On the trail of a Japanese “ghost species”—the identity of *Goniopugettia tanakae* Sakai, 1986, and the establishment of a new genus for *Pugettia sagamiensis* Gordon, 1930 (Decapoda, Brachyura, Epialtidae)

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**Abstract.**—The majoid genus *Goniopugettia* Sakai, 1986, was established to include a new species *Goniopugettia tanakae* Sakai, 1986, as well as *Pugettia sagamiensis* Gordon, 1930. Although *Goniopugettia tanakae* Sakai, 1986, was subsequently designated as the type species of the genus by Ng et al. (2008), the identity of this species has been shrouded in uncertainty because it was supposedly common according to the original description, but has never been reported since its discovery. The type material is also confusing because it appears that Sakai used the name for two different species, one of which is *G. sagamiensis*. The identity of *G. tanakae* is clarified after the discovery of several syntypes which confirms that the type series contains two species. A lectotype is here chosen that fixes the identity of *Goniopugettia tanakae* and *Goniopugettia*. As a consequence of this action, a new genus has to be established for *Pugettia sagamiensis* here named *Tunepugettia*.

**Key words:** Majoidea, Epialtidae, taxonomy, confused taxonomy, new genus, East Asian Seas

**Introduction**

In a poorly known paper, the late Tune Sakai (1986) established a new epialtid genus (as Majidae at the time), *Goniopugettia*, for two species: *Pugettia sagamiensis* Gordon, 1930, and *Goniopugettia tanakae* Sakai, 1986, both from Japan. Without reference to Sakai (1986), Griffin & Tranter (1986) transferred *Pugettia sagamiensis* to *Rochinia* A. Milne-Edwards, 1875, and this was followed by Tavares (1991) and Huang & Hsueh (1998). Ng et al. (2001) recognized *Goniopugettia* as a valid genus, and this action has since been followed by later workers (e.g., Taishaku & Konishi, 2001; Komatsu & Takeda, 2003; Takeda & Komatsu, 2005; Ng et al., 2008; Lee et al., 2017). As T. Sakai (1986) did not select a type species for *Goniopugettia*, Ng et al. (2008) designated *G. tanakae* Sakai, 1986, as the type species. *Goniopugettia sagamiensis* is a well known species and has been widely reported in East Asia (see Sakai, 1939, 1965b, 1976; Miyake, 1983; Takeda, 1993, 1997; Ikeda, 1998; Ng et al., 2001; Lee et al., 2017). The identity of *G. tanakae* Sakai, 1986, however, is uncertain and it has never been reported since its original description. Tune Sakai (1986: 2) described *G. tanakae* briefly as the second species in *Goniopugettia*, but did not indicate how it differed from *G. sagamiensis*. Sakai (1986: frontispiece fig. 3) provided one figure of *G. tanakae* which depicted a distinctive animal with pronounced lateral carapace protuberances. Yet, this figured specimen was not even listed among his material examined for *G. tanakae*. Studying Tune Sakai’s extant material in the Kanagawa Prefectural Museum of Natural History where the bulk of his material is now kept (Muraoka, 1998), we found no record of any
taxon named “Goniopugettia tanakae”. Material of *G. sagamiensis*, however, is plentiful in some Japanese museums. The apparent rarity of *G. tanakae* is surprising considering T. Sakai (1986) listed 54 specimens from different parts of Japan in his material examined. No Japanese museum we checked has any specimens of “*G. tanakae*”. Why is it then such a rare species in collections considering how distinctive the species is based T. Sakai’s (1986: frontispiece fig. 3) figure?

It is therefore important to establish the identity of this “ghost species” called *Goniopugettia tanakae* Sakai, 1986; partly because of the confused circumstances under which this species was described as well as the fact that this is now the type species of *Goniopugettia* Sakai, 1986, a genus that is clearly distinct from *Pugettia* Dana, 1851, s. str. (see also Lee et al., 2017).

Tune Sakai’s (1986) paper was his last published work. It is significant to note that it was published posthumously on 30th April 1986, about two months after he passed away on 22 February 1986 and was not even listed among his publications (K. Sakai, 1987). In all likelihood, the paper was published without the normal review and editorial process. While T. Sakai presented a reasonably clear explanation of why a new genus was needed, the manner in which he established the new species was confusing and difficult to understand. In order to discuss the taxonomy of “*Goniopugettia tanakae* Sakai, 1986”, we present a translation of his entire text here to assist the reader with the discussion that is to come.

The following abbreviations are used: cl = carapace length including pseudorostral spine; cw = carapace width; G1 = male first gonopod; G2 = male second gonopod; prl = carapace length excluding pseudorostral spine. Measurements are all in millimetres. Material examined is deposited in the Kanagawa Prefectural Museum of Natural History (KPM), Japan; Natural History Museum and Institute, Chiba (CBM), Japan; Museum für Naturkunde (ZMB), Berlin, Germany; and the Senckenberg Gesellschaft für Naturforschung (SMF), Frankfurt, Germany.

### Translation of the Japanese text of T. Sakai (1986: 1–2, frontispiece figs. 3, 4)

“1. On *Goniopugettia sagamiensis* Gordon

In 1904, the West Germany Doflein described a new species *Hyastenus brevirostris* from the southwest coast of Sumatra in a report of Deutchen Tief-see Expedition auf dem Valdivia 1898–1899 (p. 85, pl. XXVII, figs. 13, 14). With regards of the identification to genus and species, it was suggested by two researchers, Sars and Alcock, that the new species is close to the previously described *Hyastenus pleione* or *H. hilgendorfi* in the relatively short rostral spines and ambulatory legs, and the development of protuberances and spines on the denuded carapace surface.

