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A remarkable species of the Dromiacea (Crustacea, Decapoda)
from the Tsushima Islands, Japan¹

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Among the crabs from the sea around the Tsushima Islands in the northwest of Kyushu collected by the research vessel 'Genkai' for the trustees of the National Science Museum, Tokyo, a small curious crab was found. It is referable to the section Dromiacea on account of having the first pleopods in the female. After our close examination and the much consultation with Dr. I. Gordon and Dr. D. Guinot, the sole ovigerous female was proved to represent not only a new species but also a new genus. In the Dromiacea it bears some unusual features such as the absence of the vestiges of the uropods, the forwards position of the anterior margins of the third maxillipeds, the absence of the distinct *linea dromiidica*, the strong backwards extension of the abdomen bending at the fourth segment, and the flattened propodi and talon-like dactyli of the last two legs. Some of those features may be peculiar to the family Homolodromiidae, but the general formation of the carapace is more close to the family Dromiidae to which it is rather tentatively referred. In the following pages a new genus *Genkaia* named for the Genkai by which the Tsushima Expedition was carried out and a new species *G. gordonae* dedicated to Dr. I. Gordon in honour of the invaluable contributions to the knowledge of the carcinology are described. The description may be, however, not always sufficient for getting the com-

1) Contributions from the Zoological Laboratory, Faculty of Agriculture, Kyushu University, No. 426.

plete knowledge of the curious crab, since the dissection of the sole specimen is undesirable.

The holotype should be preserved in the National Science Museum, Tokyo, together with the other specimens from the sea around the Tsushima Islands collected by the Genkai.

Genkaia gen. nov.

Diagnosis. Carapace only slightly broader than long with well marked side-edges and without distinct branchial and cervical grooves, and not much convex in both directions. Frontal region rather produced forwards. Lateral frontal tooth forms a lamelliform eave together with preorbital tooth. Supraorbital border bears a deep slit-like interruption. Dorsal surface of eyestalk markedly flattened and nearly in a level of dorsum of carapace. Antennal flagellum very short and fine. Third maxillipeds opercular, completely close buccal cavern and extended forwards so as to cover proximal parts of antennulae and antennae. *Linea dromioidica* nearly obsolete only with proximal faint groove at pterygostomial region beside exopod of third maxilliped.

Chelipeds equal, stout and not much exerted beyond carapace. Palm and fingers compressed and rather curved inwards. Tips of fingers crossed to each other and not hollowed at all. First two pairs of legs slender and normal, while last two pairs rather reduced and subdorsal. In last two pairs each propodus flattened and rather ovate, and dactylus cylindrical, talon-like and recurved towards surface of propodus.

Abdomen consists of seven segments. First three segments extended horizontally-backwards, and remaining four folded below. In second to fifth segments lateral walls of abdomen formed. No vestiges of uropods. Sternal furrows of female distinct.

Type-species. *Genkaia gordonae* sp. nov.

Genkaia gordonae sp. nov.

(Figs. 1, 2)

Description of holotype. The carapace is only slightly broader than long, its dorsal surface being nearly flat only with median shallow depression; in reality, the regions behind the orbits, the gastro-cardiac region and each of the posterolateral regions are rather sunken; the dorsal surface is covered only with microscopical granules that are denser near the front and the lateral borders; the frontal region is rather protruded forwards, its median part being deeply sunken and somewhat V-shaped in the dorsal view; the lower surface of the front bears a median, longitudinal high crest, the distal end of which is pro-

duced into a small protuberance as a median frontal tooth; each of the lateral frontal teeth is weakly angulated and as strong as the preorbital tooth, forming a lamelliform eave together with the latter; the eave is generally and shallowly concave throughout the length; behind each of the preorbital teeth the front is rather strongly constricted. The supraorbital border bears a deep slit-like interruption in the middle. The external orbital angle is strongly produced into a tubercular tooth with a rounded tip and directed obliquely-forwards, but its dorsal surface is so flat that it appears to be a lobe in the dorsal view. The infraorbital border is short, ventrally convex and not interrupted; at its inner extremity is a deep depression that is extended posteriorly as a very faint, oblique line of the *linea dromiidica*. The anterior corner of the pterygostomial edge of the buccal cavern is strongly extended forwards beyond the level of the infraorbital border, curving weakly inwards. The dorsal surface of the eyestalk is almost flat, the ventral surface is convex, and the cornea is chiefly ventral; in the middle of the anterior border of the eyestalk is a conical, rather angulated prominence that is thin-edged; the prolongation onto the cornea is more or less angulated and forms the distal extremity of the anterior border of the eyestalk.

