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NEW RECORD OF *PSEUDOPORCELLANELLA MANOLIENSIS* SANKARANKUTTY, 1961 (CRUSTACEA: DECAPODA: PORCELLANIDAE) FROM INDONESIAN WATERS

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The porcelain crab, *Pseudoporcellanella manoliensis* Sankarankutty, 1961 was collected in East Lampung, Indonesia, and the species is recorded from Indonesian waters for the first time. *Pseudoporcellanella manoliensis* was previously known from India, Malaysia, Singapore, Cambodia, and the South China Sea. The present specimens were caught by a fisherman as by-catch of the blue swimming crab (*Portunus pelagicus*) in April and June 2017. *Pseudoporcellanella manoliensis* was found clinging to a sea pen (*Scytalium* sp.) taken along the net. Three males and three ovigerous females each carrying approximately 600 eggs were found. The occurrence of the species in Indonesia enhances the marine crustacean diversity list of tropical Indo-West Pacific waters.

Keywords: Anomura, first record, marine biodiversity, *Pseudoporcellanella manoliensis*, tropical Pacific waters

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Porculanski rak *Pseudoporcellanella manoliensis* Sankarankutty, 1961 prikupljen je na području istočnog Lampunga u Indoneziji te je vrsta zabilježena po prvi puta u indonezijskim vodama. Vrsta je otprije poznata za Indiju, Maleziju, Singapur, Kambodžu i Južno kinesko more. Primjerci su prikupljeni kao usputni ulov tijekom lova na plavog raka plivača (*Portunus pelagicus*) u travnju i lipnju 2017. Rak *Pseudoporcellanella manoliensis* je pronađen na morskom percu (*Scytalium* sp.) kojeg je zahvatila mreža. Nađena su tri mužjaka i tri ženke, svaka s otprilike po 600 jajašaca. Prisutnost vrste u Indoneziji pridonosi povećanju raznolikosti morskih rakova tropskog Indo-Zapadnopacifičkog mora.

Ključne riječi: Anomura, prvi nalaz, biološka raznolikost, more, *Pseudoporcellanella manoliensis*, tropske pacifičke vode

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INTRODUCTION

The family Porcellanidae is one of three taxa within anomuran crustaceans which possess a crab-like body form (Keiler *et al*., 2015). The crabs of the family Porcellanidae are widely distributed in temperate and tropical coasts of the world, i.e. Indo-West Pacific (Haig, 1964), East Pacific (Haig, 1960; Hiller *et al*., 2004), East Atlantic (Chace, 1959), and West Atlantic (Werding *et al*., 2003), and they occur from the shore to continental shelf edges (<200 m) (Prakash *et al*., 2013). Porcellanids are commonly found inhabiting intertidal and shallow subtidal zones of rocky and coral reefs, or on muddy bottoms (Werding & Hiller, 2004; Osawa & Chan, 2010), and species that live in subtidal habitats occasionally associate with other invertebrates (Hiller *et al*., 2006; Osawa & Chan, 2010).

Up to 2010, the family Porcellanidae included about 280 species in 30 genera (Osawa & Mclaughlin, 2010). However, in the last eight years, 21 new species were added to some genera, i.e. *Aliaporcellana taiwanensis* (Dong *et al*., 2011), *A. spongicola* (Hiller & Werding, 2018), *Ancylocheles peterngi* (Trivedi *et al*., 2017), *Enosteoides philippinensis* (Dolorosa & Werding, 2014), *E. turkayi* (Osawa, 2016), *Petrolisthes cyanochir* (Osawa & Maenosono, 2011), *P. elegantissimus* (Werding & Hiller, 2015), *P. holthuisi* (Hiller & Werding, 2010), *P. paulayi* (Hiller & Werding, 2016), *P. polychaetus* (Dong *et al*., 2010), *P. tuerkayi* (Naderloo & Apel, 2014), *P. uruma* (Osawa & Uyeno, 2013), *Polyonyx angustus* (Osawa, 2018), *P. heok, P. kumejima, P. planus* (Osawa & Ng, 2016), *P. similis* (Osawa, 2015), *P. sasekumari, P. pilosibrachium* (Osawa *et al*., 2018), *Raphidopus persicus* (Ng *et al*., 2012), and *R. brevipes* (Osawa & Ng, 2018). This report constitutes the first record of the poorly known species *Pseudoporcellanella manoliensis* from Indonesia. The species was previously reported to occur in some Asian countries, i.e. India (Sankarankutty, 1961a), Thailand (Ng & Nakasone, 1994; Naiyanetr, 2007), Malaysia (Ng & Nakasone, 1994), Singapore (Ng & Nakasone, 1994), South China Sea (Ng & Nakasone, 1994; Komai, 2000), and Cambodia (Jensen *et al*., 2011). Thus, this finding is significant with respect to the tropical marine fauna of the Asian region.

