

**OBSERVATIONS ON THE INCIDENCE OF
THE PEDUNCULATE BARNACLE,
OCTOLASMIS WARWICKII (GRAY, 1825)
ON HORSESHOE CRABS (XIPHOSURA)
IN THE SEAS ADJACENT TO SINGAPORE**

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ABSTRACT. - Two species of horseshoe crabs, *Tachypleus gigas* and *Carcinoscorpius rotundicauda* were collected from Singapore for the study of infestation rates by the pedunculate barnacle, *Octolasmis warwickii*. It was found that 70% of the *T. gigas* collected were infested by *O. warwickii* and the female crabs carried three times as many individual barnacles as did the males. None of the *C. rotundicauda* were found to host *O. warwickii*.

INTRODUCTION

In 1894, Aurivillius reported finding the pedunculate barnacle *Octolasmis warwickii* (Gray, 1825) on the underside of the prosoma (cephalothorax) of two horseshoe crabs, *Tachypleus gigas* (Müller, 1785) (as *Limulus moluccanus* Latreille, 1802) taken from the Java Sea near Jakarta (Batavia), Java. Shuster (1982) reported barnacles among organisms that develop commensal relationships with *Limulus* but did not list *Octolasmis* among them. This paper presents additional records of barnacles on horseshoe crabs together with a description of the spatial distribution of *O. warwickii* on *Tachypleus gigas* and the incidence of infestation.

MATERIALS AND METHODS

Between January and April 1986 eight *T. gigas* (ZRC.1986.1-8) were collected from the shallow seas adjacent to Kusu Island, south of Singapore. Additional specimens (ZRC.1986.9-13) were collected in December 1986 from the Singapore Straits near Sentosa Island and in May 1987, forty-three more specimens were obtained at Tuas, Singapore (ZRC.1987.54-56 and ZRC.1987.876-915). On 9 March 1988 nineteen *Carcinoscorpius rotundicauda* (Latreille, 1802) (ZRC.1988.2179-2197) were collected in the Kranji mangrove swamp, Singapore. Following preservation, the exterior of the specimens was examined and the locations of all epizoids was recorded. All specimens are deposited in the Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore.

