

The first occurrence of *Cycloachelous granulatus* (H. Milne Edwards, 1834) (Decapoda Portunidae) from Klah Island, Indonesia

Nisfa Hanim¹, Yusli Wardiatno^{2,3}, Dyah Perwitasari¹, Ali Suman⁴ & Achmad Farajallah¹

¹Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University, Kampus IPB Dramaga, Bogor, West Java, 16680, Indonesia

²Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, IPB University, Kampus IPB Dramaga, Bogor, West Java, 16680, Indonesia

³Environmental Research Center, IPB University, Kampus IPB Dramaga, Bogor, West Java, 16680 Indonesia

⁴Research Center of Fisheries Jakarta, Ministry of Marine and Fisheries Affair, Jalan Pasir Putih, Ancol Timur, North Jakarta, 14430, Indonesia

*Corresponding author, email: achamad@apps.ipb.ac.id

ABSTRACT

This article reported the first occurrence of *Cycloachelous granulatus* (H. Milne Edwards, 1834) (Decapoda Portunidae) from Klah Island (close to Sabang Island), Aceh Province. Two specimens were collected in intertidal zone of Klah beach, on June 2018. Our findings contribute to Indonesian Biodiversity Database and could be used as the basis to develop faunal knowledge such as study on taxonomic, biogeographic, evolutionary or conservation.

KEY WORDS

Distribution; sea crab; systematic; western Indonesia.

Received 07.05.2020; accepted 18.08.2020; published online 30.09.2020

INTRODUCTION

Indonesia is one of the biodiversity hotspots in the world, due to the high variation of the living organisms. Indonesia is located between two oceans, namely the Pacific Ocean and the Indian Ocean. One of the reasons of the high variation is due to the flow that comes from the Pacific Ocean to the Indian Ocean which distributes the marine biota (Wyrski, 1961). One of the marine biota is sea crabs which belong to infraorder Anomura and Brachyura.

Cycloachelous granulatus (H. Milne Edwards, 1834) (Decapoda Portunidae) is a brachyuran, which is distributed in Madagascar, Red Sea, and Hawaii, including Japan, Australia, Fiji and Samoa (Stephenson, 1972), Northern Arabian Sea (Tirmidzi & Ghani, 1981), Botany Bay (1993), South

Somalia-Kenya (2000). In Indonesia, it was reported in the eastern part, such as Ambon (Serene et al., 1976), Ternate (Apel & Spiridonov 1998), Tikus Island (Anggraeni et al., 2015), and Sundak Beach (Sukmaningrum et al., 2018). However, reports from western Indonesia have not been found. Therefore, this article reports the occurrence of the species from Klah Island, Aceh province (Indonesia).

MATERIAL AND METHODS

Two specimens of *Cycloachelous granulatus* were captured by hand net in the intertidal zone on 29.VI.2018 in Klah Island, Aceh province (Indonesia) (Fig. 1). The specimens were preserved in 70% alcohol for a day, then substituted in 96% alcohol

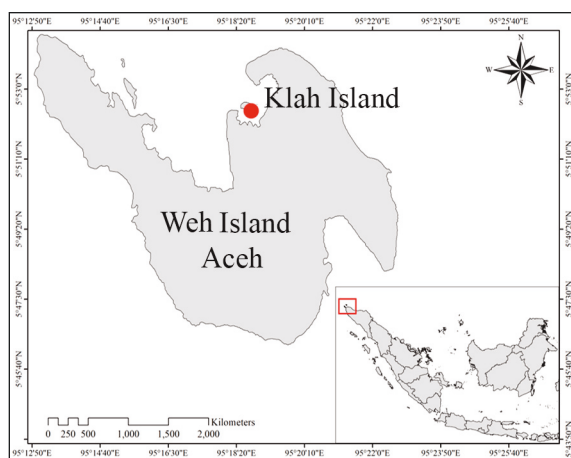


Figure 1. Map of study area.

for storage and deposited at the Laboratory of Bio-systematic and Animals Ecology. The specimens were identified following Stephenson & Campbell (1958), Tirmizi & Ghani (1981) and Vannini & Innocenti (2000).

ABBREVIATIONS. CL: Carapace Length. CW: Carapace Width.

