

SYSTEMATIC STATUS OF THE GENERA *ADINDA*, *PERISCYPHIS*,
PARAPERISCYPHIS AND *TORADJIA*

CRUSTACEA—ISOPODA—ONISCOIDEA—ARMADILLIDAE

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INTRODUCTION

The genus *Toradjia* was established by Dollfus during 1898 on the collection of Dutch East Indies. During 1904, Budde-Lund created the genus *Adinda* to include *Periscyphis Weberi* Dollfus, but gave no description of generic characters. This genus is undoubtedly the same as *Paraperiscyphis* Stebbing 1911 according to Omer-Cooper (1926).

Paraperiscyphis was set up in 1911 by Stebbing to include his new species *Paraperiscyphis travancorensis* from Madathorai, formerly from travancore state now in Kerala.

The authors agree with the views expressed by Omer-Cooper, that there has been no valid character by which the four genera can be separated namely *Toradjia*, *Adinda*, *Periscyphis* and *Pavaperiscyphis*, and according to law of priority genus *Toradjia* stands valid to accomodate under other genera namely *Adinda*, *Periscyphis* *Paraperiscyphis*.

While the senior author was studying the Oniscid Isopod in connection with the preparation of "Fauna of India—Oniscidae", he came across these interesting genera and felt this fact should be cleared in the interest of science and compelled him to write an account. Besides, fortunately all the type of the species of *Tradjia* are represented in the Zoological Survey of India collection.

The genus includes the following species from Indian region namely :

1. *Toradjia gigas* (Collinge)
2. *Toradjia pulcher* (Collinge)
3. *Toradjia scabrus* (Collinge)
4. *Toradjia stebbingi* (Collinge)

and 5. *Toradjia travancorensis* (Stebbing)

Toradjia Dollfus

1898. *Toradjia* Dollfus, Prof, Max Weber's Publ. *Zool. Ergebnisse einer Reise in Niederlandisch Ost-Indien*, 4 (2) : 357-382 (1907).
1904. *Adinda* Budde-Lund. *A Revision of the Crustacea Isopoda Terrestria. pt. 2, Spherilloninae pt. 3, Armadillo, Copenhagen.*
1911. *Paraperiscyphis*, Stebbingi, *Rec. Indian Mus.*, Calcutta 6 (4) : 184.
1914. *Paraperiscyphis* Collinge, *Rec. Indian Mus.*, Calcutta 10 (3) : 207-209.
1915. *Periscyphis* Collinge, *Rec. Indian Mus.*, Calcutta 11 (2) : 148.
1916. *Paraperiscyphis* Collinge, *Rec. Indian Mus.*, Calcutta 12 (2) : 115-117.
1922. *Toradjia* Richardson, *Proc. United States Nat. Mus.*, 60 (24) : 3-4.
1926. *Toradjia* Omer-Cooper, *Proc. Zool. Soc. London*, 1 : 349-400
1936. *Adinda* Jackson, *Bull. Raffles Mus., Singapore* 12 : 84.

Characters : Body oblong-oval, smooth or with tubercles slightly convex ; cephalon small, flanked on either side by the lateral plates of the first thoracic segment ; lateral lobes well developed, median lobe present but small ; eyes sub-dorsal. In the second antennae, the first joint of the flagellum shorter than the second. The telson, obtuse, triangular and not narrowly produced at the apex. The inner branch of the uropod attached not to the projection of the peduncle's base but to a notch far below the inner margin, while still further below attached the outer branch ; both branches extending beyond the peduncle itself extending beyond the telson.

This genus was established by Dollfus during 1898 on the collection from Dutch East Indies, During 1904, Budde-Lund formed the genus *Adinda* to contain *Periscyphis weberi* Dollfus, but gave no description of the generic characters. This genus is undoubtedly the same as *Paraperiscyphis* Stebbingi, 1911 according to Omer-Cooper (1926). The genus *Paraperiscyphis* was established by Stebbingi to include his new species *P. travancorensis* from Maddathorai, former Travancore (Kerala). The author agrees with the views expressed by Omer-Cooper, that there has been no valid characters by which the three genera can be separated viz. *Toradjia*, *Adinda* and *Paraperiscyphis* and according to law of priority, the genus *Toradjia* stands valid to accommodate species described later under genera *Adinda* and *Paraperiscyphis*.

Type-Species : *Periscyphis weberi* Dollfus, 1898.

Distribution : Indonesia, India, Sri Lanka, East Africa, and Malaysia.

Keys to the Indian Species of the Genus Toradjia (Paraperiscyphis)

1. Body surface smooth length about twice its greatest width.
 - 1a. Body surface tubercular.
2. Lateral lobes of head raised in an angle.
 - 2a. Lateral lobes well developed.

3. Eyes small with three longitudinal rows of ocelli 17 in number.
 ... *Toradjia gigas* (Collinge).
- 3a. Eyes larger with 13 ocelli arranged in three longitudinal rows.
 ... *Toradjia pulcher* (Collinge).
4. Surface richly tubercular eyes with 11 ocelli arranged in three rows.
 ... *Toradjia Scabrus* (Collinge).
- 4a. Surface with rows of tubercles well arranged, eyes with 22 ocelli arranged in four rows.
 ... *Toradjia Strebbing* (Collinge).
- 4b. Surface with minutely setose warts, eyes with 16 ocelli arranged in four rows.
 ... *Toradjia travancorensis*
 (Strebbing).