In 1915, Italian Bruno Parisi published “I. Decapodi Giapponesi del Museo di Milano”, in which crabs from Sagami Bay, Japan, are reported from the collections deposited in the museum in Milan, and he established the crab species *Pugettia brevirostris* on Pl. 7, p. 287. The figure provided was a photograph and it is obvious that the crab figured is the same crab reported by Doflein (p. 85, Pl. XXVII, figs. 13, 14). Dr. Isabella Gordon of the British Museum (Natural History) then illustrated the entire carapace of a crab species she referred to as *Pugettia sagamiensis* in her paper on Chinese crabs (crabs from Amoy, Hong Kong, China and Sagami Bay) published in 1931. She proposed a new name because the species was synonymous with *Pugettia brevirostris* Parisi, not Doflein. In January 1959, Sakai changed this name to *Goniopugettia*, replacing the name *Pugettia* as used by Dr. Gordon with the new name *Goniopugettia*. As discussed later, it is not *Pugettia*. On the other hand, *Hyastenus*
brevirostris of Doflein, 1904 (Pl. XXVII, figs. 13, 14) was accurately illustrated as Pugettia brevirostris in Gordon (557, text-fig. 36, a).

Genus Pugettia

Crabs of the genus are common in shallow rocky shores in Japan, and the Japanese name of the genus is “Yotsuhamogani-zoku”. The surface of the carapace is covered with dense pubescence. When denuded, there are numerous elevations. There are numerous setae on the rostral spines and anterior and posterior margins of meri, carpi, propodi and dactyli. The body size is rather small, and even in the largest species Pugettia quadridens, the carapace length attains 30 mm and the carapace width attains at most 24 mm (including epi-branchial spines). The color of the carapace is entirely brown or dark green, sometimes yellowish brown. The tip of the first gonopod in this genus is always tri-lobed (Pl. I, 7, 8, 9).

The Japanese species of Pugettia contains the following 10 species.

Pugettia quadridens (de Haan) (Frontispiece, 1)
Pugettia quadridens intermedius Sakai
P. pellusence Rathbun
P. incisa (de Haan)
P. minor Ortmann
P. elongata Yokoya
P. nipponensis Rathbun
P. similis Rathbun
P. kagoshimaensis Rathbun
P. brevirostris Doflein

Genus Goniopugettia, Sakai (1957)

This genus differs from Pugettia in; 1, large crab, exceeding 54 mm in the carapace length and 45 mm in the carapace width, with numerous pubescence on the carapace surface; 2, the general color is deep red, including pereopods; 3, the rostral spines are subparallel, meri, carpi and dactyli of pereopods bear numerous pubescence on anterior and posterior margins. The supraorbital branch is well developed, with dense pubescence; 4, the male first gonopod is straight, of which the tip is not tri-lobed (Pl. I, 6).

Goniopugettia tanakae n. g., n. sp. Tanaka-oni-mo-gani (Frontispiece, fig. 3)
3 ♂♀, 2 ♀♂, off Enoshima
20 ♂♂, 3 ♀♀, Odawara Carcinological Museum, Tokyo, Dr. T. Odawara
3 ♂♀, 2 ♂♂, off Hayama, Mr. H. Ikeda, Mr. T. Watanabe
3 ♂♀, 2 ♂♂, Kii Minabe, coll. by Mr. M. Ozaki
10 ♂♂, 5 ♀♀, Tosa Mimase, coll. K. Sakai
1 ♂, Tosa Murotozaki, coll. by Mr. K. Matsuzawa
2 ♂♂, 1 ♀, Nagasaki, coll. Mr. M. Matsuo

The species name is dedicated to Mr. Shin’ichi Tanaka, a director of the Motoori Museum in Toba, Mie Prefecture, who is an enthusiastic collector. This is the second species of the genus.

This species is large, attaining 60 mm in the carapace length and 55 mm in the carapace width. The body is entirely deep red. The supraorbital plate is well developed, the carapace has three protuberances on each lateral side, the cardiac region is highly elevated. The male first pleopod is slender, straight, with it tips not tri-lobed. Each article of chelipeds and ambulatory legs are plate-like, flattish.”

Review of the Situation

There are several puzzling questions connected with Goniopugettia and Goniopugettia tanakae that require discussion before the evidence can be considered further.

1. When was Goniopugettia actually recognised and established? Tune Sakai (1986: 1) writes: “In January 1959, Sakai changed this name to Goniopugettia, replacing the name Pugettia as used by Dr. Gordon with the new name Goniopugettia. As discussed later, it is not
Pugettia.” In his heading for the genus name *Goniopugettia*, however, he writes “Sakai (1957)” after it. We have found no 1957 or 1959 paper when this name was used. Also, this name was neither used nor even cited in his two major works of 1965b and 1976. The name only appeared in print in 1986. As such, the action of “January 1959” he referred to was probably from his unpublished notes or manuscript and his intention then to establish a new name, “*Goniopugettia*”. For whatever reasons, this did not happen until 1986.

2. The material listed and examined by T. Sakai is listed in an unusual manner. The one figure of this species shows a crab with the pseudorostral spines prominent and only slightly divergent, and very prominent lateral carapace protuberances which are directed laterally (T. Sakai, 1986: frontispiece fig. 3) (present Fig. 1). These are quite different from *G. sagamiensis* in which the pseudorostral lobes are more clearly diverging, and lateral projections on the carapace are wider and less prominent (Figs. 4, 5). These are characters not associated with size as even small male and female specimens show them (Figs. 4, 5). In addition to these differences that T. Sakai would have surely observed, this specimen was a female and he as such, he did not know the condition of the male first pleopod which he had argued was a diagnostic character for his new genus. Nevertheless, T. Sakai’s caption for this figure was “*Goniopugettia tanakae* SAKAI Tanaka-oni-mo-gani (n.g. et sp., photo by S. TANAKA)”. T. Sakai (1986: 2) listed a total of 54 specimens from Enoshima, Hayama, Kii Minabe, Tosa Mimase, Tosa Murotozaki and Nagasaki; as well as Japanese material housed in the Odawara Carcinological Museum in Tokyo. No types were designated. He figured the specimen photographed by S. Tanaka, but it is not listed among his material examined. Nevertheless, under the current zoological code (ICZN, 1999), all the material listed by T. Sakai, including Tanaka’s photographed specimen, are syntypes.

