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## A New Freshwater Crab of the Family Grapsidae from Taiwan

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### Synopsis

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A new crab of the family Grapsidae, *Varuna yui*, is described on the specimens found in rivers of northeastern Taiwan as the third representative of the genus. It is closely related to *V. litterata* (FABRICIUS) which is widely distributed in fresh, brackish and estuarine waters of the whole Indo-West Pacific region, but distinguished from it most readily by the different shape of the male first pleopod. Its possible occurrence in the wide area of the Indo-West Pacific together with *V. litterata* is suggested.

### Introduction

In the course of systematic and ecological studies on the freshwater crabs and shrimps of Taiwan, the senior author found the crabs closely related to, but distinct from *Varuna litterata* (FABRICIUS) of the family Grapsidae, which is a well-established species living usually in fresh, brackish and estuarine waters, rarely in the open sea, of the whole Indo-West Pacific.

The genus *Varuna* H. MILNE EDWARDS consists of *V. litterata* (FABRICIUS, 1798) and *V. tomentosa* PFEFFER, 1889, the latter of which is known only by the original description based on the specimens from Zanzibar. As a result of comparative study of the specimens in question with those identified as *V. litterata* from Taiwan, the Philippines and Japan, the authors were convinced that there exists an undescribed species as the third representative in the genus *Varuna*.

In the following lines it is to be described under the name of *V. yui* dedicated to Dr. Hsiang-Ping YU who is the professor of National Taiwan College of Marine Science and Technology and was the colleague of the junior author at Kyushu University in Japan.

### Materials and Measurements

Da-Taung village, I-Lan County, Taiwan; 9♂♂, 5♀♀ (including holotype ♂ and allotype ♀); Nov. 27, 1983; J.-J. HWANG leg. Ro-Tung, I-Lan County; 14♂♂, 7♀♀; July 19, 1984; J.-J. HWANG leg. All the

specimens other than the holotype form the paratypes. Measurements of the holotype and the allotype are given in Table 1. The paratypes range from the smallest specimen ( $23.7 \times 25.4$  mm in ♂;  $20.5 \times 24.2$  mm in ♀) to the largest specimen ( $35.1 \times 37.7$  mm in ♂;  $35.0 \times 36.2$  mm in ♀). In addition to the type specimens are 3♂♂ and 6♀♀, in each of which the carapace is more or less deformed on the right or left branchial region probably due to the infection by parasite.

The holotype, the allotype and some paratypes are preserved in the National Science Museum, Tokyo, and the other paratypes will be sent to the National Museum of Taiwan; Peking Natural History Museum; National Museum of the Philippines; Australian Museum; Allan Hancock Foundation, the University of Southern California; National Museum of Natural History, U.S.A.; British Museum (Natural History); Museum National d'Histoire Naturelle, France; Rijksmuseum van Natuurlijke Historie, the Netherlands; Natur-Museum, W. Germany.

### Description

Genus *Varuna* H. MILNE EDWARDS, 1830

*Varuna yui* sp. nov.

(Figs. 1, 2)

*Diagnosis.* Carapace squarish, glabrous and evenly convex in both directions, its general appearance being markedly close to that of *V. litterata* (FABRICIUS). First male pleopod divided into two lobes of unequal size at its tip as usual, but the larger lobe subdivided into two by a deep cleft and fringed with sinuous, chitinized brown ridge.

*Description.* Carapace squarish and almost glabrous, only with some minute pits along cervical groove, being evenly convex in both directions; protogastric and mesogastric regions are jointed to form a lobe curved down to frontal margin; hepatic and epibranchial regions are in conformity on the general convexity of carapace, being only slightly depressed in their lateral parts; cervical groove with a H-shaped mark in the middle, and indistinct in its lateral part; subregions of branchial region not distinct, only with very shallow, lateral grooves; cardiac region forms a distinct convexity between branchial regions of both sides, extending backward to intestinal region, from which it is separated laterally by a short and shallow sulcus at each side.

Front horizontal and broad. Upper orbital margin fissured and very weakly everted; its inner angle slightly deflexed. Anterolateral border of carapace cut into three lobes by two small notches; first lobe confluent with external orbital angle, its margin being nearly truncated; second

lobe only slightly shorter than the first and weakly convex; the third is small and nearly longitudinal or rather convergent. Posterolateral part of carapace is marked by a facet delimited from branchial region by a linear ridge originated from posterior end of third anterolateral lobe to posterior end of posterolateral border of carapace.

Buccal cavern squarish, a rhomboidal gap being left between third maxillipeds of both sides. Merus of third maxilliped auriculate at its external angle; exopod narrower than ischium.