***Toradjia gigas* (Collinge)**

Text-Fig. 1 & 2 (1-8)

1898. *Toradjia* Dollfus, Prof. Max Weber's Publ. *Zool. Ergebnissener. Reise in Niederlandisch Ost-Indien* 4 (2) : 357-382 (1907).

1915. *Periscyphis gigas* Collinge, *Rec. Indian Mus.*, 11 (2) : 141-149.

1916. *Paraperiscyphis gigas* Collinge, *Rec. Indian Mus.*, 12 (3) : 116.

General : Body oblong oval (Text fig. 1) very strongly convex and surface practically smooth. Length nearly double the greatest breadth.

Cephalon : Head (Text fig. 2-1) about two and half times wider than long, completely embedded within the lateral plates of the 1st thoracic somite. Anterior edge folded in the centre, with a triangular spine on its ventral surface. Lateral edges slightly raised in an angle. Central portion of posterior border depressed. Eyes small compared to the size of the specimen, with three longitudinal rows of ocelli 17 in number.

Thorax : Mesosomatic somites broad, strongly convex and gradually decreasing in size towards the posterior end. Lateral plates of first thoracic somite covering the lateral sides of the head. The first somite widest of all. All other somites sub-equal in width.

Abdomen : Abdomen about one-third in length of the mesosome, almost of the same width as the last thoracic somite. The first two segments small, covered by the last thoracic somite. Lateral plates of third to fifth somites expanded distally. Telson (Text fig. 1) broadly triangular, convex and smooth, its distal being rounded.

Appendages : First antenna (Text fig. 2-3) short and stout, 3 jointed, its distal end being pointed. Mandibles consisting an outer cutting edge with three blunt teeth and a blunt process on the inner edge beneath which is tuft of setae.

First maxilla (Text fig. 2-5) outer lobe terminating in four curved spines and five finer and straighter ones on the inner side. Second maxilla thin and plate-like, the inner lobe terminating in a mass of setae, while the outer lobe is more robust and tooth-like.

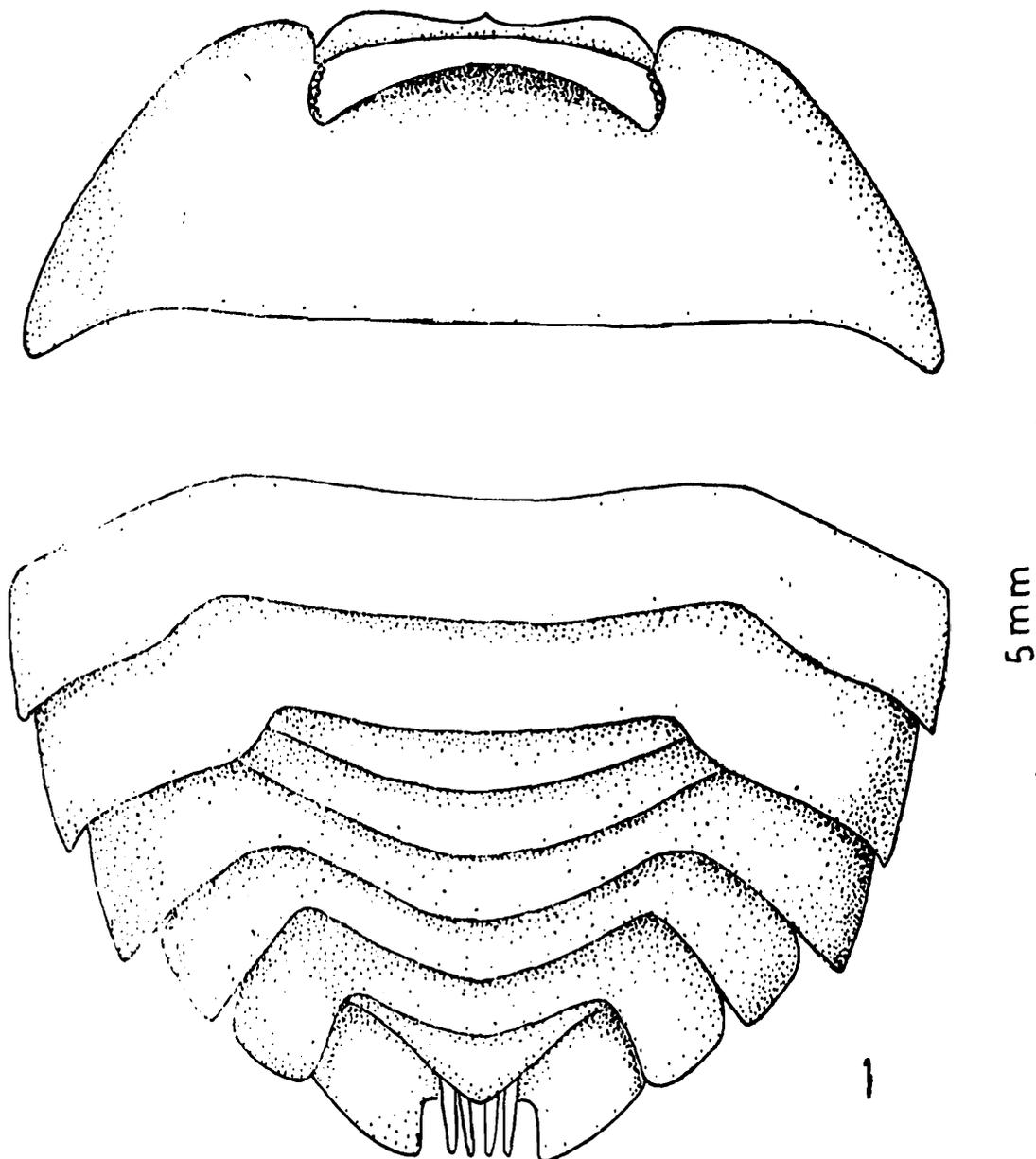


Fig. 1. *TORADJIA gigas* (Collinge) DORSAL VIEW
Head with Paereon Segment Paereon and Pleon.