3. The rationale of T. Sakai in listing his material of *G. sagamiensis* in his key papers is hard to understand. In his monograph of the Japanese spider crabs, Sakai (1938) listed a total of three specimens, one from Hukuura (= Fukuura), Sagami Bay, one from Suruga Bay and one from Mimase, Tosa Bay. In his monograph of the brachyuran crabs from Sagami Bay, Sakai (1965b) listed two specimens from Amadaiba Aoyama-dashi, one specimen from south-west of Jogashima, as well as “a lot of specimens” from Tosa Bay collected by his son K. Sakai. In his major synthesis of Japanese crabs, T. Sakai (1976: 195) listed a total of 35 specimens from Amadaiba Aoyama-dashi and Jogashima (Sagami Bay), Mikawa Bay, Kii Minabe and Mimase in Tosa Bay. None of these had catalogue numbers or had dates of collection. When he described *G. tanakae*, T. Sakai (1986) listed 54 specimens from Enoshima, Hayama, Kii Minabe, Tosa Mimase, Tosa Murotozaki and Nagasaki, as well as material in the Odawara Carcinological Museum (without specific localities). None were dated or had catalogue numbers. For unknown reasons, T. Sakai (1986) did not refer to his 1976 book, or elaborate on whether some of the material of *G.*
Fig. 2. *Goniopugettia tanakae* T. Sakai, 1986, lectotype female (cw 16.2 mm) (SMF 49690). A, overall dorsal view; B, ventral view of cephalothorax with 2005 label written by H. Watabe.
Crustacean Research 46

4. A major part of T. Sakai’s type material in the special Emperor’s Collection under the National Museum of Nature and Science, Tsukuba, which contains the material given to him by the late Emperor Hirohito (see T. Sakai, 1963, 1964, 1965a, b; Takeda, 1993). Tune Sakai also gave the U.S. National Museum of Natural History in the Smithsonian Institution many type specimens (Sakai, 1969, 1983). Searches of both museums failed to uncover any material listed under “Goniopugettia tanakae”. A part of T. Sakai’s collection is also in the Senckenberg Gesellschaft für Naturforschung in Frankfurt (SMF), which was donated by his son (K. Sakai) after his death, and at least one euryplacid type has been found (see Castro, 2017). An initial search by the first author in 2014 failed to find any specimen labelled as “Goniopugettia tanakae” in the collections. Discussions with K. Sakai also did not throw light on the matter as he was not familiar with the problem, although he suggested we search the SMF collections again as many of the specimens there had still not been properly sorted or catalogued. At his urging, and with the help of Moritz Sonnewald, who was taking care of the collections after the passing of Michael Türkay in 2015, a new search was made. Moritz eventually found an uncatalogued box in the T. Sakai collection with a dried specimen labelled as “Goniopugettia tanakae” which had been identified as the holotype of the species by H. Watabe (Fig. 2B).

### Extant Material

All the specimens in KPM examined clearly belong to *G. sagamiensis* as presently defined (Gordon, 1930, 1931; Sakai, 1965b, 1976). It is a collection with numerous specimens of both sexes as well as juveniles. Of these, the following specimens match those listed as material examined by T. Sakai (1986): 1 male (cw 27.2 mm, cl 42.9 mm, prl 33.4 mm) (KPM-NH 130988, ex TO 0279), 1 male (cw 15.7 mm, cl 25.8 mm, prl 19.7 mm, with *Sacculina*) (KPM-NH 130990, KPM-NH 124094, KPM-NH 124098, KPM-NH 124163 and KPM-NH 124170) had dates. All were collected before 1976 and were available to T. Sakai when writing his 1976 book and so were almost certainly part of the material he listed then. These also include three specimens (2 males and 1 female: KPM-NH 130988, KPM-NH 130989, KPM-NH 130990) from the Odawara Collection collected from off Mimase in Kochi, an area which is part of Tosa Bay. They could be part of the syntypes listed by T. Sakai (1986) for *G. tanakae*. There is also one specimen from Enoshima in Sagami Bay (KPM-NH 124163) that was not mentioned by T. Sakai (1976) for *G. sagamiensis* (as *Pugettia*) but listed in T. Sakai (1986) under *G. tanakae* and probably also part of the type series.

*sagamiensis* from his 1976 paper may in fact be *G. tanakae*. Noteworthy is also that he did not mention any material from the Odawara Collection in his 1976 book. The KPM holds a good series of T. Sakai wet-preserved specimens. All the material was catalogued in a separate book by K. Muraoka when they were first transferred to KPM. Specimens that had been in the collection of Toshimitsu Odawara carried their own numbers (here indicated as TO). All the specimens were eventually catalogued, given new KPM numbers and published as a catalogue (Muraoka, 1998). We examined all the labels in every bottle as well as the hand-written catalogue data in Muraoka’s catalogue book to ascertain their provenance. Of the 24 specimens examined that definitely belonged to the T. Sakai collection, nine specimens from eight lots (KPM-NH 130988, KPM-NH 130989, KPM-NH 130990, KPM-NH 124094, KPM-NH 124098, KPM-NH 124163 and KPM-NH 124170) had dates. All were collected before 1976 and were available to T. Sakai when writing his 1976 book and so were almost certainly part of the material he listed then. These also include three specimens (2 males and 1 female: KPM-NH 130988, KPM-NH 130989, KPM-NH 130990) from the Odawara Collection collected from off Mimase in Kochi, an area which is part of Tosa Bay. They could be part of the syntypes listed by T. Sakai (1986) for *G. tanakae*. There is also one specimen from Enoshima in Sagami Bay (KPM-NH 124163) that was not mentioned by T. Sakai (1976) for *G. sagamiensis* (as *Pugettia*) but listed in T. Sakai (1986) under *G. tanakae* and probably also part of the type series.
ON THE TRAIL OF A JAPANESE “GHOST SPECIES”

T. Sakai Collection; 1 female (cw 19.8 mm cl 33.7 mm prl 25.8 mm) (KPM-NH 124163), Enoshima, at Sagami Bay, Kanagawa Prefecture, Japan, coll. 1968, T. Sakai Collection (lateral spines short). These four specimens are probably syntypes of what T. Sakai (1986) believed were *G. tanakae* (see discussion later).