MATERIALS AND METHODS

In April and June 2017, six specimens of *Pseudoporcellanella manoliensis* were obtained from Kuala Penet, Seputih, and Labuhan Maringgai in East Lampung, Indonesia (Fig. 1). The specimens were caught as by-catch during blue swimming crab (*Portunus pelagicus*) fishing. They were found in the net, clinging to a sea pen (*Scytalium* sp.) (Fig. 2). The collected specimens were preserved in 96% alcohol and taken to the laboratory for morphological observation. Following Osawa (2016), who did a study on *Enosteoides* in the Central Phillipines, carapace length (CL) of all specimens was measured from the anterior median tip of the rostrum to the posteromedian margin of the carapace in millimetres. Each specimen was weighed in dry condition in grams. The number of eggs of ovigerous females were counted. All the specimens examined were deposited with the abbreviation PMLM in the Department of Aquatic Resources Management, Bogor Agricultural University, Indonesia.

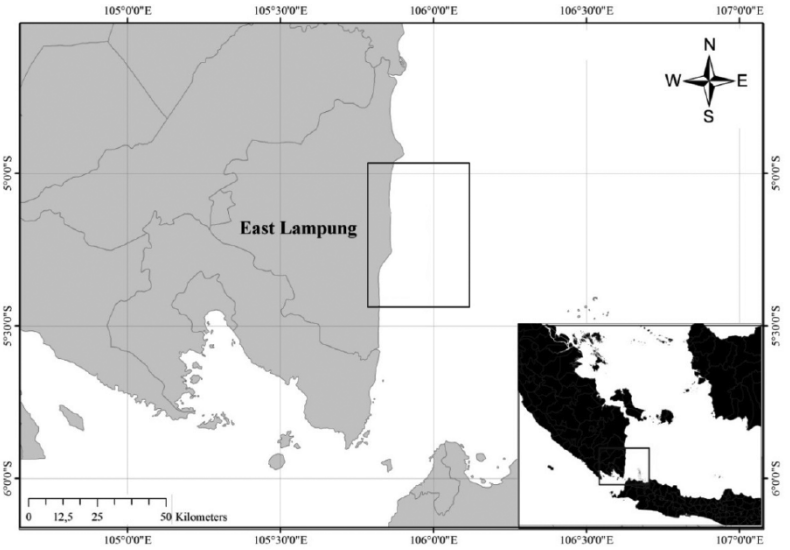

Fig. 1. Map of East Lampung waters, Province Lampung, Indonesia, where the present specimens of *Pseudoporcellanella manoliensis* were collected; (□) = blue swimming crab *(Portunus pelagicus)* fishing area.

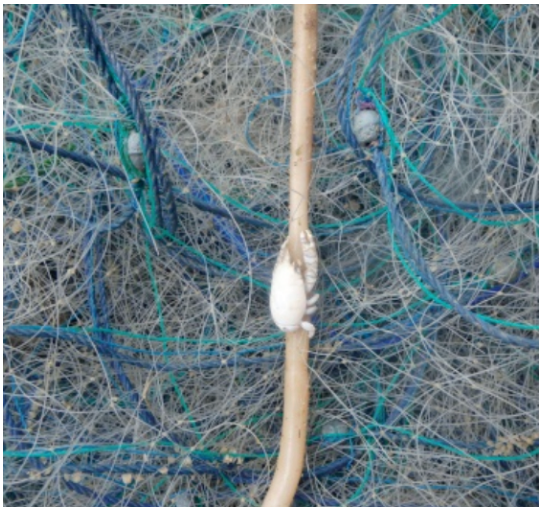

Fig. 2. *Pseudoporcellanella manoliensis* trapped in the blue swimming crab *(Portunus pelagicus)* net and clinging to a sea pen *(Scytalium* sp.*).*

RESULTS AND DISCUSSION

Systematics

Infraorder Anomura MacLeay, 1838
Family Porcellanidae Haworth, 1825
Genus *Pseudoporcellanella* Sankarankutty, 1961
Pseudoporcellanella manoliensis Sankarankutty, 1961

Material examined: #PMLM 01-02. 2♂: carapace length (CL), 18.12 and 20.03 mm; weight, 0.4136 and 1.050 g. April 2017, Kuala Penet. #PMLM 03-04. 2 ovigerous ♀: carapace length (CL), 18.35 and 20.56 mm; weight, 0.8470 and 1.1587 g; 571 and 643 eggs. April 2017, Kuala Penet, #PMLM 05. 1 ovigerous ♀: carapace length (CL), 23.38 mm; weight, 1.6926 g. April 2017, Seputih. #PMLM 06. 1 ♂: carapace length (CL), 18.12 mm; weight, 0.8261 g. June 2017, Labuhan Maringgai.

Distribution: *Pseudoporcellanella manoliensis* were originally described from the Gulf of Mannar near Manoli Island, India (Sankarankutty, 1961a) and later recorded from Thailand (Ng & Nakasone, 1994; Naiyanetr, 2007), Malaysia (Ng & Nakasone, 1994), Singapore (Ng & Nakasone, 1994), the South China Sea (Ng & Nakasone, 1994; Komai, 2000), and Cambodia (Jensen *et al*., 2011). The present material represents the first record of the species from Indonesia.