The basal segment of the antennula is very large and freely movable, but not contact with each other due to the median low crest. The antenna is composed of five segments and the flagellum; the second segment or the basis is the most prominent and bears a long lateral outgrowth that is thickly armed with spiniform granules; the flagellum is short, fine and as long as or only slightly longer than the third segment, being probably composed of two hairs.

The third maxillipeds are rather narrow, but entirely close the buccal cavern; the epistome is very short, sunken and entirely concealed beneath the third maxillipeds which are extended forwards so as to cover the proximal parts of the antennae and antennulae; the merus is more or less quadrate and half the length of the ischium; its antero-external angle is rather produced into a rounded lobe and curved upwards, while its antero-inner angle is prominently granulated and angulated; the anterior border of the merus is thin-edged together with that of the carpus; the distal angle of the propodus is rather produced and fitted in the cleft between the merus and ischium; the dactylus is lanceolate and provided with short hairs on the lower surface, but bears no distal hairs.

Each of the lateral borders of the carapace is armed with three teeth at some distance behind the prominent external orbital lobe, being bluntly crested; the subhepatic region is rather swollen near and below the external orbital lobe and visible between the external orbital lobe

and the first tooth; the first and second teeth are more or less conical and rather similar to each other, but the latter is larger and more lobular; the third is not prominent and is only a rounded or more or less angulated prominence; between the second and third teeth is a shallow dorsal depression that is extended obliquely-inwards as an indistinct shallow furrow; the posterior slope of the third tooth is not delimited from the posterolateral part of the lateral border of the carapace which is rather convergent and weakly concave in the middle; near the posterior end of the lateral border is a dorsal groove by which the lateral part of the posterior border is delimited from the dorsal surface of the carapace; the middle part of the posterior border is prominently concave.

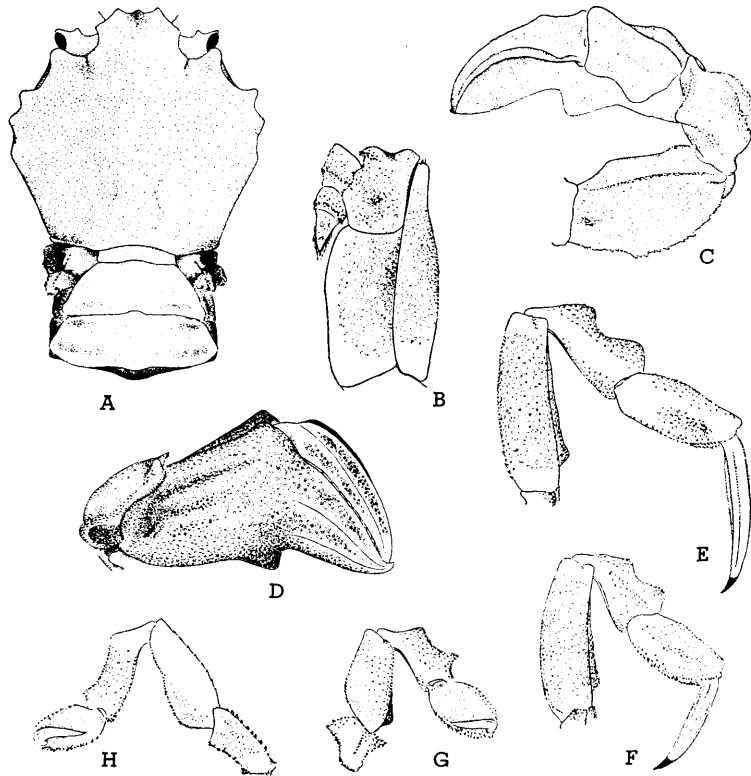


Fig. 1. *Genkaia gordonae* gen. et sp. nov., holotype. A, Carapace and abdomen in dorsal view, $\times 7.5$; B, left third maxilliped, $\times 17.5$; C, right cheliped in dorsal view, $\times 12.5$; D, right chela in outer view, $\times 12.5$; E and F, right first and second ambulatory legs, respectively, in dorsal view, $\times 12.5$; G, right third leg in dorsal view, $\times 12.5$; H, left fourth leg in dorsal view, $\times 12.5$.