The type status of the remaining 24 specimens from the T. Sakai Collection is uncertain: 1 male (cw 21.2 mm, cl 44.8 mm, prl 35.7 mm) (KPM-NH 130987, ex TO 0278), Tosa, Kochi Prefecture, Japan, coll. T. Sakai, February 1959; 1 male (cw 10.3 mm, cl 18.4 mm, prl 14.2 mm) (KPM-NH 124094), Tosa Mimase, Kochi Prefecture, Japan, coll. 16 November 1958, Japan; 1 female (cw 18.6 mm, cl 30.8 mm, prl 24.0 mm) (KPM-NH 124098), Tosa Mimase, Kochi Prefecture, November 1965; 1 male (cw 25.4 mm, cl 41.3 mm, prl 31.1 mm), 1 female (cw 28.8 mm, cl 44.1 mm, prl 34.5 mm) (KPM-NH 124166), Tosa Mimase, Kochi Prefecture, Japan; 1 male (cw 33.3 mm, cl 49.0 mm, prl 37.2 mm), 1 female (cw 26.0 mm, cl 42.1 mm, prl 32.7 mm) (KPM-NH 124170), Tosa Mimase, Kochi Prefecture, February 1966, Japan; 1 female (cw 32.2 mm, cl 46.4 mm, prl 35.5 mm) (KPM-NH 104410), Kii Minabe, Wakayama Prefecture, Japan; 1 female (cw 31.0 mm, cl 46.7 mm, prl 35.5 mm) (KPM-NH 104824), Kii Minabe, Wakayama Prefecture, Japan; 1 male (cw 38.3 mm, cl 54.8 mm, prl 42.0 mm) (KPM-NH 104899), Kii Nagashima, near Mie, Toba, Mie Prefecture; 1 male (cw 54.7 mm, cl 72.7 mm, prl 56.5 mm) (KPM-NH 124131), 1 male (cw 15.7 mm, cl 25.5 mm, prl 18.9 mm) (KPM-NH 104809), 1 male (cw 26.1 mm, cl 41.5 mm, prl 31.2 mm) (KPM-NH 104810), 1 female (cw 29.3 mm, cl 46.8 mm, prl 35.2 mm) (KPM-NH 104811), 1 male (cw 18.0 mm, cl 28.4 mm, prl 22.2 mm) (KPM-NH 104866), 4 males (cw 21.0 mm, cl 33.7 mm, prl 24.0 mm; cw 38.0 mm, cl 54.2 mm, prl 43.0 mm; cw 44.6 mm, cl 62.4 mm, prl 50.4 mm; cw 45.2 mm, cl 60.1 mm, prl 50.2 mm), 1 male (carapace badly damaged) (KPM-NH 104898), Japan.

The single dried female specimen in the SMF (cw 16.2 mm, cl 21.6 mm, prl 16.4 mm) labelled as *Goniopugettia tanakae*, while not the holotype of the species, is still in good condition, and we have no doubt that this was the individual figured by Sakai (1986: frontispiece fig. 3). It is, however, clearly a syntype of *Goniopugettia tanakae* Sakai, 1986.

**Discussion**

In considering the available evidence, we believe the following conclusions are reasonable.

In 1957 or 1959, T. Sakai had manuscript notes that *Pugettia sagamiensis* Gordon, 1930, should be referred to a new genus, which he would name *Goniopugettia*. For unknown reasons, these notes were never published, even after he compiled his landmark work of 1976. Sometime between 1957 and 1986, T. Sakai believed that he had a new species of *Goniopugettia* that resembled *G. sagamiensis* *s. str.* In his manuscript, he started to separate out material of what he had previously referred to *G. sagamiensis* as belonging to the second species. However, probably because of uncertainty and/or there was too much variation, he never proceeded to publish on the new species. Neither did he label the material of his new species. In his last years, as he cleared his unfinished manuscripts, he decided to publish his notes, which included a photograph given to him by Mr. S. Tanaka. We can only speculate as to why T. Sakai did not list this specimen among his material examined of the new species. Was it merely a lapsus on his part or perhaps the specimen only reached his office after he wrote the manuscript? Nevertheless, because the photograph depicted what appears to be a distinct species, and based on his earlier notes, he thought all belonged to his new species which he finally named *G. tanakae*. The re-identified specimens of *G. sagamiensis* that
he believed were *G. tanakae*, however, were unfortunately never relabelled. It is important to note that none of 24 KPM specimens examined even had a label with the name “*Goniopugettia*”. Even the dried specimen recently found in the SMF was not labelled with this name, with the present label written much later in 2005 (Fig. 2B).

