected in plankton tows. The various types of gear used in the different tows are indicated by the third alphabet

TABLE I  
Number and species of *Halobates* recorded for each station  
(g = *germanus*, m = *micans*, f = *flaviventris*)

Year	Station No.	Location		Depth (m)	Date	Hour	Species	Number of specimens
		Longitude °S	Latitude °E					
1963	NBV 88	12°56'	47°50'	1940	22 Aug	0705	g	3
	NBV 98	12°56'	48°10'	800	26 Sep	0200	g	7
1965	NBH 463	13°34'	47°44'	1400	19 Jul	2330	m	6
	NBH 465	13°27.5'	48°07'	48	20 Jul	0320	m	6
1966	NBP 57	13°16'	47°25'	2800	3 Nov	0400	g	2
	Light	Continental shelf		—	— Aug	—	f	9
	Light	Nosy Mitsio		—	11 May	—	f	2
	Light	Nosy Iranja		—	16 Sep	—	f	7
1967	NBL 1	13°27'	48°07'	48	13 Apr	1300	g	42
1968	NBP 60	13°33'	47°48'	300	7 Aug	0445	g&m	5
	NBP 61	14°05'	47°26'	1400	7 Aug	2130	g	2
	NBP 64	13°54'	47°27'	2100	8 Aug	0900	g	1
	NBP 71	12°54'	48°09'	500	2 Oct	0000	g	1
	NBP 76	13°18'	47°59.5'	700	3 Oct	1800	g	1
	NBC 594	13°17'	48°44'	16	13 May	1355	m	1
	NBC 659	13°19.5'	48°43.5'	7	28 May	1810	m	2
1969	NBC 783	13°16'	48°37'	14	16 Jul	0950	m	2
	NBT 141	09°43'	50°49'	1600	28 Nov	0235	m	1
	1971	NBT 173	08°09'	50°38'	4000	7 Apr	1900	m
1972	NBT 175	07°14'	51°04.5'	4500	8 Apr	0450	m	1
	NBT 176	05°43'	51°40'	4750	8 Apr	2100	m	4
	NBT 177	05°23'	51°48'	4700	9 Apr	0410	m	2
	NBT 178	04°12'	52°17'	4400	9 Apr	1840	m	2
	NBT 182	07°17'	54°20'	3900	13 Apr	1935	m	4
	NBT 183	07°43'	54°10'	4000	14 Apr	0030	m	1
	NBT 187	12°01'	52°28'	4200	15 Apr	2330	m	2
	NBT 188	12°50'	51°07.5'	4100	16 Apr	1930	m	1

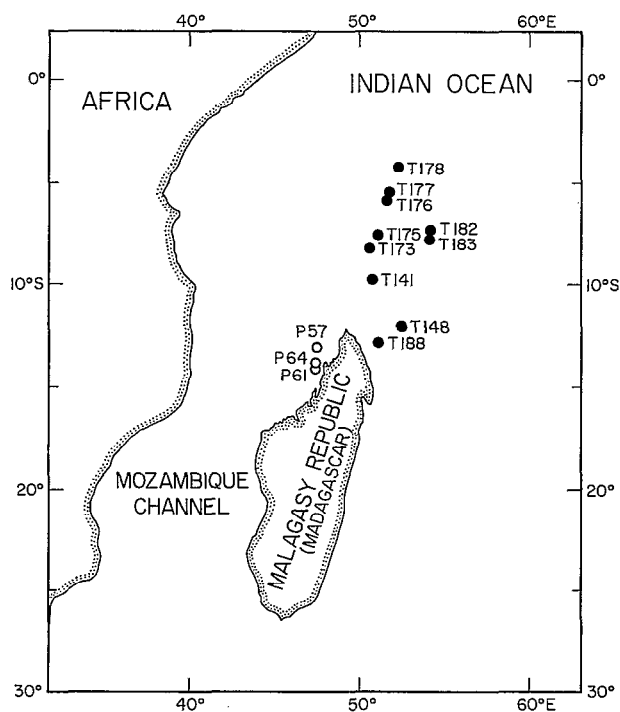


Fig. 1. — Collecting stations in the Indian Ocean and the northern end of Madagascar Island. (● = *H. micans*, ○ = *H. germanus*).

letter of the code preceding the station number (1). Descriptions and details on the operation of these nets — vertical — closing «Discovery» type (V), horizontal non-closing «Tregouboff» type (H), and horizontal non-closing «Larval Fish» type (P) — have been published by FRONTIER (1966), the «Clark-Bumpus» type net (C) was described by PETIT and BOUR (1971), and the «Larval Tuna net» (T) is a standard one-meter-diameter net with 500  $\mu$  mesh used by FAO and CALCOFI expeditions.

## RESULTS OF ANALYSIS.

All the specimens collected at light belong to *Halobates flaviventris* Eschscholtz, an inshore species of the genus. Adults are rather large, dark grey insects, more than 4 mm in body length, distinguished from adult *Halobates* of the oceanic species by their relatively large eyes and by a characteristic pale yellow band on the ventral surface of the body

(1) It should be noted that none of the tows were made specifically for collecting pelagic organisms, and since *Halobates* only occur on the sea surface, they must have been caught when the net surfaced, hence the numbers of individuals caught (except NBL 1) were very low.