Octolasmis on horseshoe crabs

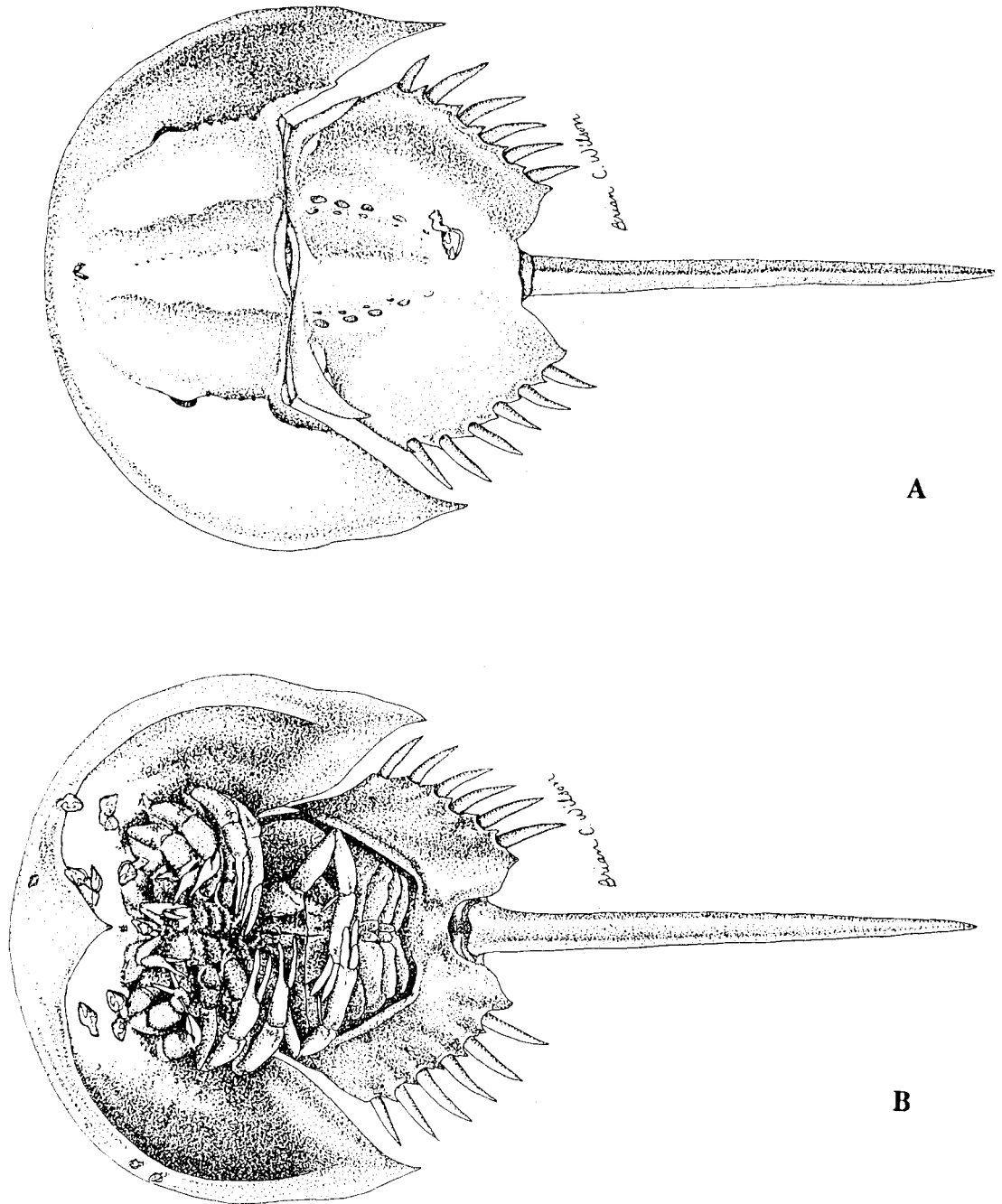


Fig. 1. *Tachypleus gigas*. A. Dorsal view of specimen (ZRC:1986.1) with one *O. warwickii* on the episthosoma; B. Ventral view of specimen (ZRC:1986.2) showing *O. warwickii* on the ventral carapace and on the walking legs.

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TABLE 1. *Octolasmis warwickii* on male *Tachypleus gigas*.

ZRC NUMBER	TACHYPLEUS		LOCATION OF <i>O. WARWICKII</i>						
	PROSOMA W	L	PROSOMA D	V	OPISTHOSOMA D	V	APPENDAGES LOC. NO.	TOTAL	
1986.2	165	92	0	14	2	0	L1	1	17
							R1	1	1
1986.4	160	90	0	8	0	0	LCa	1	9
1986.5	162	91	0	20	0	0	L2	1	21
1986.6	153	86	0	4	0	0			4
1986.10	159	96	0	20	0	0			20
1986.12	152	88	0	3	0	0			3
1986.13	155	83	0	4	0	0			4
1987.54	142	81	0	0	0	0			0
1987.55	163	93	0	0	0	0			0
1987.879	154	94	0	10	0	0	R1	2	12
							L2	2	2
1987.882	158	87	0	4	0	0	L1	1	5
1987.884	151	84	0	10	0	0	L1	2	12
							R1	5	5
							R2	1	1
1987.886	156	85	0	0	0	0	R1	1	1
							R3	1	1
1987.888	155	87	0	0	0	0	LOp2	1	1
							ROp2	1	1
							ROp3	1	1
1987.889	151	87	0	0	0	0			0
1987.890	160	90	0	23	0	4	L2	1	28
							R2	3	3
							L4	3	3
							ROp2	1	1
1987.891	164	95	0	1	0	0			1
1987.892	167	92	0	6	0	0	L1	1	7
							L3	2	2
1987.893	153	85	0	0	0	0			0
1987.894	163	89	0	0	0	0			0
1987.896	155	80	0	3	0	0			3
1987.898	156	85	0	3	0	0			3
1987.899	135	81	0	0	2	0			2
1987.901	162	90	0	3	0	0	L1	1	4
							LCm	1	1
1987.902	165	91	0	0	0	0			0
1987.903	159	90	0	0	0	0			0
1987.904	166	93	0	4	0	0			4
1987.905	168	93	0	0	0	0	L5	1	1
							R5	1	1
1987.906	157	85	0	0	0	0			0
1987.907	138	81	0	0	0	0			0
1987.908	164	89	0	0	0	0			0
1987.909	152	89	0	4	0	0	L1	2	6
							L2	2	2
							R2	3	3
							R3	1	1
1987.910	166	93	0	0	0	0			0
1987.911	159	88	0	0	0	0			0
1887.912	163	99	0	2	0	0			2
1987.913	163	91	0	0	0	0			0
1987.914	129	70	0	0	0	0			0
1987.915	157	87	0	2	0	0			2
n	ave.	ave.	sum	sum	sum	sum		sum	sum
38	157	88	0	148	4	4		45	201

Table 1. Location abbreviations: L (left) or R (right), 1-5 walking legs. Ca = Chelicera(s), Cm = Chilidium(a), Op = Operculum(a) 1-6. W = width; L = length; D = dorsal; V = ventral

***Octolasmis* on horseshoe crabs**

TABLE 2. *Octolasmis warwickii* on female *Tachypleus gigas*.