Maxillipedes (Text fig. 2-4) inner lobe palp-like with setae on the inner side and two rows across the distal side, the outer palp terminating in three multispinous processes.

Thoracic appendages (Text fig. 2-7) robust and fringed with numerous spines with trifid terminal portion and smaller spines.

Uropoda (Text fig. 2-6) with a large basal plate, extending beyond the telson. Outer margin subcrenate ; exopodite articulating on the middle inner border, endopodite

slightly longer than the exopodite and articulating at the top of the inner border of the basal plate.

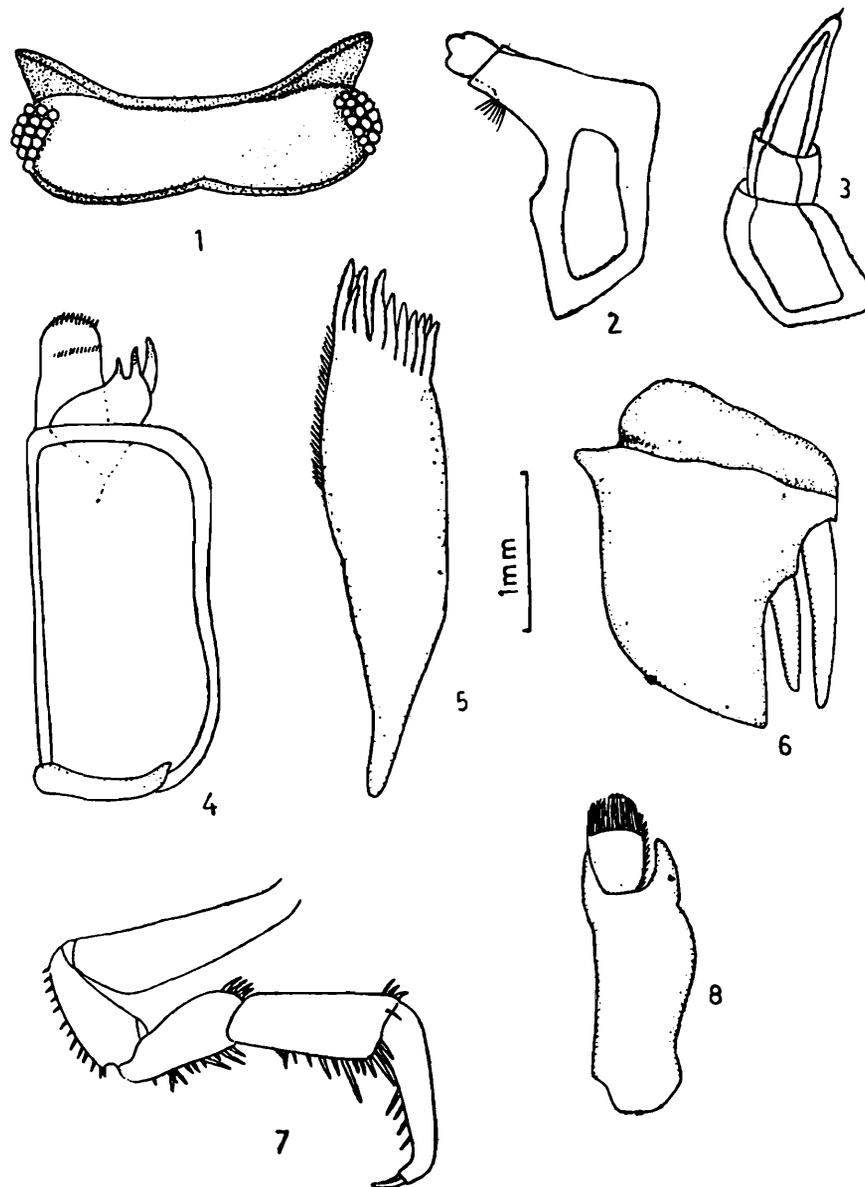


Fig. 2 (1-8). *TORADJIA gigas* (Collinge)

1. Dorsal view of Cephalon, 2. Right mandible, 3. First antenna, 4. Maxillipede,
5. Outer lobe of first maxilla, 6. Left uropod, 7. Second thoracic leg, 8. Second maxilla.

Colour horny-brown with the lateral plates of the 1st fifth and sixth mesosomatic and the third and fourth metasomatic segments yellow.

Length and breadth of female specimen 24 mm. and 13 mm. respectively.

Type-locality : Ponmudi near Trivandrum, Kerala, INDIA, September, 1893, Coll. H. S. Ferguson.

Syntypes : A male and female in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8626/10.

Distribution : This species is known, so far, from its type locality only.

Remarks : Since either of the two specimens do not possess the second antennae, it has not been possible to furnish particulars of the same.

Toradjia pulcher (Collinge)

Text-Fig. 1 & 2 (1-8)

1893. *Toradjia* Dollfus, Prof. Max Weber's Publ. *Zool. Ergebnissener. Reise in Niederlandisch Ost-Indien* 4 (2) : 357-382 (1907).