(HERRING, 1961) : the venter of the oceanic species is uniformly pale brown. *H. flaviventris* has been recorded from various near-shore localities of the Pacific and Indian Oceans (HERRING, 1961), but this is the first time it has been found off the coasts of Madagascar.

The remaining samples include both adults and nymphs of either *Halobates micans* Eschscholtz or *H. germanus* White. One sample contains specimens of both species, which were likewise found associated in certain other samples collected in the Pacific Ocean (CHENG, 1971, 1973 a).

18 out of 24 samples were taken at night or the early morning hours between 1800 and 0600 hours. The much higher frequency of *Halobates* caught

in night tows is probably due to the evident ability of these insects to see an approaching net during daylight hours; since they can move at a speed of 50-100 cm/sec, which is about the speed of most of the plankton tows, they presumably can easily dodge the net and avoid being caught (CHENG, 1973 b).

The developmental stages of the specimens in each sample have also been identified as far as possible. Since there were very few specimens in each sample collected from the same general area, the numbers collected per month in the different years have been combined and the totals for each species from all the samples are presented in Table II

TABLE II

Number of different stages of *Halobates* species collected in different months (data pooled from different years)

Species	Month	Stages of Development					♂	♀	Number of Collections
		I	II	III	IV	V			
<i>H. flaviventris</i>	May	—	—	—	—	—	1	1	1
	Aug	—	—	—	—	—	3	6	1
	Sep	—	—	—	—	—	5	2	1
<i>H. germanus</i>	Apr	1	—	1	2	—	18	20	1
	Aug	—	—	2+	1+	1	2	5	4
	Sep	—	—	—	—	—	1	6	1
	Oct	—	—	—	—	—	—	2	2
	Nov	—	—	—	—	—	1	1	1
<i>H. micans</i>	Apr	1	2	3	—	2,1+	4	6	9
	May	—	—	2	—	—	—	1	2
	Jul	—	1	7,1+	1,3+	1	—	—	3
	Aug	—	—	—	—	—	1	—	1
	Nov	—	—	—	—	—	—	1	1

+ cast skin of insect

*H. flaviventris* was collected at night in the months of May, August and September. Only adults were caught; this confirms our observation in the Pacific Ocean that it is apparently only the adult *Halobates* which are attracted to lights (CHENG, *in press*, A).

*H. germanus* was collected in nine of the tows. As can be seen in Table II, adults were found in all the months, but nymphs were only found in the April and August samples. (Two of the stages — III and IV — were also represented by cast skins.) More females (34) than males (22) were caught.

More than half of the samples studied contained *H. micans*; here, too, there were more females (8) than males (5). Nymphs of four of the five stages were collected in April and July, but none were found in the August and November samples. A study of this species from the Atlantic Ocean suggested that in the subtropical zones this insect probably reproduces without any distinct seasonality (CHENG, 1973 c).

Ten of the samples collected from the Indian Ocean between 4° S and 13° S (fig. 1) contained insects, all of them identified as *H. micans*, a cosmopolitan species widely distributed in the Pacific and Atlantic, as well as in the Indian Ocean (CHENG, 1973 d). Its known distribution in the Indian Ocean extends from 20° N to 20° S, and well into the Mozambique Channel down the coast of Africa to the Atlantic Ocean. Several other samples from waters around Nosy Bé (fig. 2) contained specimens of this species, but are all nymphs except for one adult female. Adults of this species are apparently seldom found in nearshore waters.

All the samples containing *H. germanus* were collected in the Mozambique Channel or in areas around Nosy Bé (fig. 1 and 2). This species, known only from the Pacific and Indian Oceans, has been collected from many localities along the African coast (CHENG, 1973 d) but has not hitherto been collected from the nearshore waters around Madagas-

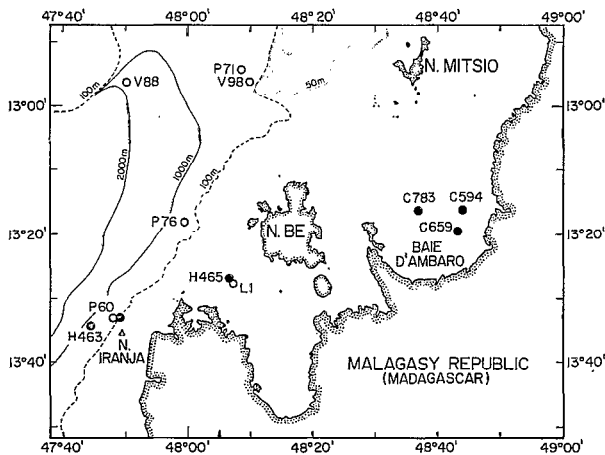


Fig. 2. — Collecting stations in the Nosy Be area. (● = *H. micans*, ○ = *H. germanus*).

car. Although extensive collections of planktonic organisms have been made during the International Indian Ocean Expeditions, *H. germanus* has been found in only a limited number of samples, the

majority of which came from nearshore waters (CHENG, *in press B*).

#### CONCLUSION.

Although only 27 samples were available for this study, they are of note since they came from an area around Nosy Be where the marine fauna is poorly known and from which *Halobates* has never been previously recorded. These collections thus add to our knowledge on the distribution and biology of these little-known oceanic insects.

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