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# *PLANODASYS MARGINALIS* GEN. ET SP. NOV. AND PLANODASYIDAE FAM. NOV. (GASTROTRICHA MACRODASYOIDEA)

By

G. CHANDRASEKHARA RAO
Zoological Survey of India,
27-Chowringhee Road, Calcutta-13, India

and

CLAUS CLAUSEN
Zoological Laboratory,
N-5000 Bergen, Norway



## ABSTRACT

A new marine interstitial macrodasyoid gastrotrich *Planodasys marginalis* is described from the intertidal sands on Waltair coast, India (Bay of Bengal). In the disposition of the adhesory tubules, shape of the tail lobes and the structure of the reproductive system, the new species fails to fit into any known genera of the order Macrodasyoidea, for which reason it is assigned to a new genus, *Planodasys*. The distribution of the species in relation to the nature of the biotope, has also been reported.

A new macrodasyoid gastrotrich family, Planodasyidae, is established to comprise the new genus *Planodasys* and the genus *Crasiella* CLAUSEN, 1968.

The present paper is divided into two sections: 1) the description of *Planodasys marginalis* gen. et sp. nov. by RAO, and 2) the establishment of a new family, Planodasyidae, by RAO and CLAUSEN.

## *PLANODASYS MARGINALIS* GEN. ET SP. NOV.

Studies of marine interstitial fauna in the beach sands of Waltair coast during the years 1960—1963, have revealed the occurrence of several interesting gastrotrichs (GANAPATI & CHANDRASEKHARA RAO 1967; CHANDRASEKHARA RAO & GANAPATI 1968a, b). During a brief faunistic survey undertaken by the Zoological Survey of India in November—December 1968, a further study of intertidal sands on Waltair coast and its environs was carried out. Four new species of Gastrotricha were encountered in the collections. The description of one of them is given in this paper while that of the other three species has been published elsewhere (CHANDRASEKHARA RAO 1970). The material has been examined in living condition.

*Description* (Figs. 1—7)

The adult specimens of *Planodasys marginalis* attain a length of 1.2—1.5 mm, and a maximum width of 130—150$\mu$ is seen about one-third of the body length from the anterior end. The body is transparent, flat and ribbon-like. Both ends are bluntly rounded, the posterior end being the narrower; it terminates in a pair of tail lobes. The tail lobes are distinct, oval lappets 30—35$\mu$ in diameter and highly retractable. The head is not discernible.

The dorsal surface of the body is smooth, without any cuticular hooks or scales. On this surface, projecting laterally, there are 22—26 pairs of conical epidermal papillae about 3$\mu$ long. The papillae start about one-fifth of the body length from the anterior end and extend to the posterior end. They do not seem to serve any adhesive function. Numerous epidermal glands 6—12$\mu$ in size occur on the dorsal surface and the bulk of them are disposed on the lateral sides. The anterior margin of the head and the sides of the trunk bear sensory hairs 20—50$\mu$ long. A pair of lateral pestle organs occur on the head. The ventral surface of the animal is smooth and the ciliation appears to form a continuous field, with the lateral sides showing a pronounced growth. The ventral glands are not well-developed.

The adhesory tubules occur as usual in three groups viz., anterior, lateral, and posterior. The anterior tubules occur in two groups, disposed in an arc broken in the middle, on the ventral surface of the head and just behind the buccal cavity. Each group consists of 14—16 tubules 12—14$\mu$ long and closely crowded, almost touching one another. Numerous lateral tubules are closely arranged in two longitudinal rows, extending from the anterior end, just behind the anterior tubules to the posterior end close to the tail lobes. There are 120—140 lateral tubules on each side, from 12—15$\mu$ long. Each tail lobe bears 12—16 posterior tubules radiating like the veins of a palm leaf. The tubules measure 10—15$\mu$ in length depending on the state of extension. Adhesory tubules are absent on the posterior border of the animal between the two tail lobes.

The mouth is 45$\mu$ wide, terminal, and inclined to the ventral surface. Its outer edge bears a corona of 15—20 hook-like projections reaching a length of 3$\mu$. The buccal cavity is barrel-shaped, with thin cuticularized walls. The pharynx is about 450$\mu$ long and occupies nearly one-third of the total gut length. The pharyngeal pores are well developed and occur close to the hind end of the pharynx. The gut following the pharynx is almost straight and consists of a broad stomach and a slender intestine. The anus is subterminal, opening on the ventral surface.

The species is a hermaphrodite, bearing paired testes and ovaries situated lateral to the digestive tract. The testes run from the pharyngeal knobs backwards along the anterior part of the stomach. The ovaries lie just behind the testes. The position of the male genital pore could not be determined, but the vasa deferentia are directed backwards and converge at a point just posterior to the level of the egg cells. A cylindrical bursa copulatrix occurs posteriorly, running close to the intestine. The bursa is 300—350$\mu$ long and muscular, with a conspicuous internal ciliated canal opening on the ventral surface close to the anus. No seminal receptacle or antrum femininum could be distinguished.