1916. *Parapericyphis pulcher* Collinge, *Rec. Indian Mus.*, 12 (3) : 116.

1975. *Paraperiscyphis pulcher* Ramakrishna, *Rec. zool. Surv, India*, 68 : 297-303.

General : Body elongate oval (Text-fig. 1) strongly convex, about two and half times longer than broad. Surface smooth all through.

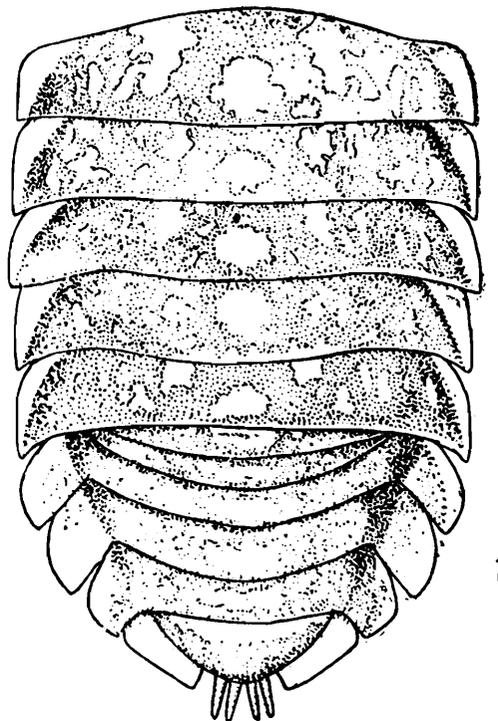
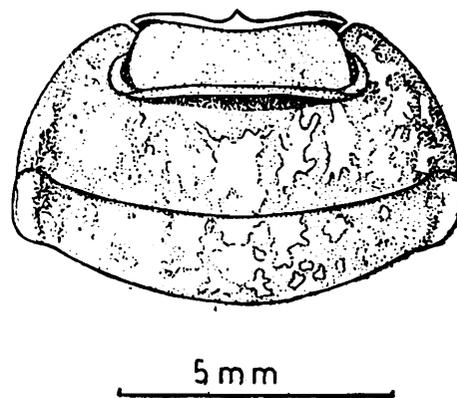


Fig. 1. *TORADJIA pulcher* (Collinge) Dorsal View.

Cephalon : Head almost three times wider than long, oval shaped. Frontal margin folding inwards with its middle portion deep, its ventral part forming a well developed, large and blunt spine. Antero-lateral lobes well developed. Posterior margin smooth and rounded postero-laterally. Eyes large, dorso-lateral, placed well behind the lateral lobe of the head with thirteen ocelli arranged in three longitudinal rows.