The chelipeds are equal and alike each other. In the merus the upper surface is wholly excavated, the inner surface is truncated, and the lower surface is generally convex, the borders being bluntly crested; the outer border is convex near the middle, and the distal part from the weak prominence is armed with several equidistant granules, the inner upper border is entire, and the inner lower bears a prominence near the middle which is more or less angulated; there is otherwise a small low prominence near the distal end of the inner surface. The outer surface of the carpus is truncated and nearly flat only with a longitudinal prominence parallel to the outer border; its inner angle is strongly produced into a large, lobular thin tooth, and at the articulation with the palm there is a more or less tuberculated tooth that is rather directed upwards; the outer border of the carpus is distinctly crested, and the outer surface is small and truncated. The palm is compressed and bears some crests; the upper border appears to be equipped with a "plate" due to the strong, inwards-directed lobular expansion of the upper border that is deeply concave in the middle; the outer border of the "plate" is also rather strongly crested, forming the outer upper border of the palm; the middle of the "plate" is ornamented with a longitudinal elevation and both sides of the elevation are rather strongly sunken, so that two longitudinal concavities are formed; the outer surface of the palm is provided with two longitudinal crests, of which the lower one is, however, obsolete except the proximal protuberance; the upper ridge-like crest is so prominent that the longitudinal cavity is formed between the crest and the outer border of the "plate"; the distal part of the crest is, however, rather low and only rounded; there is a thin, rather conical outgrowth at the distal end of the lower border; the lobular outgrowth is rather strongly curved inwards and weakly forwards, its summit being rounded. The fingers are rather strongly curved inwards and downwards; the movable finger is somewhat sickle-shaped, being about half the height of the immovable one; the cutting edge of the movable finger is nearly entire, while that of the immovable one bears several, distant conical teeth, both edges meeting throughout the lengths; in the movable finger the inner upper and outer upper borders are so strongly crested and raised that the upper surface appears to be concave; the inner upper crest is, however, more strongly developed throughout the length than the outer upper one, forming the upper border of the finger distally; the outer surface of the movable finger is provided with a longitudinal, low but distinct linear crest; the outer surface of the immovable finger also bears two longitudinal linear crests that are convergent to the tip of the finger, and the lower border of the immovable finger is markedly thin.

The first two pairs of the ambulatory legs are slender and alike

each other, while the last two pairs are short and also rather similar to each other. The first leg is much longer than the second; the anterior border of the merus is weakly convex, and the posterior border bears a longitudinal concavity throughout the length, in which the posterior borders of the carpus and proximal half of the propodus are fitted; both borders of the concavity are more or less crested, and the proximal part of the posterior border is strongly angulated; the anterior border of the carpus is strongly crested and bears two lobular prominences that are widely separated from each other and make the appearance of two humps in the dorsal view; the distal lobe is much larger than the proximal one; the posterior border of the propodus is provided with a longitudinal concavity, both borders of which are bluntly crested and minutely serrated; the posterior border of the carpus is also serrated and weakly crested due to the presence of the longitudinal low prominence in the middle of the upper surface; the dactylus is much longer than the propodus in the first pair, and as long as the propodus in the second pair; the dactylus is four-edged, two on the anterior and two on the posterior; in the middle of the surface there is a longitudinal, narrow crest-like ridge throughout the length. The third and fourth pairs are subdorsal in position, and the dorsal parts of the coxae of the fourth are nearly in the level of the dorsal surface of the carapace; unfortunately, all the legs are detached, so that the third and fourth pairs cannot be determined with certainty, but the fourth is probably longer than the third; in the shorter or probably third pair each of the ischium is about half the length of the merus and strongly angulated near the distal ends of both borders, while in the longer pair the ischium is two-thirds the length of the merus and fringed with sharp granules along both thin borders; in each of the legs the merus and carpus are rather similar to those of the first and second pairs, but two humps are rather angulated, and in the longer pair the proximal lobe of the merus is generally rounded; in both pairs each propodus is strongly depressed and flattened on the upper surface, being fringed with sharp granules, some of which are spiniform; in the shorter pair the propodus is more distinctly ovate than that of the longer pair in which it tapers only slightly; in each of both pairs the dactylus is cylindrical and talon-like, turning back towards the upper surface of the flattened propodus.

There is a prominent lobe on the thoracic sternite, with which the cheliped articulates; behind the lobe there is a semicircular lateral incision of the sternite carrying the chelipeds. The sternal furrows are rather short, and the spermathecal openings on the low eminences or mounds are rather far apart opposite coxae of the first legs. Each of the anterolateral border of the sternite carrying the second legs is well defined

and distinctly petaloid.