We admit these are mere speculations and we will never know what really happened. It is, however, important that the type species of *Goniopugettia* be identified with certainty. As noted earlier, the dried specimen in SMF is without doubt a syntype of *G. tanakae* as it was the one figured by him. All the other 54 specimens listed by T. Sakai (1986) of *G. tanakae* are also syntypes. The 1968 specimen from Enoshima in Sagami Bay (KPM-NH 124163) is almost certainly one of the types as this site was not included among the locations for Sagami Bay in his 1976 list of *G. sagamiensis* but was specifically listed in his 1986 paper. We are reasonably certain that the material T. Sakai (1986) listed as from Odawara Carcinological Museum which he referred to *G. tanakae* in his paper are now represented in KPM—the three specimens there (KPM-NH 130988, KPM-NH 130989, KPM-NH 130990) are also syntypes. Under the circumstances, it is best that we select the unambiguous syntype female collected by S. Tanaka as the lectotype of *Goniopugettia tanakae* Sakai, 1986. The type status of the other specimens, which are all clearly what is today called *G. sagamiensis*, is debatable. The present action will allow both names to be retained and stabilises the taxonomy of *Goniopugettia* T. Sakai, 1986, through a clear identification of the designated type species. With stabilisation of the identity of *Goniopugettia*, a new problem emerges because the lectotype of *Goniopugettia tanakae* Sakai, 1986, is not congeneric with *G. sagamiensis* (Gordon, 1930).

### Taxonomy

Family *Epialtidae* MacLeay, 1838  
Subfamily *Pisinae* Dana, 1851  
**Genus Goniopugettia** T. Sakai, 1986

*Goniopugettia* T. Sakai, 1986: 2 (part); Ng *et al.*, 2001: 13 (part); Ng *et al.*, 2008: 103 (part).

**Type species**  
*Goniopugettia tanakae* T. Sakai, 1986; subsequent designation by Ng *et al.* (2008). Gender feminine.

**Diagnosis**

Carapace pyriform; dorsal surface with regions well defined (Figs. 1, 2A); pseudorostral spines fused along proximal half, dorso-ventrally flattened, lateral margins with sharp edge, apically blunt (Figs. 1, 2, 3A); supraorbital eave very narrow, almost confluent with lateral edges of pseudorostral spine, preorbital tooth or spine hardly discernible (Figs. 2B, 3A); postorbital tooth short, triangular (Figs. 1, 2A, 3A), inner surface gently concave; hiatus between supraorbital eave and postorbital tooth U-shaped; hepatic, epibranchial and mesobranchial spines prominent, parallel, directed laterally, each with rounded tip (Figs. 1, 2A); epibranchial spine dorso-ventrally flattened (Figs. 1, 2A); cardiac and intestinal regions raised vertically but without spines or tubercles, posterior carapace margin unarmed, distinctly convex (Figs. 1, 2A). Basal antennal article sub-rectangular, distinctly longer than broad, lateral margin almost straight to gently concave (Figs. 2B, 3A). Third maxilliped with ischium sub-rectangular, elongate (Figs. 2B, 3B). Cheliped and ambulatory legs with margins of merus, carpus, propodus and dactylus rounded, not carinate (Figs. 1, 2A, 3C). First ambulatory leg (pereopod 2) longest. Female pleon with 6 free somites + telson. Gonopods unknown.
ON THE TRAIL OF A JAPANESE “GHOST SPECIES”

Composition
Monotypic. Goniopugettia tanakae T. Sakai, 1986.

Distribution
Known only from Japan.

Remarks
The lectotype of Goniopugettia tanakae is clearly not conspecific with the paralectotypes of this taxon. The paralectotypes are instead, clearly identical to G. sagamiensis (Gordon, 1930). The differences are so substantial that G. tanakae and G. sagamiensis cannot even be regarded as congeneric, even if the G1 structure of G. tanakae is not known at present. The absence of a preorbital spine in G. tanakae (Figs. 1A, 2A) (present in G. sagamiensis, Figs. 4, 5); prominently dorso-ventrally flattened pseudo-rostral spines (Figs. 1A, 2A, B, 3A) (spines less obviously flattened dorso-ventrally and more subovate in cross-section in G. sagamiensis, Figs. 4, 5); the epibranchial region has a prominent lateral lobiform spine (Figs. 1A, 2A) (epibranchial region is swollen but not dentiform or projecting laterally in G. sagamiensis, Figs. 4, 5); the cardiac region is gently convex, not prominently projecting posteriorly (Figs. 1A, 2A) (cardiac region strongly swollen, projecting obliquely posteriorly as a large

Crustacean Research 46

Fig. 3. Goniopugettia tanakae T. Sakai, 1986, lectotype female (cw 16.2 mm) (SMF 49690). A, ventral surface of pseudorostral spines, antennae, antennules, orbit and epistome; B, outer view of left third maxilliped; C, outer view of left chela.
protuberance in *G. sagamiensis*, Figs. 4, 5); the intestinal region is swollen, forming a gently convex margin with the posterior carapace margin (Figs. 1A, 2A) (intestinal region prominently swollen, with a prominent tubercle on the posterior carapace margin in *G. sagamiensis*, Figs. 4, 5); the basal antennal article is sub-rectangular and proportionately longer with the
lateral margin almost straight (Fig. 3A) (basal article quadrate with the outer margin distinctly convex in *G. sagamiensis*, Fig. 6E); the ischium of the third maxilliped is proportionately longer (Fig. 3B) (the ischium is proportionately shorter and more quadrate in *G. sagamiensis*, Fig. 6D); and the absence of marginal carinae on the chela and merus of the cheliped (Figs. 1A, 2A, B, 3C) (distinct carinae present in *G. sagamiensis*, Figs. 4A–C, E, F, 5, 6F) are major distinguishing features. In addition, the surfaces of the entire carapace, chelipeds, ambulatory legs, thoracic sternum and pleon of *G. tanakae* are clearly covered with setal punctae, depressions where the setae used to insert and which would have been probably brushed away when the type specimen was first cleaned (Figs. 2, 3). In *G. sagamiensis*, when the setae are denuded or brushed away, the same surfaces appear smooth or almost so (Figs. 4–6). The differences in the structures of the pseudorostral spines, carapace and chelipeds are significant at the generic level (cf. Griffin & Tranter, 1986; Tavares, 1991). The carapace features of *Gonio-pugettia* s. str. (notably the large and subparallel hepatic, epibranchial and mesobranchial projections) are also markedly different from any of the Indo-West Pacific epialtid genera as-