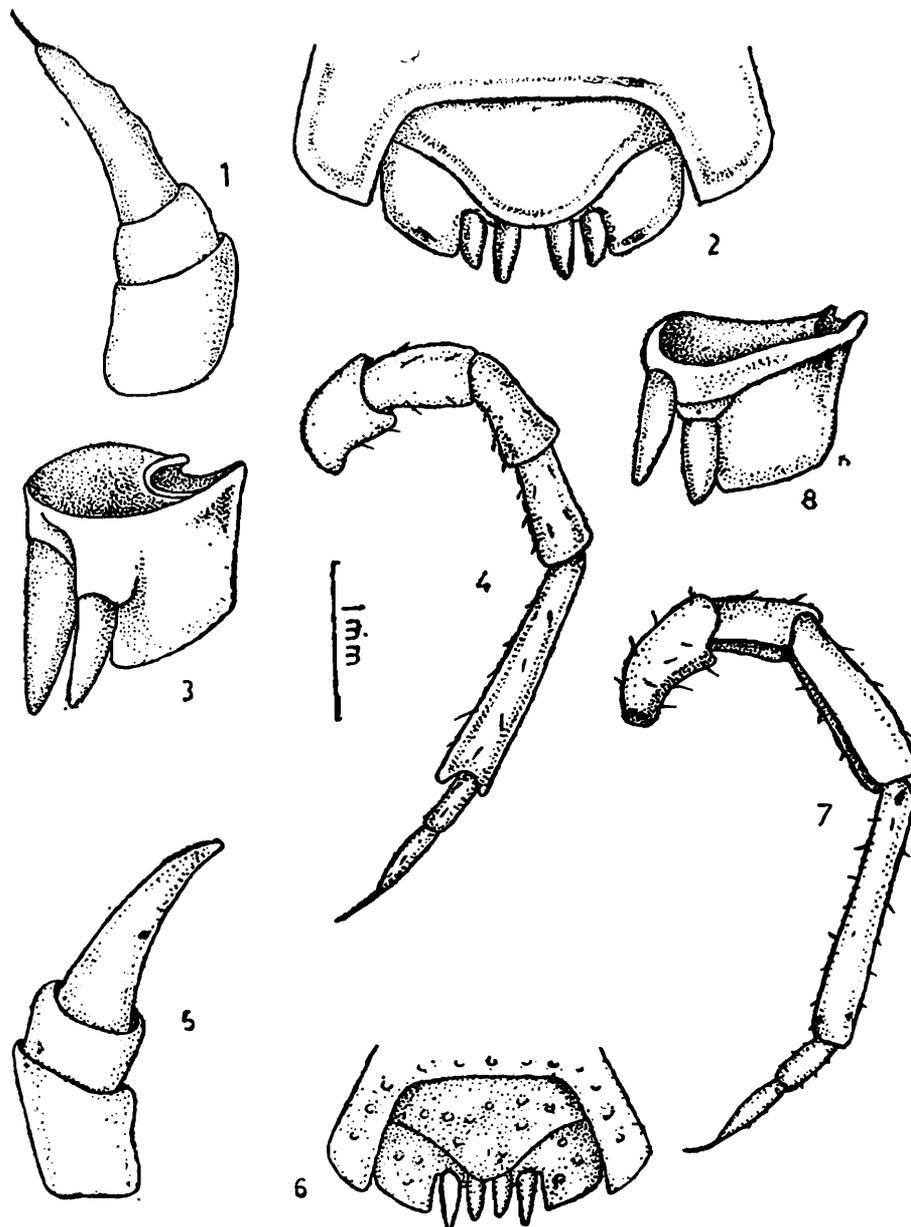


Fig. 2 (1-8). *TORADJIA pulcher* (Collinge)

1. Right antenna, 2. Telson with uropoda, 3. Right uropoda—dorsal view, 4. Right antenna (second antenna).

TORADJIA scabrus (Collinge)

5. Left antennule (first antenna), 6. Telson with uropoda, 7. Right antenna (second antenna), 8. Right uropoda, dorsal view.

Thorax : The first thoracic somite widest of all. Lateral plates of the first thoracic segment covering the head both laterally and posteriorly and its posterior part drawn out into an acute spine. The lateral plates of the second somite ending with a blunt

process, those of the third and fourth somites drawn posteriorly into a broad pointed spine. Lateral plates of the 5th to 7th segments not at all drawn but ending in a blunt process similar to that of the second somite. All the thoracic somites strongly convex.

Abdomen : Metasome about a third of the body. The first two somites, small, narrow and covered laterally by the lateral plates of the last thoracic somite. Third to fifth somites large with lateral plates expanding posteriorly. Telson large (Text fig. 2-2), broadly triangular with its apex slightly rounded.

Appendages : Antennule (Text fig. 2-1) small, and three-jointed, the distal longer than the basal two joints with its terminal portion ending in a style. The inner side of the distal joint indented. Antennae (Text fig. 2-4) moderately stout and long, second to fourth joints almost subequal, the fifth joint longest. Flagellum two jointed, the proximal shorter than the distal, the latter ending in a fine style.

Uropoda (Text fig. 2-3) extending beyond the telson, basal plate short and stout with anterodorsal surface expanded, convex dorsally, concave ventrally. Exopodite and endopodite extending beyond the basal plate, both articulating on the inner margin, exopodite flat and blade-like, endopodite three sided.

Colour greyish green with regular yellow patches all through the mesosome and metasome, arranged in the median line and laterally.

Length and greatest breadth of the ovigerous female 18 and 7.5 mm. respectively.

Type-locality : Peradeniya, (Ceylon), Sri Lanka, 28.5.1910, coll. Dr. F. H. Gravely.

Holotype : An ovigerous female specimen (in two parts) in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8603/10.

Distribution : In addition to its type locality viz. Peradeniya, Sri Lanka, this species is, so far, reported for the first time from the Silent Valley in Kerala, India.

Remarks : In the form of Cephalon, antennae, Uropoda and the size and shape of the specimen, this species differs from others of the genus.

Taradjia scabrus (Collinge)

(Text-Fig. 1)

1898. *Taradjia* Dollfus, Prof. Max Weber's Publ. *Zool. Ergebnissener. Reise in Niederlandisch Ost-Indien* 4 (2) 357-382 (1907).

1916. *Paraperiscyphis scabrus*, Collinge, *Rec. Indian Mus.*, 12 (3) : 117.

1975. *Paraperiscyphis scabrus* Ramakrishna, *Rec. Zool. Surv, India*, 68 : 297-303,

General : Body oblong oval, highly convex, (Text fig. 1) about two times longer than broad. Surface richly tubercular all through.

Cephalon : Head small, flanked on the lateral and posterior side by the lateral plates of first mesosomatic segment, its anterior frontal portion raised laterally into prominent lobes, the middle portion raised ventrally into a broad pointed process, almost looking like a spine. Posterior border with slight depression in the middle. Eyes dorso-lateral well behind the lateral lobes, with eleven ocelli arranged in three rows.