ZRC NUMBER	TACHYPLEUS		LOCATION OF <i>O. WARWICKII</i>						TOTAL
	PROSOMA W	L	PROSOMA D	V	OPISTHOSOMA D	V	APPENDAGES LOC.	NO.	
1986.1	220	128	0	58	1	0			59
1986.3	209	126	0	6	0	0			6
1986.7	202	119	0	0	0	0			0
1986.8	214	128	0	12	0	0			12
1986.9	203	125	0	23	0	0	R2	1	24
							L4	1	1
1986.11	200	119	0	43	0	0			43
1987.56	203	121	0	31	0	0	LCa	2	33
							RCa	1	1
							R1	4	4
							R2	1	1
							L3	7	7
							L4	1	1
							R4	1	1
							R5	2	2
1987.876	199	122	0	0	0	0			0
1987.877	190	120	0	6	0	0			6
1987.878	189	115	0	1	0	0			1
1987.880	208	123	0	1	0	0	R2	2	3
1987.881	184	109	0	1	0	0			1
1987.883	217	134	0	2	0	0	R1	1	3
							LCm	3	3
1987.885	207	126	0	6	0	0			6
1987.887	210	127	0	23	0	0			23
1987.895	193	121	0	91	0	1	L1	1	93
							R3	2	2
							R5	19	19
							ROp2	1	1
1987.897	226	132	0	0	0	0			0
1987.900	203	123	0	15	0	0			15
n	ave.	ave.	sum	sum	sum	sum		sum	sum
18	204.3	123.2	0	319	1	1		50	371

Table 2. Location abbreviations: L (left) or R (right), 1-5 walking legs. Ca = Chelicera(s), Cm = Chilarium(a), Op = Operculum(a) 1-6. W = width; L = length; D = dorsal; V = ventral

RESULTS AND CONCLUSIONS

Most of the fifty-six *T. gigas* bore epizoids, colonies of Bryozoa, and Cirripedia. The former were widespread dorsally and ventrally on the prosoma and the opisthosoma (abdomen). Very few balanomorphs were present, but when present they were primarily on the dorsal prosoma. Thirty-nine of 56 (70%) of the *T. gigas* were carrying from one to 115 adults of the lepadomorph, *Octolasmis warwickii* (Fig. 1). None were found on the dorsal prosoma. A total of 467 (82%) *O. warwickii* were located on the ventral prosoma, whereas 95 (17%) were found on the appendages (Tables 1 and 2). There were very few *O. warwickii* on the opisthosoma or opercula and none on the gills.

Male *T. gigas* in this collection were smaller (mean prosoma width of 156.8 mm, range 129 to 168 mm) than the females (mean prosoma width of 204.3 mm, range 184 to 226 mm) (Tables 1 and 2). Male crabs were also found to host fewer *O. warwickii* and to host them less often. Thirty-eight of the crabs were male and of these 24 (63%) carried from one to 35 *O. warwickii*. Eighteen were female and of these 15 (83%) had from one to 115 *O. warwickii*. The 24 infested males had an average of 8.4 *O. warwickii* whereas the 15 females carried three times as many with an average of 24.7.

The 70% frequency of infestation observed on this sample of *T. gigas* falls within the range of seven to 100% infestation by *O. warwickii* reported for 17 species of decapods (Jeffries, *et al.* 1982, 1984).

Tachyplesus gigas collected in each of the four months during the six month period were infested so it seems likely that infestation is not sharply delineated seasonally.

Of the 19 *C. rotundicauda* examined 13 were male, five were female, and one was juvenile. None of these were found to have any *Octolasmis* although all but the juvenile had balanomorph barnacles. The balanomorphs were found primarily on the dorsal side of the opisthosoma and to a slightly lesser extent on the dorsal side of the prosoma. Only a few were found on the ventral sides of the prosoma and opisthosoma.

LITERATURE CITED

- Aurivillius, C. W. S., 1894. Studien über Cirripeden. I. Morphologie und systematik neuer oder wenig bekannter Cirripeden. *Kong. Sven. Vet.-Akad. Hand.*, 26(7): 1-89.
- Jeffries, W. B., H. K. Voris & C. M. Yang, 1982. Diversity and distribution of the pedunculate barnacle *Octolasmis* in the seas adjacent to Singapore. *J. Crust. Biol.*, 2(4): 562-569.
- Jeffries, W. B., H. K. Voris & C. M. Yang, 1984. Diversity and distribution of the pedunculate barnacle *Octolasmis* Gray, 1825 epizoic on the scyllarid lobster, *Thenus orientalis* (Lund, 1793). *Crustaceana*, 46(3): 300-308.
- Shuster, C. N., Jr. 1982. A pictorial review of the natural history and ecology of the horseshoe crab *Limulus polyphemus*, with reference to other Limulidae. In: *Physiology and Biology of the Horseshoe Crabs: Studies on normal and environmentally stressed animals*. Pp. 1-52, Eds. J. Bonaventura, C. Bonaventura & S. Tesh. Alan R. Liss, Inc. New York 10011.

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