The first three segments of the abdomen are extended posteriorly and in the same level as the dorsal surface of the carapace, while the remaining four are folded below the former and the thoracic sternum and not strongly tapering; the first segment is fitted in the concavity of the posterior border of the carapace, being constricted between the coxae of the first legs; the second and third segments are very prominent, widening posteriorly; in the second there is a weak transverse ridge in front of and along each side of the posterior border, while in the third there is a pair of the transverse depressions, the margins of which are bluntly crested; in both segments each of the posterolateral corners is prolonged downwards to form the lateral wall; the surfaces of the distal four segments are uneven; in each of the fourth and fifth segments a median, transverse low crest is developed, the surface along it being somewhat sunken, and in addition, the lateral walls are strongly developed; in the penultimate the lateral proximal part is weakly curved to form the imperfect lateral wall, and there is no trace of the vestiges of the uropods; the apex of the terminal segment is subacute, the margin being very thin.

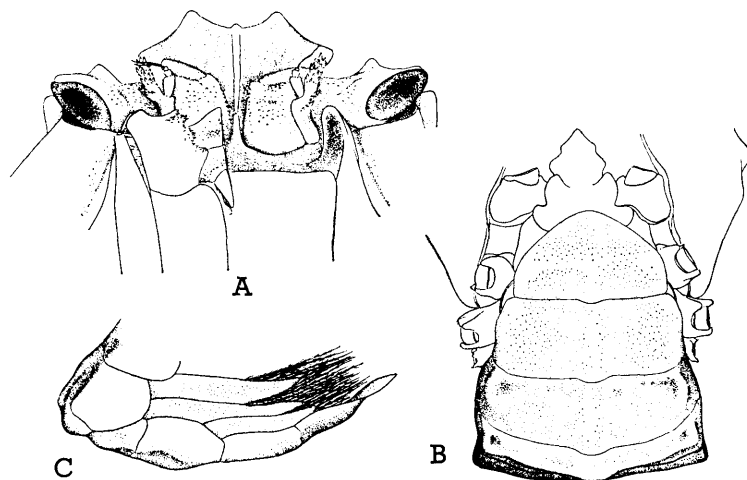


Fig. 2. *Genkaia gordonae* gen. et sp. nov., holotype. A, Fronto-orbital region in ventral view, $\times 17.5$; B, abdomen and sternum in ventral view, $\times 10.5$; C, abdomen in lateral view, $\times 12.5$.

Material examined.

Tsushima Straits, $33^{\circ} 49.9' N$, $129^{\circ} 29' E$ (St. 8), 100 m deep, sand and shells; 1 ovig. ♀ (holotype), ZLKU No. 12698; July 26, 1968; Tsushima Expedition by the Genkai leg.

Measurements (in mm).

Length of carapace in median line.....	4.1
Greatest length of carapace	4.3
Length of carapace and abdomen in median line	6.7
Breadth of carapace	4.6
Distance between frontal lateral teeth	0.7
Distance between preorbital teeth	1.5
Distance between external orbital lobes	3.0

Remarks. Though the present new genus is highly aberrant and bears some unusual and pazzling characters, it is safely referable to the section Dromiacea on account of bearing the small first pleopods in the female. It is referable to the superfamily Dromiidea and distinguished from the Thelxiopidea by the presence of the sternal furrows in the female and by the short eyestalks. Due to the important contributions by Alcock (1899), Ihle (1913), Rathbun (1923), Sakai (1936), Gordon (1950), Balss (1957) and other authorities it is well known that in the Dromiidea are comprised three families Homolodromiidae, Dromiidae and Dynomenidae. The present new genus is distinguished from the members of the Dynomenidae most readily by that the last two pairs of the legs are small and subdorsal in position instead of only the last pair in the Dynomenidae. The present new genus is also not referred to the Homolodromiidae by bearing the well-defined side-edges of the carapace, the forwards position of the third maxillipeds which cover the entire epistome and the proximal parts of the antennulae and antennae, and by that in the fourth and fifth legs each propodus is ovate and the dactylus is recurved towards the upper surface of the propodus and hooked rather than prehensile. Furthermore, it is somewhat different from the Dromiidae in the absence of the vestiges of the uropods, the strong horizontal extension of the abdomen, and also in the formation of the third maxillipeds and the fourth and fifth legs. At present, in the result, the present new genus is tentatively referred to the family Dromiidae to which it seems to be more related rather than to the family Homolodromiidae in the general formation of the carapace.