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Fig. 5. Overall dorsal view of *Tunepugettia sagamiensis* (Gordon, 1930) new combination. A, paralectotype male of *Goniopugettia tanakae* T. Sakai, 1986 (cw 27.2 mm) (KPM-NH 130988); B, paralectotype male of *Goniopugettia tanakae* T. Sakai, 1986 (cw 15.7 mm, with *Sacculina*) (KPM-NH 130990); C, paralectotype female of *Goniopugettia tanakae* T. Sakai, 1986 (cw 22.7 mm) (KPM-NH 130989); D, male (cw 21.2 mm) (KPM-NH 130987).
associated with *Rochinia* A. Milne-Edwards, 1875, *Oxypleurodon* Miers, 1885, *Garthinia* Richer de Forges & Ng, 2009, *Guinotinia* Richer de Forges & Ng, 2009, *Laubierinia* Richer de Forges & Ng, 2009, *Stegopleurodon* Richer de Forges & Ng, 2009, and *Samadinia* Ng & Richer de Forges, 2013 (see Richer de Forges & Ng, 2009a, b; Ng & Richer de Forges, 2013).

The carapace and other diagnostic features of *Goniopugettia* s. str. are quite distinct among Indo-West Pacific epialtids and nothing known resembles it. Among the taxa known from Europe and the Americas, *Goniopugettia* s. str. bears a superficial resemblance to species of *Epialtus* H. Milne Edwards, 1834, *Eupleurodon* Stimpson, 1871, and *Epialtoides* Garth, 1958, particularly in possessing parallel and laterally directed hepatic and mesobranchial projections (cf. Rathbun, 1925: text figs. 53, 57, pl. 46 fig. 1, pl. 47 fig. 1; Garth, 1958: pl. M fig. 1, pl. N fig. 1, pl. 26 figs. 1, 4, 6). However, none of these species also have a distinct epibranchial projection or spine, and the form of their pseudorostral spines, as well as structures of the antennule, basal antennal article, third maxilliped and chelipeds are completely different.

**Goniopugettia tanakae** T. Sakai, 1986
(Figs. 1–3)

**Material examined**
Lectotype: dried female (cw 16.2 mm, cl 21.6 mm, prl 16.4 mm) (SMF 49690), Japan, no other data available, coll. S. Tanaka.

**Diagnosis**
As for genus.

**Description of lectotype female**
Carapace pyriform; dorsal surface with regions well defined, uniformly covered with numerous small punctae (probably remnants of basal pits of short pubescence after brushing), without sharp tubercles or spines; gastric and cardiac regions elevated (Figs. 1, 2A). Pseudorostral spines moderately long, fused along proximal half, strongly dorso-ventrally flattened, gently diverging outwards (Figs. 1, 2, 3A); lateral margins faintly convex; apices rounded. Supraorbital eave long, narrow, almost confluent with lateral edges of pseudorostral spine, demarcated only by small, shallow notch, without preorbital tooth or spine; postorbital tooth short, triangular, inner surface with gentle concavity (Figs. 1, 2A, 3A). Hepatic spine prominent, straight, tip rounded, directed laterally (Figs. 1, 2A). Mesobranchial spine prominent, directed laterally, extending beyond hepatic spine, tip rounded (Figs. 1, 2A). Epibranchial spine shorter than mesobranchial spine, but still prominent, stout, dorsoventrally flattened, directly laterally, subparallel to hepatic and mesobranchial spines; tip rounded (Figs. 1, 2A). Cardiac and intestinal regions raised vertically but without conspicuous spines or tubercles; posterior carapace margin prominently convex, but unarmed (Figs. 1, 2A).

Ocular peduncle short; cornea rounded, darkly pigmented (Figs. 2, 3A).

Suborbital margin confluent with lateral margin of basal antennal article, without trace of fissures (Fig. 3A). Antennules folding obliquely vertically (Figs. 2B, 3A). Basal antennal article subrectangular, distinctly longer than broad; outer margin partly gently crenulated, otherwise entire, unarmed, nearly straight; inner margin with proximal part dilated, appearing dentiform, rest of margin slightly concave; third article cylindrical, slender, shorter than basal article; fourth article slightly shorter than third article; flagellum short, not reaching tip of pseudorostral spine (Figs. 2B, 3A). Epistome subrectangular, slightly wider than long; posterior margin crenulated (Figs. 2B, 3A). Sub-orbital and pterygostomial regions covered with numerous setal punctae, otherwise smooth, separated from sub-branchial region.
by row of 3 or 4 low, rounded tubercles (Figs. 2B, 3A).

Third maxilliped almost completely covering buccal cavity when closed; surfaces covered by setal punctae and short pubescence; ischium subrectangular with outer and inner margins parallel, elongate, with a distinct submedian longitudinal sulcus wider distally than proximally; merus subquadrate, inner margin shorter than outer margin, anterolateral margin weakly produced, auriculiform; exopod relatively slender, not reaching distal edge of merus, with long flagellum (Figs. 2B, 3B).

Chelipeds equal, not elongate; chelae not inflated; margins of merus, carpus, chela and fingers rounded, not carinate. Merus trigonal in cross-section, with low distal tooth on dorsal margin. Carpus short, with dorsal surface slightly flattened, without inner subdistal tooth or spine. Surface of palm covered with scattered setal punctae, outer surface with low longitudinal groove on upper third running along entire length. Fingers straight, shorter than palm; cutting edges with distinct low, evenly spaced teeth (Figs. 1, 2A, 3C).

Ambulatory legs moderately long, slender; first leg (pereopod 2) longest, fourth leg (pereopod 5) shortest; margins of merus, carpus and propodus rounded, not carinate; surfaces with scattered setal punctae; meri unarmed; carpi short, with shallow submarginal sulcus; dactyli gently curved, tapering to curved corneous claw, surface with dense short setae except for corneous claw (Figs. 1, 2A, B).