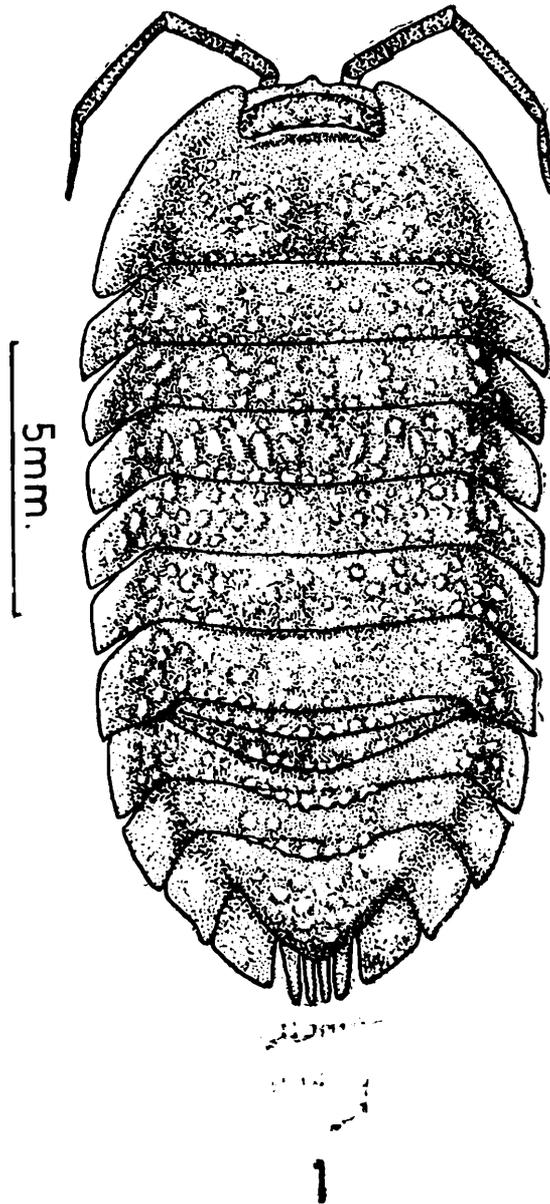


Fig. 1. *TORADJIA scabrus* (Collinge) Dorsal View.

Thorax : The first thoracic somite widest of all, the others being almost subequal. Lateral plates of all thoracic somite expanding posteriorly and ending in a blunt process, except the first one in an acute point.

Abdomen : Metasome about one third in length of the total body. The first two somites small, narrow in width and covered laterally by the lateral plates of the last thoracic segment. Third to fifth segments wider, prominent and their lateral plates

expanding posteriorly in an obtuse point. Telson (Text fig. 2-6) triangular with its apex broadly rounded.

Appendages : First antenna (Text fig. 2-5) small, three jointed, the distal joint terminating as a cone. Second antenna (Text fig. 2-7) short and stout, second and third joints subequal, fourth nearly double the size of the 2nd and fifth longest, about three times longer as the 2nd joint. Flagellum of two joints, with its proximal shorter than distal and the latter ending in a terminal style. The entire appendage being sparsely covered by blunt setae.

Uropoda (Text fig. 2-8) extending beyond telson, basal plate short and stout, with antero-dorsal surface expanded, convex dorsally with thickened antero-dorsal margin bounding the antero-dorsal surface, concave ventrally with groove. Exopodite and endopodite both extending beyond the basal plate and articulating on the inner margin.

Colour greenish brown with irregular yellow patches spread throughout the body.

Measurements of egg-bearing female specimen being 12 and 6 mm. in length and breadth respectively.

Type-locality : Peradeniya, (Ceylon), Sri Lanka, 26.5.1980, Coll. Dr. F. H. Gravely.

Holotype : An egg-bearing female in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 8585/10.

Distribution : In addition to its type locality, *Paraperiscyphis scabrus* is known to occur for the first time from Karnataka and Silent Valley in Kerala in India.

Remarks : *Paraperiscyphis scabrus* has some resemblance with regard to form of the telson and uropoda with *P. pulcher*, but it is distinct from it by the striking difference in the shape and development of the lateral and median lobes of the cephalon, antennule, antenna, number and rows of ocelli in the eye, and size and shape of the body.

Toradjia stebbingi (Collinge)

(Text figures a-f)

1898. Toradjia Dolifus, Prof. Max. Weber's Publ. *Zool. Ergebnissener. Reise in Niederlandisch Ost-Indien* 4 (2) : 357-382 (1907),
 1914. *Paraperiscyphis stebbingi* Collinge, *Rec. Indian Mus.*, 10 (3) : 207-209.
 1916. *Paraperiscyphis stebbingi* Collinge, *Rec. Indian Mus.*, 12 (3) : 115.

General : Body oblong oval (Text fig. a) strongly convex, nearly twice as long as the greatest breadth. Surface with rows of tubercles well arranged.

Cephalon : Head small, flanked laterally and posteriorly by the lateral plates of the first thoracic somite. Frontal margin laterally expanding to two lateral lobes with its anterior extremity ending in an obtuse angle. The middle portion of the front depressed deeply and folded with a raised triangular apex giving the appearance of an obtuse spine. Eyes dorso-lateral, prominent, with 22 ocelli arranged in four rows.