RESULTS

Systematics

Classis MALACOSTRACA Latreille, 1802
 Ordo DECAPODA Latreille, 1802
 Infraordo BRACHYURA Linnaeus, 1758
 Superfamilia PORTUNOIDEA Rafinesque, 1815
 Familia PORTUNIDAE Rafinesque, 1815
 Subfamilia CARUPINAE Paulson, 1875
 Genus *Cycloachelous* Ward, 1942

Cycloachelous granulatus (H. Milne Edwards, 1834) Figs. 2, 3

Achelous granulatus (H. Milne Edwards, 1834)

Portunus (Achelous) granulatus (H. Milne Edwards, 1834)

EXAMINED MATERIAL. Indonesia. 2 males, CW = 17.6 mm and 25 mm; CL = 12.1 mm and 16.8 mm]; Sumatera, Klah Island; 5°52.4189'N, 95°18.7411'E; 0 m a.s.l., 29 jun. 2018; Hafiz "leg."; intertidal zone; GenBank: LC521922. Spe-

cimens are deposited in the Laboratory of Biology Departement, IPB University with collection number S36.

DESCRIPTION. Males. In front region, the median lobe is the lowest, and the submedian/lateral lobe is the highest. The carapace is circular, and most of its surface is covered by granules, the sharpness and measure of anterolateral teeth is almost the same.

Front: the median lobe is divided into two lobes with a shallow indentation. The tooth between the median lobe and the inner supraorbital lobe is the highest tooth in the frontal region of carapace, whereas the lowest tooth is the median tooth.

Carapace: The size is wide. The posterior border is rounded, and its surface has granules. The cardiac region is in the middle vertically, and the postero-lateral area is the most extensive. The sharpness and measure of the anterolateral teeth are almost the same, however, the widest is the first spine, and the sharpest is the last one.

Chelipeds: long and slim. The inner surface of manus/palm has granules and small pit, the upper surface hand is hirsute. The cheliped has two spines of posterior of manus, four spines on the anterior border of merus, three spines of the carpus, and one spine on posterior of manus.

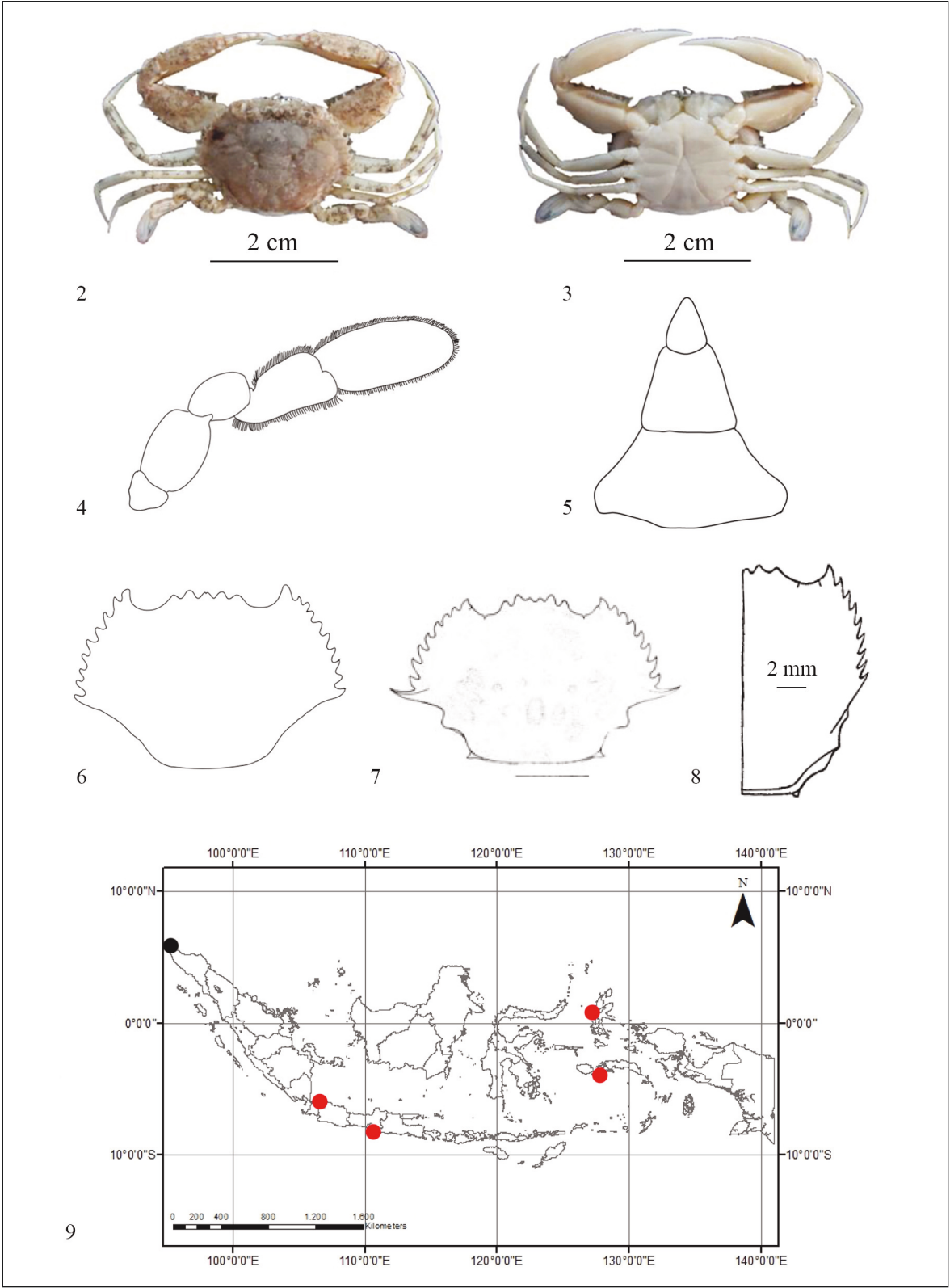
Fifth leg: has hairs in the outside edge of the propodus and dactylus (Fig. 4).