According to Gordon (1963), otherwise, the so-called Tymolinae of the family Dorippidae of the section Oxystomata must maintain a familial separation from the Dorippidae and is much neared to the family Dromiidae of the section Dromiacea than to the family Dorippidae. At present, in the present paper, the inclusion of the "Tymolidae" in the section Dromiacea is refused chiefly as a matter of convenience on account of the absence of the first pleopods in the female. In the present new genus referred to the family Dromiidae, however, the very

strong projection of the abdomen bending at the fourth segment and the forwards position of the anterior corner of the pterygostomial edge show the close affinities with those of the "Tymolidae."

Among the known genera of the family Dromiidae it was noticed that the genus *Platydromia* Brocchi based on *P. depressa* from Saint-Paul Island, the name of which indicates the possession of the flattened dorsum of the carapace like in the case of the present new genus, is very imperfectly known without any definite features only by the original description and by André (1932). Dr. D. Guinot was kind enough to inform us that *P. depressa* is not a dromiid species, but is referable to the family Dynomenidae.

It is less easy to determine the position of the present new genus in the Dromiidae, since there are no genera which appear to be closely related and the branchial formula cannot be available. However, the present new genus seems to be placed near to the genus *Conchoedromia* Chopra based on a single species *C. alcocki* from off the mouth of the Hooghly River faced to the Bay of Bengal, and also to the genus *Hypoconcha* Guérine represented by seven species from both coasts of Central America. In both genera it is peculiar that there is no trace of the vestiges of the uropods like in the case of the present new genus. Besides the absence of the vestiges of the uropods, the external characters of *Hypoconcha* are typically those of the Dromiidae, while in *Conchoedromia* it is noted in the original description that the elongate carapace with well marked grooves, and the rather pediform third maxillipeds are some of the characters peculiar to the Homolodromiidae. In fact, among the characters considered the presence or absence of the vestiges of the uropods is outstandingly important and may be characteristic of the family. Up till now, unfortunately, the knowledge of those aberrant genera is not thorough especially with respect to the branchial formulae. In due time, however, it may be advisable to erect a new family based on *Hypoconcha*, *Conchoedromia* and the present new genus for drawing attention to this peculiar structure.

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References

- Alcock, A., 1899. Materials for a carcinological fauna of India. No. 5. The Brachyura Primigenia, or Dromiacea. J. Asiat. Soc. Bengal, (2), 68: 123-169.
- André, M. M., 1932. Crustacés recueillis par M. E. Aubert de la Rüe aux îles Kerguelen, Saint-Paul et de la Nouvelle-Amsterdam. Bull. Mus. Nat. Hist. nat., Paris, (2), 4: 174-181.
- Balss, H., 1957. Decapoda. VIII. Systematik. In: Dr. H. C. Bronns, Klassen und Ordnungen des Tierreichs. 5: 1505-1672.
- Brocchi, M., 1875. Sur un dromien nouveau, genre *Platydromia*. Bull. Soc. Philom. Paris, (6), 11: 53, 54.
- Chopra, B., 1934. Further notes on Crustacea Decapoda in the Indian Museum. VI. On a new dromiid and a rare oxystomous crab from the Sandheads, off the mouth of the Hooghly River. Rec. Ind. Mus., 36: 477-481, pl. 8.
- Gordon, I., 1950. Crustacea: Dromiacea. Part I: Systematic account of the Dromiacea collected by the "John Murrery" Expedition. Part II: The morphology of the spermatheca in certain Dromiacea. John Murrery Exp., 9: 201-253, pl. 1.
- , 1963. On the relationship of Dromiacea, Tymolinae and Raninidae to the Brachyura. In: H. B. Whittngto and W. D. I. Rolfe, Phylogeny and evolution of Crustacea. Mus. Comp. Zool., spec. publ., 51-57.
- Ihle, J. E. W., 1913. Die Decapoda Brachyura der Siboga-Expedition. I. Dromiacea. Siboga-Exp., 39b: 1-96, pls. 1-4.
- Rathbun, M. J., 1937. The oxystomatous and allied crabs of America. Bull. U. S. Nat. Mus., 166: i-vi, 1-278, pls. 1-86.
- Sakai, T., 1936. Studies on the crabs of Japan. I. Dromiacea. Sci. Rep. Tokyo Bunrika Daigaku, (B), 3, suppl., 1: 1-66, pls. 1-9.