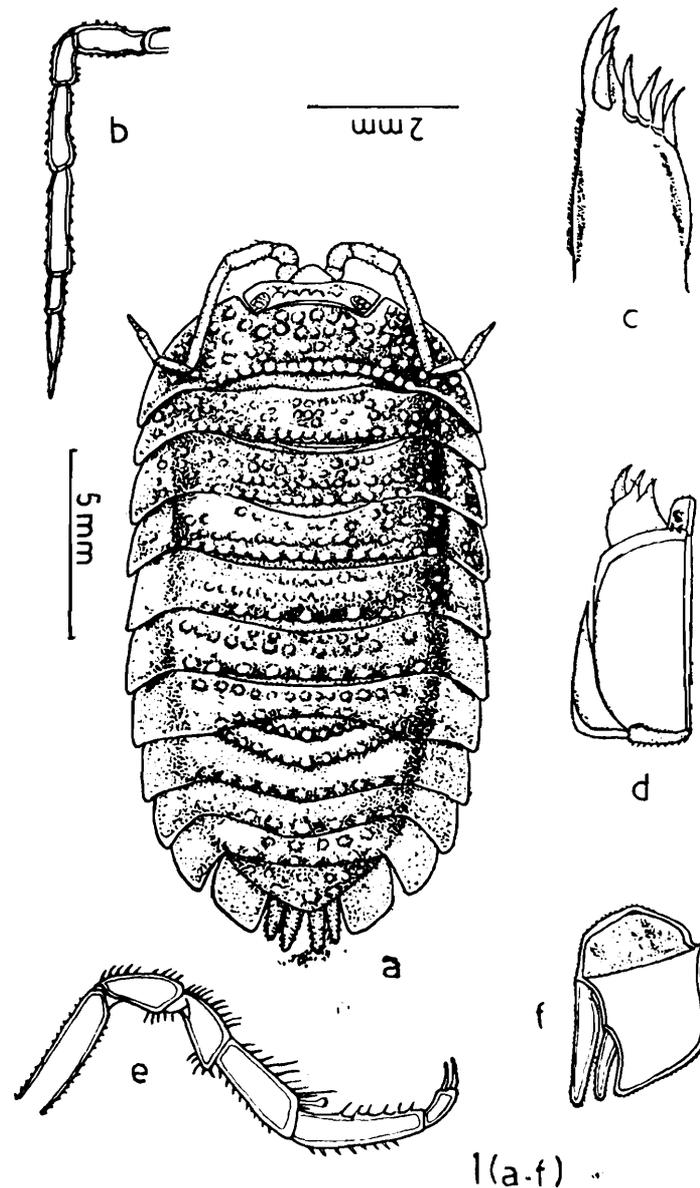


Fig. 1 (a-f). *TORADJIA stebbingi* (Collinge).

- a. Dorsal view, b. Second antenna, c. First maxilla, d. Maxillipede.
e. Second thoracic leg, f. Uropoda.

Thorax : First thoracic somite nearly double in width of the second, all others almost subequal. The lateral plates of the first somite covering the Cephalon laterally and posteriorly. The lateral plates of all other somites expanding towards their posterior end terminating distally in a blunt process. All the thoracic somites convex with regular rows of tubercles.

Abdomen : Metasome convex and about one-fourth the length of the body, somites wider than long. The first two somites broadly rounded posteriorly and smaller compared with third to fifth, its terminal end covered by the lateral plates of the last thoracic somite. Third to fifth somites well expanding posteriorly and its distal end terminating in an obtuse process. Telson broadly triangular with its apex terminating in a rounded obtuse process.

Appendages : First antenna small, three jointed. Located between the ventral side of the cephalon and the base of the second antennae. Second antenna (Text fig. b) moderately stout, its basal joint small, second and third subequal, fourth longer than the third and the fifth longest of all. The flagellum with two joints, the proximal shorter than the distal, the latter terminating in a thick style. Mandibles with three stout teeth at the outer cutting edge and a blunt process on the inner side. First maxilla (Text fig. c) with an outer lobe oblong and somewhat triangular in shape, distally terminating in seven incurved spines. Inner lobe small and narrow. Second maxilla slender, terminating distally in two setose plumes. Maxillipedes (Text fig. d) broad, the inner plate with numerous short simple setae, the outer palp terminating in three teeth. Thoracic appendages (Text fig. e) fringed with numerous spines, 2nd appendage terminating in two incurved spines.

Uropods (Text fig. f) basal plate large, extending beyond the telson, expanded and plate-like laterally, outer margin subcrenate fringed with hair-like setae and tuberculated. Exopodite on the inner margin, endopodite longer than exopodite and located at the top of the inner margin of the basal plate, both covered with fine setae and extending slightly beyond the basal plate.

Colour uniform dark-brown with the lateral plates yellowish.

Length and greatest width of the male specimen designated Lectotype are 19 and 10 mm. respectively.

Type-locality : Annamalai Hills, 4000 ft., Tamil Nadu, INDIA, 22.1.1912, coll. T. B. Fletcher.

Lectotype : A male specimen in the National Collections of the Zoological Survey of India, Calcutta, Regd. No. C.

Paralectotypes : Two males and two females (broken into parts) from the same locality as above, in the National Zoological Collections of the Zoological Survey of India. Regd. No. 8612/10

Distribution : This species is, so far, known from its type locality viz. Annamalai Hills, Tamil Nadu and Kavalai Hills, (Cochin State), Kerala between altitudes 1300 to 4000 ft. respectively.

Remarks : *Paraperiscyphs stebbingi* is the second species described under the genus *Paraperiscyphis* from India, the first being *P. travancorensis* Stebbing.

Toradjia travancorensis (Stebbingi)

(Text-Fig. 1-7)

1898. *Toradjia* Dollfus, Prof. Max. Weber's Publ. *Zool. Ergebnissener. Reise in Niederlandisch Ost-Indien* 4 (2) : 357-382 (1907).

1911. *Paraperiscyphis travancorensis* Stebbing, *Rec. Indian Mus.*, 6 (4) : 184-185.

1975. *Paraperiscyphis travancorensis* Ramakrishna, *Rec, zool, Surv. India*, 68 : 297-303.

General : Body elongate-oval, convex, (Text fig. 1) narrow anteriorly and wider in the posterior region. Length about double the width. Body not smooth but covered with minutely setulose warts.