Male abdomen: the penultimate is more than two times breadth of ultimate segment (Fig. 5).

DISCUSSION

Cycloachelous granulatus specimens were collected in intertidal zone which was inundated by water at 05.30 p.m. at local time. The habitat characterised by mix of white and black sands, muddy, coral reef, and rock. The species has been reported found in nine meters under the water depth (Vannini & Innocenti, 2000) and also found in 120 meters under the water depth (Shantanam, 2018). Based on these phenomena, we believe that the species has a good adaptability to the water pressure, salinity, oxygen, temperature, and nutrient.

Mostly, the species is reported from the Pacific Ocean, such as Philippines, Melanesia, Marianas, Marshalls, Samoa, Hawai and Toamotus (Stephenson & Rees, 1967). It was assumed that the expan-



Figures 2, 3. *Cycloachelous granulatus*: dorsal (Fig. 2) and ventral view (Fig. 3). Figure 4. *Cycloachelous granulatus* fifth leg. Figure 5. Same as above, abdomen. Figure 6–8. Carapace of *C. granulatus* (Fig. 6), *Portunus orbitosinus* (Fig. 7), and *P. orbicularis* (Fig. 8). Figure 9. Distribution of *C. granulatus* in Indonesia (red dots: previous study; black dot: this study).

N°	Characteres	<i>C. granulatus</i>	<i>P. orbitosinus</i>	<i>P. orbicularis</i>	References
1	Carapace	Carapace uniformly granulate, without smooth zones between the granule clusters	Lobus in central are larger than in <i>C. granulatus</i>	Data is not available	Vannini & Innocenti, 2000; Stephenson & Campbell, 1958
2	Male abdominal	The sixth male abdominal (penultimate) segment with lesser convex sides and without median swelling; the penultimate is two times the breadth of the ultimate segment (this study)	Penultimate segment swollen, i.e. with extremely convex borders, maximum breadth nearly 3 times the breadth of the ultimate segment.	Data is not available	Vannini & Innocenti, 2000; Stephenson & Campbell, 1958
3	Anterolateral teeth	Almost equal in measure and sharpness, the first the broadest, the fourth usually the smallest, and the sharpest is the last	Approximately equal size and all sharp, the first the broadest, the second was the smallest, the last slightly the most protruding	The nine teeth of anterolateral border diminish in size from front to back; last anterolateral spine the smallest	Edmondson, 1954; Stephenson & Campbell, 1958; Shantanam, 2018;
4	The third maxilliped	The hirsute covering of the ischium of the third maxillipeds, sometimes the hair are long and dense, and sometimes short	Antero-external angle of merus produced acutely in a lateral direction.	Data is not available	Stephenson 1972; Stephenson & Campbell, 1958
5	Male Pleopod	First male pleopod stout, with widely flared tip	The outer side of the tip with no armature and the inner side with 3 or 4 microscopic spinules	The structure of male pleopod is very different from <i>C. granulatus</i>	Stephenson & Campbell, 1958; Vannini & Innocenti, 2000
6	Color	Pale, with darker lined dots	Variable from pink to yellow	Dark brown mottled on pale creamyback round	Vannini & Innocenti, 2000

Table 1. The morphological differences between *Cycloachelous granulatus*, *Portunus orbitosinus* and *P. orbicularis*.

sion of *C. granulatus* to the Indian Ocean from the Pacific Ocean through Indonesian waters was caused by the water flow which originated from Pacific to Indian Ocean (Wyrski, 1961) during the larva phase (Anger, 2001). Data about the stage of *C. granulatus* larvae is not available, but the stage from another species from genus *Portunus* Weber, 1795 such as *P. spinicarpus* (Stimpson, 1871) which has a duration of its larvae stage about 38–46 days long (Bookhout & Costlow, 1974), could be assumed. The long-time period of the larval stage might make the *C. granulatus* disperse widely in the waters.