Both chelipeds similar in shape and equal in size, length being proportional to size of carapace; female chelipeds are smaller than males' as usual, but not remarkably so. Carpus with a sharp tubercle at its inner angle and usually with two small ones on each side, being

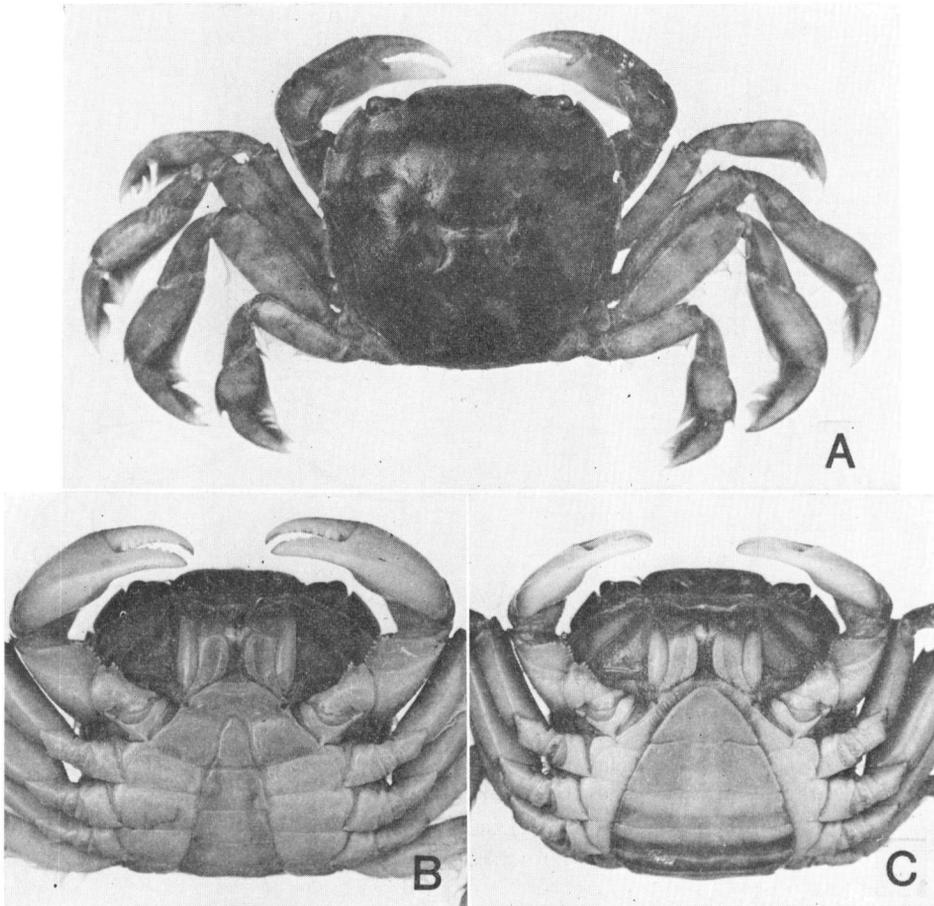


Fig. 1. *Varuna yui* sp. nov., holotype ♂ (A, B) and allotype ♀ (C).