Thoracic sternum covered with short pubescence. Stermites 1 and 2 completely fused, forming small triangular plate, separated from sternite 3 by distinct suture, lateral parts not visible; sternite 3 and 4 completely fused (Figs. 2B).

Female pleon broadly rounded, with 6 free somites + telson, covering most of thoracic sternum; surface covered with short setae, without prominent tubercles or spines; telson broadly triangular with rounded tip (Figs. 2B).

Remarks
This species is known only from the single female specimen collected by S. Tanaka and now deposited in the SMF. The precise location and circumstances of its collection are unknown.

**Tunepugettia n. gen.**
LSID urn:lsid:zoobank.org:pub: 327B79AD-873A-44BA-9632-596E99DFD066

**Goniopugettia** T. Sakai, 1986: 2 (part); Ng et al., 2001: 13 (part); Ng et al., 2008: 103 (part).

**Type species**
*Pugettia sagamiensis* Gordon, 1930, by present designation. Gender feminine.

**Diagnosis**
Carapace pyriform; dorsal surface with regions well defined (Figs. 4, 5, 8A); pseudorostral spines fused along proximal one-third to two-fifths, not strongly flattened dorso-ventrally with more rounded lateral margin, cross section subovate (Figs. 4, 5, 8A); supraorbital eave separated from lateral edges of pseudorstral spine by distinct notch, preorbital spine blunt to acute (Figs. 4, 5, 8A); postorbital tooth short, thick, triangular, terminally blunt (Figs. 4, 5, 8A); hiatus between supraorbital eave and postorbital tooth widely V-shaped; hepatic, epi-branchial and mesobranchial regions swollen, but not forming distinct spines or long projections; hepatic region with large laterally directed protuberance (Figs. 4, 5, 8A); mesobranchial region with lateral protuberance of various sizes (Figs. 4, 5, 8A); cardiac and intestinal regions inflated, protuberance on cardiac region may be large, directed obliquely posteriorly, intestinal region swollen (Figs. 4, 5); posterior carapace margin with distinct median tooth or low tubercle (Figs. 4, 5, 8A). Basal antennal article subquadrate, longer than broad, outer
margin distinctly convex, inner margin sinuous (Figs. 6E, 8B). Third maxilliped with ischium subquadrate, longer than broad; anterolateral margin of merus weakly produced (Figs. 6D, 8B). Cheliped with margins of merus, carpus, propodus and dactylus (including chela and fingers) sharply carinate (Figs. 4, 5, 6F). Male thoracic sternites 3 and 4 fused without median sutures; lateral margins of sternites 3 and 4 constricted, surface prominently concave (Fig. 6.

Tunepugettia sagamiensis (Gordon, 1930) new combination, paralectotype male of Goniopugettia tanakae T. Sakai, 1986 (cw 27.2 mm) (KPM-NH 130988). A, thoracic sternum and pleon; B, sternopleonal cavity; C, pleon; D, outer view of right third maxilliped; E, ventral surface of frontal region of carapace, showing details of pseudorostral spines, antennules, antennae, orbit and epistome; F, outer view of left chela.
ON THE TRAIL OF A JAPANESE “GHOST SPECIES”

Composition

Two species, *Goniopugettia sagamiensis* (Gordon, 1930), and *G. brevirostris* (Doflein, 1904).

Distribution

Indo-West Pacific.

Remarks

Takeda & Komatsu (2005: 280), in their discussion of their new species, *Rochinia daiyuae*, commented briefly that *Rochina brevirostris* (Doflein, 1904) should be transferred to *Goniopugettia* (now *Tunepugettia* n. gen.) but did not elaborate. We concur for the moment. *Rochinia* is being revised by the first author, B. Richer de Forges and B.Y. Lee with additional material from the Indian Ocean and the western Pacific and the composition of this genus will be discussed further then.

*Tunepugettia sagamiensis* (Gordon, 1930),
new combination
(Figs. 4–7)

*Pugettia brevirostris*—Parisi 1915: 287–289, text-fig. 2, pl. 7 fig.1 [not *Hyastenus brevirostris* Doflein, 1904 = *Rochina brevirostris* (Doflein, 1904)].

*Pugettia sagamiensis* Gordon, 1930: 520 (list), 521.

*Pugettia sagamiensis*—Gordon 1931: 557, 558, text-figs. 35, 36c.

*Goniopugettia sagamiensis*—Sakai, 1986: 1, pl. 1 figs. 4–6; Marumura & Kosaka 2003: 33; Ng et al., 2008: 103 (for complete synonymy, see Sakai, 1976; Lee et al., 2017).

Material examined

Paralecotypes of *Goniopugettia tanakae* Sakai, 1986, and other T. Sakai material; see above under Extant material.

Other material: 1 ovigerous female (cw 32.0 mm, cl 46.5 mm, prl 40.1 mm) (CBM-ZC 422), Uraga Strait, off Kanaya, Futtsu, Chiba Prefecture, 200–300 m, gill net, coll. T. Komai, 9 May 1994; 1 male (cw 42.8 mm, cl 59.5 mm, prl 52.8 mm) (CBM-ZC 1959), similar locality, 35°09′N, 139°47′E, 200–230 m, gill net, coll. M. Miya, 12 July 1995; 1 male (cw 29.0 mm, cl 45.5 mm, prl 38.2 mm), 1 ovigerous female (cw 33.8 mm, cl 50.1 mm, prl 46.3 mm) (CBM-ZC 2424), Uraga Strait, off Myogane, Futtsu, Chiba Prefecture, 230 m, gill net, coll. M. Miya, 10 April 1996; 1 ovigerous female (cw 29.2 mm, cl 44.0 mm, prl 39.5 mm), 1 juvenile (cw 15.0 mm, cl 26.8 mm, prl 22.5 mm) (CBM-ZC 2659), similar locality, 180–200 m, gill net, M. Miya, 10 April 1996; 1 female (cw 20.0 mm, cl 32.4 mm, prl 28.0 mm), 1 ovigerous female (cw 25.2 mm, cl 240 A, B); sterno-pleonal cavity reaching anteriorly to level of proximal margins of coxae of chelipeds (Fig. 6A, B). Male pleon broadly triangular, all somites and telson free, somite 6 broadly rectangular (Fig. 6A, C). G1 gently sinuous with distal part composed of short inner lobe and more produced outer lobe (Fig. 7A–C); G2 short, with distal tip slightly cup-shaped, flagellum absent (Fig. 7D).