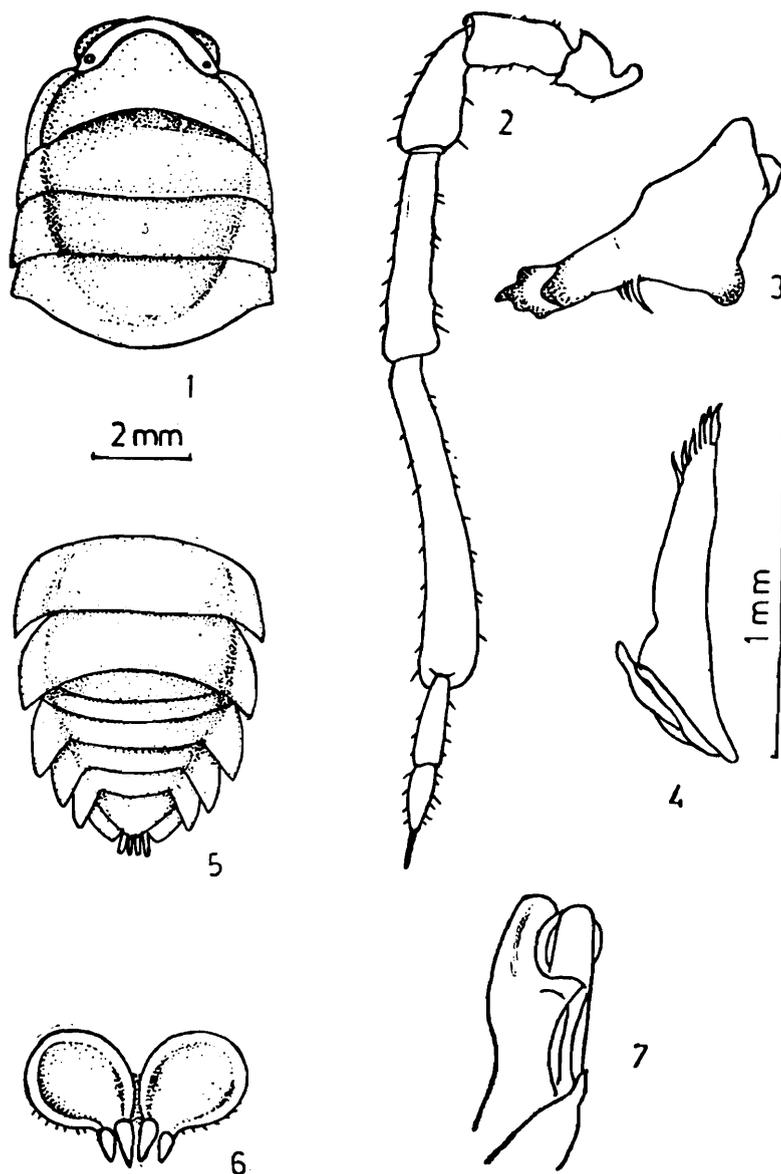


Fig. (1-7). *TORADJIA travancorensis* (Stebbingi).

1. Dorsal view : Head and anterior portion of Paereon, 2. Second antenna with terminal spine more magnified, 3. Mandible, 4. First maxilla,
5. Dorsal view : Posterior portion of Paereon and Pleon, 6. Uropods,
7. Second maxilla.

Cephalon : Head wider than long, about three times wider than long. Frontal portion raised. Antero-lateral lobe angular, folding in the centre giving the appearance of a depression. Posterior border almost straight, except for the depression in the middle. Eyes dorso-lateral, prominent and consisting of 16 ocelli arranged in four rows. Cephalon covered posteriorly and laterally by the first thoracic somite.

Thorax : Thorax widest at the sixth somite, strongly convex and its lateral plates/ending posteriorly in an obtuse process. First somite wider than others covering the posterior portion of the head. Surface also with setulose warts.

Abdomen : Metasome (Text fig. 6) about one-third of the body. The first two segments narrower but as wide as the last thoracic somite and the lateral plates of the same covering the two segments. Third to fifth somites prominent and its lateral plates expanding posteriorly pointing backward. Telson triangular and its apex being rounded.

Appendages : Second antenna (Text fig. 2) the basal joint is shortest of all, the 2nd and 3rd joints almost sub-equal, fourth as long as end and 3rd together and fifth longest of all. Flagellum two jointed, the distal shorter than the proximal, the apical seta being well formed.

Mandible (Text fig. 3) with two teeth and three sharp spines of which the third one longest and stout, placed within the inner side.

Maxilla (Text fig. 4) outer lobe with eight apical spines, with peculiar dumbbell shaped process at its proximal end.

The maxillipedes broad as in the genus *Periscyphis*. The thoracic legs fringed with numerous spines, most of them pointed, but one on the apical border of the fifth joint having an obtuse plumose apex.

Uropoda (Text fig. 6) with graceful curves of both the inner and outer margins. The endopods longer than the exopods and pointed distally.

Colour light-brown all through the body.

The length and width of the larger of the two specimens measuring 11 mm. and 6 mm. respectively.

Type-locality : Maddathoray, western base of the Western Ghats, Travancore, Kerala, INDIA, 18. 11. 1908, Coll. N. Annandale.

Syntypes : Two specimens (one female) damaged, in the National Collections of the Zoological Survey of India, Calcutta. Regd. No. 7931/10.

Distribution : This species, is so far, known to occur from its type locality only.

Remarks : The other mouth parts could not be dealt with as the material at the disposal do not have them, besides what ever available is badly damaged.

Paraperiscyphis traavancorensis Stebbingi has close resemblance to *Paraperiscyphis scabrus* Collinge, but differs from it by its shape and size of the body, cephalon, eyes, abdomen, and the mouth parts specially second antenna, maxilla and the uropoda.

SUMMARY

This paper includes details of the genus *Toradjia*, keys to the Indian species of *Toradjia* together with detailed synonyms and the description of the species *Toradjia gigas* (Collinge) together with illustrations of the five species wherever it was required.