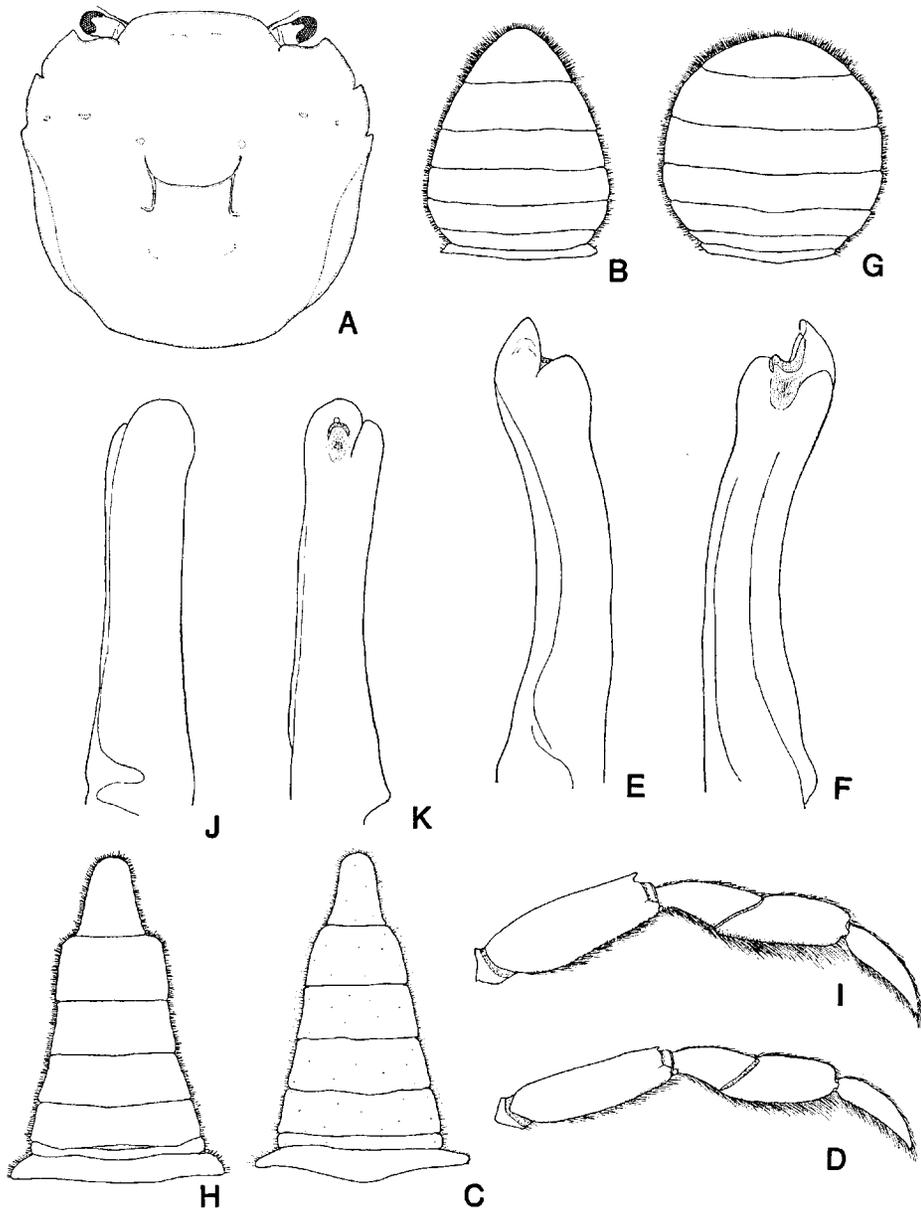


Fig. 2. *Varuna yui* sp. nov. (A-F) and *V. litterata* (FABRICIUS) (G-K).—A, carapace of holotype; B, G, female abdomen; C, H, male abdomen; D, I, right 3rd ambulatory leg; E, F, J, K, first male pleopod in abdominal (E, J) and sternal (F, K) view.

Table 1. Measurements (in mm) of holotype ♂ and allotype ♀ of *V. yui* sp. nov. and ♂♀ of *V. litterata* (FABRICIUS).

	<i>V. yui</i>		<i>V. litterata</i>	
	Holotype	Allotype	♂	♀
Carapace				
Length	32.6	32.0	32.6	36.4
Breadth	35.2	33.2	37.1	38.0
Frontorbital border	12.5	12.4	13.4	14.0
Cheliped				
Merus	11.1	9.5	16.0	11.1
Palm	20.0	15.8	28.8	19.2
Ambulatory legs				
2nd merus	18.3	16.8	18.1	19.1
3rd merus	17.8	16.3	17.2	18.6

fringed with soft hairs on inner upper margin. Tip of fingers not spoon-shaped, but slightly curved inward; a very narrow gape between cutting edges of fingers.

Ambulatory legs long and flattened, being thickly fringed with hairs on both margins of distal two segments. Breadth of merus is about 0.35 times its own length, and dactylus about 0.6 times the length of merus.

Male and female abdomens are as figured. Female abdomen is somewhat tongue-shaped, with obtuse, triangular distal segment.

Male first pleopod heavily calcified as usual; its distal part densely provided with stiff setae and divided into two lobes of quite unequal size; larger lobe deeply cleft at the middle, distal margin between two lobules thus formed being fringed with a sinuous, chitinized brown ridge; a genital orifice at the tip of inner lobe surrounded by protruded soft ridge.

### Discussion

There is no doubt that this new species is a close relative of *Varuna litterata* (FABRICIUS), and readily distinguished from another representative of the genus, *V. tomentosa* PFEFFER, which is known only by the short original description cited as follows.

“Die Art unterscheidet sich von *V. litterata* Herbst durch die über den ganzen Körper (mit Ausnahme der Fingerenden) verbreitete filzige Behaarung, ferner durch den Mangel der Fissur am oberen Augenrande, welche nur durch eine einspringende Ecke angedeutet ist; schließlich sind die Zähne am anterolateral-Rande viel schwächer eingekerbt als bei der typischen Art.”