6A, B); sterno-pleonal cavity reaching anteriorly to level of proximal margins of coxae of chelipeds (Fig. 6A, B). Male pleon broadly triangular, all somites and telson free, somite 6 broadly rectangular (Fig. 6A, C). G1 gently sinuous with distal part composed of short inner lobe and more produced outer lobe (Fig. 7A–C); G2 short, with distal tip slightly cup-shaped, flagellum absent (Fig. 7D).

**Fig. 7.** *Tunepugettia sagamiensis* (Gordon, 1930) new combination, paralectotype male of *Goniopugettia tanakae* T. Sakai, 1986 (cw 27.2 mm) (KPM-NH 130988). A, left G1 (ventral view); B, distal part of left G1 (ventral view); C, distal part of left G1 (dorsal view); D, left G2. Scales: A, D = 1.0 mm; B, C = 0.5 mm.
41.5 mm, prl 35.0 mm) (CBM-ZC 4452), Uraga Strait, off Iwai, Kyonan, Chiba Prefecture, 200–250 m, gill net, coll. T. Komai, 26 April 1998; 1 male (cw 34.6 mm, cl 50.3 mm, prl 44.3 mm) (CBM-ZC 6639), Uraga Strait, off Katsuyama Ukishima Islet, Kyonan, Chiba Prefecture, 250–300 m, gill net, coll. T. Komai, 16 December 2002.

**Diagnosis**

Carapace with gastric and cardiac regions distinctly inflated (Figs. 4, 5); hepatic and mesobranchial protuberances large, subparallel, directed laterally (Figs. 4, 5); margin between postorbital spine and hepatic protuberance gently concave (Figs, 4, 5); cardiac region prominently swollen with distinct posteriorly-directed protuberance (Figs. 4, 5). Posterior margin of carapace with large tooth in adults (Figs. 4, 5). Merus and propodus of ambulatory legs distinctly carinate marginally (Figs. 4, 5). G1 with distal part directed obliquely upwards (Fig. 7A–C).

**Remarks**

*Tunepugettia sagamiensis* is a common species in waters deeper than 200 m in Japan, Taiwan and the South China Sea (Sakai, 1976; Ikeda, 1998; Huang & Hsueh, 1998; Lee et al., 2017). Specimens have been mainly found on soft and muddy substrates but also sometimes from rocky bottoms.

The second representative of the genus, *Tunepugettia brevirostris* was described by Doflein (1904: 85, pl. 27-figs 13, 14) from off the coast of Sumatra on the basis of one female (Fig. 8). Griffin & Tranter (1986: 176) reported an additional male specimen from the Bay of Bengal and figured parts of its carapace and gonopods. *Tunepugettia brevirostris* can be separated from *T. sagamiensis* in having the gastric and cardiac regions proportionately less inflated (Fig. 8A) (distinctly inflated in *T. sagamiensis*, Figs. 4, 5); the hepatic protuberance is directed obliquely anteriorly, forming a deep concave margin with the postorbital tooth (Fig. 8A) (versus the hepatic protuberance is directed laterally, forming a gently concave margin with the postorbital tooth in *T. sagamiensis*, Figs. 4, 5); the cardiac region is not as prominently swollen without a distinct posteriorly-directed protuberance (Fig. 8A) (cardiac region with large protuberance in *T. sagamiensis*, Figs. 4, 5); the posterior carapace margin has only a low tubercle (Fig. 8A) (with a large tooth in adult *T. sagamiensis*, Figs. 4, 5); and the merus and propodus of the ambulatory legs are not carinate (Fig. 8A) (sharply carinate in *T. sagamiensis*, Figs. 4, 5). In addition, while the G1 of *T. brevirostris* resembles that of *T. sagamiensis* in its general shape except that the distal part is directed laterally (Griffin & Tranter, 1986: fig. 62c, d) (directed obliquely upwards in *T. sagamiensis*, Fig. 7A–C). The record of “R. aff. brevirostris” from Vanuatu by Richer de Forges & Ng (2013) represents clearly an undescribed species, differing from the type in having the carapace regions even less developed.

The publication date for *T. sagamiensis* is 1930 and not 1931 as has sometimes been cited. In a relatively well cited paper on Chinese and Japanese crabs, Gordon (1931) named seven new species and provided two replacement names. However, seven of these new names had already been published in a short paper by her several months earlier (Gordon, 1930). This earlier paper had been overlooked by most workers and not even cited by Gordon herself. The seven affected names are: *Pugettia cristata* Gordon, 1930, *Pugettia sagamiensis* Gordon, 1930 [presently in *Tunepugettia*], *Litocheira amoyensis* (Gordon, 1930) [presently in *Heteropilumnus* De Man, 1895], *Pilumnus penicillatus* Gordon, 1930, *Charybdis barneyi* Gordon, 1930 [= *Charybdis (Charybdis) affinis* Dana, 1852], *Charybdis sinensis* Gordon, 1930 [= *Charybdis (Goniohellenus) vadorum*].
Fig. 8. *Tunepugettia brevirostris* (Doflein, 1904) new combination, holotype female (cw 15.9 mm) (ZMB 13647), station 185W, Sumatra, 614 m, coll. Deutsche Tiefsee Expedition, 21 January 1899. A, overall dorsal view; B, ventral surface of frontal region of carapace, showing details of antennules, antennae, orbit, epistome and third maxillipeds.
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