Habitat: The present specimens were found attached to a sea pen (*Scytalium* sp.) inadvertently taken by blue swimming crab (*P. pelagicus*) nets from depths of 3-6 m. The substrate of the habitat was fine-grain silt and silty loam.

Reproductive biology: The number of eggs of two ovigerous females examined ranged from 571 to 643, and the size of the eggs (Stage 1) was between 380-490 μm.

Discussion: The East Lampung waters are rich in *Portunus pelagicus*, commonly known as blue swimming crabs, and the crab is a significant resource for the fisheries in Indonesia (Zairion *et al*., 2014a, 2014b, 2015a, 2015b). Organisms fished as by-catch probably include new records of crustacean or other marine species, like the present report of *Pseudoporcellanella manoliensis*. In the same way, the species was found as a new record from Cambodia based on by-catch (Jensen *et al*., 2011).

The occurrence of *P. manoliensis* in East Lampung waters also enriches and strengthens the biological information about the species. As mentioned above, all the specimens were discovered clinging to a sea pen as its associated host. The association between *P. manoliensis* and sea pens (*Scytalium* and *Pteroeides* spp.) was firstly reported by Johnson (1967). He found that *P. manoliensis* lived attaching to the stem and bulb of *Scytalium*, whilst *Porcellana* sp. lived between the flat leaves of *Pteroeides*. In this study only one individual of *P. manoliensis* was found in the sea pen, indicating a solitary lifestyle. This is similar with the association of the *Allopetrolisthes spinifrons* crab and the sea anemone *Phymactis clematis* in Chile (Baeza & Thiel, 2003). Many porcelain crabs are obligate commensals showing complicated intertwined relationships, for examples i.e. *Allopetrolisthes spinifrons* with sea anemones (Baeza & Stotz, 2001; Baeza & Thiel, 2003), *Neopetrolisthes spinatus* with sea anemones (Kumaralingam *et al*., 2015), *Porcellanella triloba* with sea pens (Sankarankutty 1961b), *Porcellana cancrisocial* and *P. paguriconviva* with hermit crabs (Gore & Abele, 1976). In terms of conservation, it is necessary to protect muddy benthic habitats for sea pens and their commensal fauna.

From the aspect of reproductive biology, Jensen *et al*. (2011) reported 442 eggs carried by an ovigerous female of *P. manoliensis* collected from Cambodia. The present two ovigerous females from East Lampung had higher egg numbers, 571–643.

In terms of specimen size, the largest female crab in the present material from Indonesia is 23.38 mm in carapace length, which is larger than that previously reported from other Southeast Asian countries: Cambodia (21.1 mm; Jensen *et al*., 2011), and Singapore (17.7 mm) (Ng & Nakasone, 1994). For males, the largest size of the present material (20.03 mm) is larger than sizes reported from Singapore (19.6 mm), Malaysia (18.9 mm), and the South China Sea (18.3) mm (Ng & Nakasone, 1994), but is smaller than the largest specimen of Cambodia (22.1 mm) (Jensen *et al*., 2011).

Information on the occurrence and distribution of marine crustaceans in Indonesia has been increasing in the last three years, i.e. porcellanid crabs (Anggraeni *et al*., 2015; Werding & Hiller, 2015), hippoid crabs (Ardika *et al*., 2015, Mashar *et al*., 2015; Wardiatno *et al*., 2015), palinurid lobsters (Wardiatno *et al*. 2016a, Wahyudin *et al*., 2016, 2017), nephropid lobsters (Wardiatno *et al*., 2016b), scyllarid lobsters (Wardiatno *et al*., 2016c). These findings enlarge the faunal list of marine decapod crustaceans in Indonesia, suggesting waters of the country are richer in marine biodiversity than other Southeast Asian countries.

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SUMMARY

New record of *Pseudoporcellanella manoliensis* Sankarankutty, 1961 (Crustacea: Decapoda: Porcellanidae) from Indonesian waters

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As a marine biodiversity hotspot, Indonesian waters are known to have huge numbers of marine species. However, in terms of crustaceans, the current information from the Ministry of Environment and Forestry of Indonesia showed only 309 species in their database. It is therefore very important to further explore the Indonesian marine crustacean fauna and diversity. Our previous studies have elucidated some interesting and ecologically important marine crustacean species as new records from Indonesia. In this study, we found one more marine anomuran crab species as a new record from the country, i.e. *Pseudoporcellanella manoliensis*. The species was previously known from India, Malaysia, Singapore, Cambodia, and the South China Sea. The crab was obtained as a by-catch of blue-swimming crab fishery in Lampung waters. Three males and three ovigerous females were found clinging to a sea pen (*Scytalium* sp.). This finding enhances the faunal list of marine decapod crustaceans in Indonesia and adds to the distribution localities of *P. manoliensis* in the global map.

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