The old literature concerning *V. litterata* are referred to ALCOCK (1900), and in this century the fine figures and photographs are given

by SAKAI (1939, 1976), BARNARD (1950), CROSNIER (1965) and GUINOT (1967). The general appearance of the new species is very close to that of *V. litterata*, but the following differences are enumerated. 1) The carapace is somewhat swollen dorsally at the gastric region, with ill-defined regions in the new species. In *V. litterata*, on the contrary, the carapace is less convex, with the gastric region rather well subdivided, and also with the hepatic and epibranchial regions flattened. Thus, the carapace surface appears to be more uneven and flattened in *V. litterata*. The anterolateral teeth are generally well marked in *V. litterata*, but apparently variable; the first tooth is weakly convex in *V. litterata*, and nearly truncated in the new species. The posterolateral facet is narrower in the new species, because the linear ridge from the posterior end of the third anterolateral lobe is rather straight and not so strongly convex inward like in *V. litterata*. 2) The chelipeds are variable according to the sex and developmental stages in both species. The full-grown male of *V. litterata* has the bulky chelipeds with the long meri armed with marginal granules of good size, but in the new species the chelipeds are not bulky, with the short meri. In the new species the inner margin of the carpus is provided with soft hairs. 2) As understood from the figures, the male abdomen of the new species is narrower, especially in the sixth segment, than that of *V. litterata*, and tapering distally more strongly in the new species. CROSNIER (1965) described about the abdomen of *V. litterata* as "6<sup>o</sup> segment ♂ un peu plus long que le 5<sup>o</sup>." The female abdomen is somewhat tongue-shaped with the obtuse, triangular terminal segment in the new species, recalling the subadult stage. All the specimens at hand seem to be large enough to exceed the mature size of *V. litterata*, but may attain more larger size, as such a shape of the female abdomen is unusual in the other crabs. 4) The differences of the male first pleopods are distinctive in the two species. The male first pleopod of *V. litterata* is figured by BARNARD (1950) and CROSNIER (1965), and the former author gave the description as follows: "1st pleopod ♂ apically bilobed, with 2 strongly chitinized ridges on inner (dorsal) surface of the larger lobe." This is true in *V. litterata*, but the larger lobe is again divided into two by a deep cleft at the middle in the new species. The schematic figures in this paper show the clue to distinguish the two species in question. 5) The ambulatory legs are slenderer in the new species than in *V. litterata* as also shown in this paper.

### Distribution

As already recorded elsewhere, the type specimens of the new species

were collected only at I-Lan County, and all the specimens from the other districts of Taiwan were identified as *Varuna litterata*. However, our comparative study revealed that there are some specimens referable to the new species among the *Varuna* specimens from Cebu Island, the Philippines. Considering this fact, it is highly probable that two *Varuna* species are widely distributed in the whole Indo-West Pacific region, although it is not sure at present whether they cohabit in the same river or more restricted place, or are isolated biogeographically from each other. The reexamination of the specimens preserved in the universities, museums and other institutes is recommended to find out if this speculation is true.

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The specimens from the Philippines were collected by Dr. Hiroshi MOTOH of the former staff of SEAFDEC in Panay Island, and also by the junior author, whose collecting trip to the Philippines was supported by a Grant-in-aid for Scientific Research (Overseas) from the Ministry of Education, Science and Culture, Japan (no. 60041078).

### 摘 要

黄娟娟 (台湾, 国立海洋学院漁業研究所)・武田正倫 (国立科学博物館動物研究部)——台湾産イワガニ科の1新種.

イワガニ科のオオヒライソガニ *Varuna litterata* (FABRICIUS) はインド西太平洋海域の汽水, 淡水域に広く分布しているが, 流木などについて沖合を漂流していることもある. 同属には他にザンジバル産の *V. tomentosa* PFEFFER が知られているが, 1889年の原記載以後, 記録されていない. 台湾産の標本を調査したところ, 典型的なオオヒライソガニに加えて, 明らかな別種が存在することが判明した. 本論文でこの種を *V. yui* の名で記載したが, 最も著しい相違は雄の第1腹肢の形態である. オオヒライソガニの第1腹肢は先端が丸い完縁であるのに対し, 新種では深く切れ込んでいる. その他, 甲殻の状態, 腹部の形態, 歩脚の長さなどもわずかに異なる. なお, フィリピン産の標本中にも新種に同定できるものがあり, 新種もオオヒライソガニと同様にインド西太平洋海域沿岸部に広く分布している可能性がある.

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