The carapace sharp of *C. granulatus* is similar to *P. orbitosinus* Rathbun, 1911 (Vannini & Inno-

centi, 2000; Shantanam, 2018; Stephenson, 1972) and also with *P. orbicularis* (Richters, 1880) (Shantanam, 2018) (Figs. 6–8). The differences between those organism will be presented in Table 1.

Distribution of *C. granulatus* in Indonesia is showed in figure 9.

This article contributes to the Indonesian Biodiversity Database and could be used as the basis for the future study on taxonomic, biogeographic, evolutionary or conservation.

ACKNOWLEDGEMENTS

We would like to thank the Program Magister Me-

nuju Doktor untuk Sarjana Unggul (PMDSU) Grant 2017 from the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia for supporting our study.

REFERENCES

- Anger K., 2001. The Biology of Decapod Crustacean Larvae, Crustacean Issues. Taylor & Francis, United Kingdom, 262 pp. <https://doi.org/10013/epic.15410>
- Anggraeni P., Elfidasari D. & Pratiwi R., 2015. Sebaran Kepiting (Brachyura) di Pulau Tikus, Gugusan Pulau Pari, Kepulauan Seribu. Prosiding Seminar Nasional Masyarakat Biodiversitas Indonesia, 2: 171–391. <https://doi.org/10.13057/psnmbi/m010208>
- Apel M. & Spiridonov V.A., 1998. Taxonomy and Zoogeography of the Portunid Crabs (Crustacea: Decapoda: Brachyura: Portunidae) of the Arabian Gulf and Adjacent Waters. Fauna of Arabia, 17: 159–331.
- Bookhout C.G. & Costlow J.D., 1974. Larval Development of *Portunus spinicarpus* Reared in the Laboratory. Bulletin of Marine Science, 24: 20–51.
- Edmondson C.H., 1954. Occasional Papers of Bernice. P. Bishop Museum Honolulu Hawaii (Hawaiian Portunidae), 21: 217–274.
- Shantanam R., 2018. Biology and Culture of Portunid Crabs of World Seas. CRC Press., Canada, 404 pp. <https://doi.org/10.1201/9781315205816>
- Serene R., Romimohtarto K. & Moosa M.K., 1976. Hippidea, Brachyura and Stomatopoda of the *Rumphius* Expedition II. Oseanologi Indonesia, 6: 15–21.
- Stephenson W., 1972. Portunid crabs from the Indo-West Pacific and Western America in the Zoological Museum, Copenhagen (Decapoda, Brachyura, Portunidae). Steenstrupia, 2: 127–156.
- Stephenson W. & Rees M., 1967. Some Portunid Crabs from the Pacific and Indian Oceans in The Collections of the Smithsonian Institution. Proceedings of the United States National Museum, 120: 1–128.
- Stephenson W. & Campbell B., 1958. The Australian Portunids (Crustacea: Portunidae). Australian Journal of Marine and Freshwater Research, 10: 84–124. <https://doi.org/10.1071/MF9600073>
- Sukmaningrum T., Adji B.K., Pratiwi E.M., Larasati B., Sayekti P.R., Maulana I. & Eprilurahman R., 2018. Diversity of Crabs in the Intertidal Zone at Sundak Beach, Gunung Kidul, Indonesia. AIP Conference Proceeding, 020066: 2–5. <https://doi.org/10.1063/1.5050162>
- Tirmizi N.M. & Ghani N., 1981. Three Brachyrrhynchan Crabs New to the Coastal Waters of Pakistan (Decapoda: Brachyura). Crustaceana, 1: 105–110. <https://doi.org/10.1163/156854082X00146capoda>
- Vannini M. & Innocenti G., 2000 Research on the Cost of Somalia-Portunidae (Crustacea Brachyura). Tropical Zoologi, 13: 251–298. <https://doi.org/10.1080/03946975.2000.10531136>
- Wyrski K., 1961. Physical Oceanography of the Southeast Asian Waters. Naga Report 2. Scripps Inst of Oceanography California, 1–195.