The spermatozoa are homogeneous, thread-like and remarkably long, reaching 360$\mu$. The spermatozoon is obliquely ringed in its entire length and is undifferentiated except that it tapers from the head end to the tail end.

Holotype. Specimen 1.4 mm long, with ova and sperm, collected by the author on 26 November 1968. Deposited in the Zoological Survey of India, Calcutta. Regd. No. P1862/1.
Type locality. Medium and coarse sand, depth 15—40 cm, intertidal zone, Palm Beach (17° 43′ 30″ N and 83° 20′ 30″ E), Waltair, Andhra Pradesh, India.
Paratypes. Four specimens with the same collection data as given for the holotype. Deposited in the Zoological Survey of India, Calcutta. Regd. No. P1863/1.
Etymology. The term for the genus *Planodasys* is based on the flat (from Latin planus = flat) and ribbon-like body of the animal. The specific name *P. marginalis* is referable to the presence of numerous marginal adhesory tubules.

*Diagnoses*

*Planodasys* gen. nov. Body flat and ribbon-like. Anterior tubules in a diagonal row. Lateral tubules numerous. Hind end with two distinct oval tail lobes bearing posterior tubules. Cuticular armament absent. Testes and ovaries paired lying lateral to anterior part of intestine. Vasa deferentia directed backwards. Penis absent. Bursa copulatrix cylindrical and posterior. Type species: *Planodasys marginalis*.

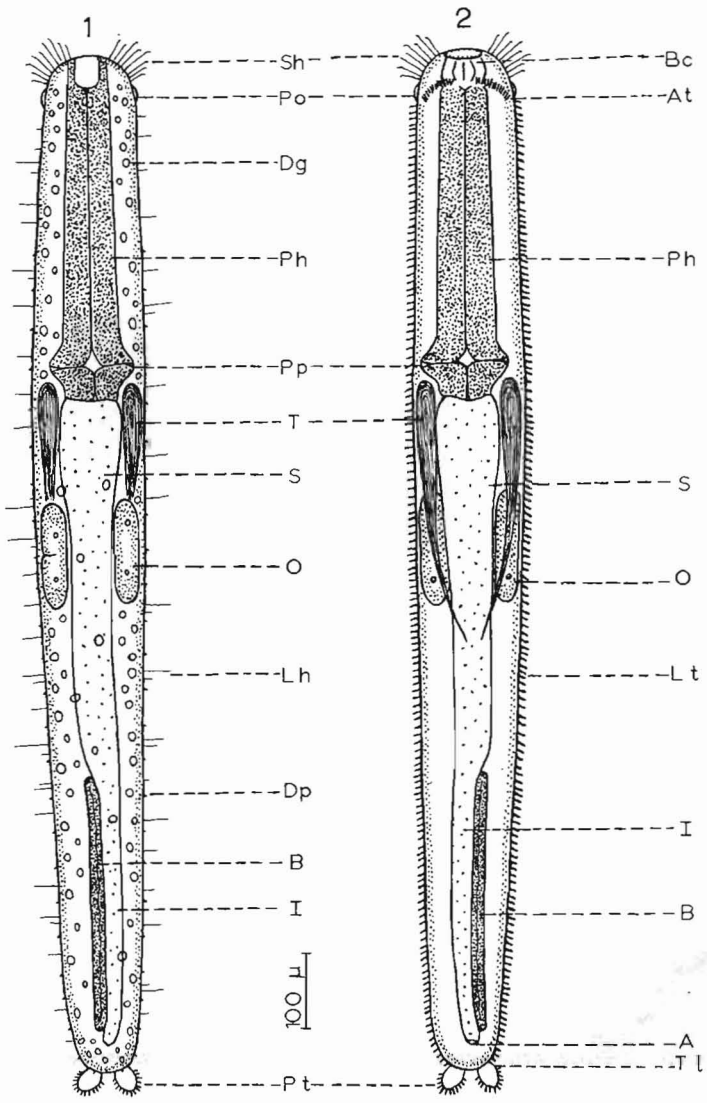
*Planodasys marginalis* sp. nov. Body up to 1.2—1.5 mm long. Maximum width/total length about 1/10. No distinct head. Dorsolateral papillae 22—26 pairs. Numerous epidermal glands on dorsal surface. Lateral pestle organs present. Anterior tubules 14—16 pairs. Lateral tubules 120—140 pairs. Posterior tubules 12—16 pairs. Buccal cavity barrelshaped. Pharynx/total gut length 1/3. Pharyngeal pores at hind end of pharynx. Anus subterminal.

*Ecology*

*Planodasys marginalis* was occasionally encountered in coarse and medium sands containing a little detritus and in fine shell gravel at a depth of 15—40 cm below surface between the low and half-tide levels of the intertidal zone. The texture of the sands varied between 300 and 600$\mu$ in mean diameter. The temperature in the habitat varied from 26 °C to 28 °C, while the salinity of the interstitial water ranged between 27‰ and 31‰. The dissolved oxygen content measured 2.5—4.0 ml/l.

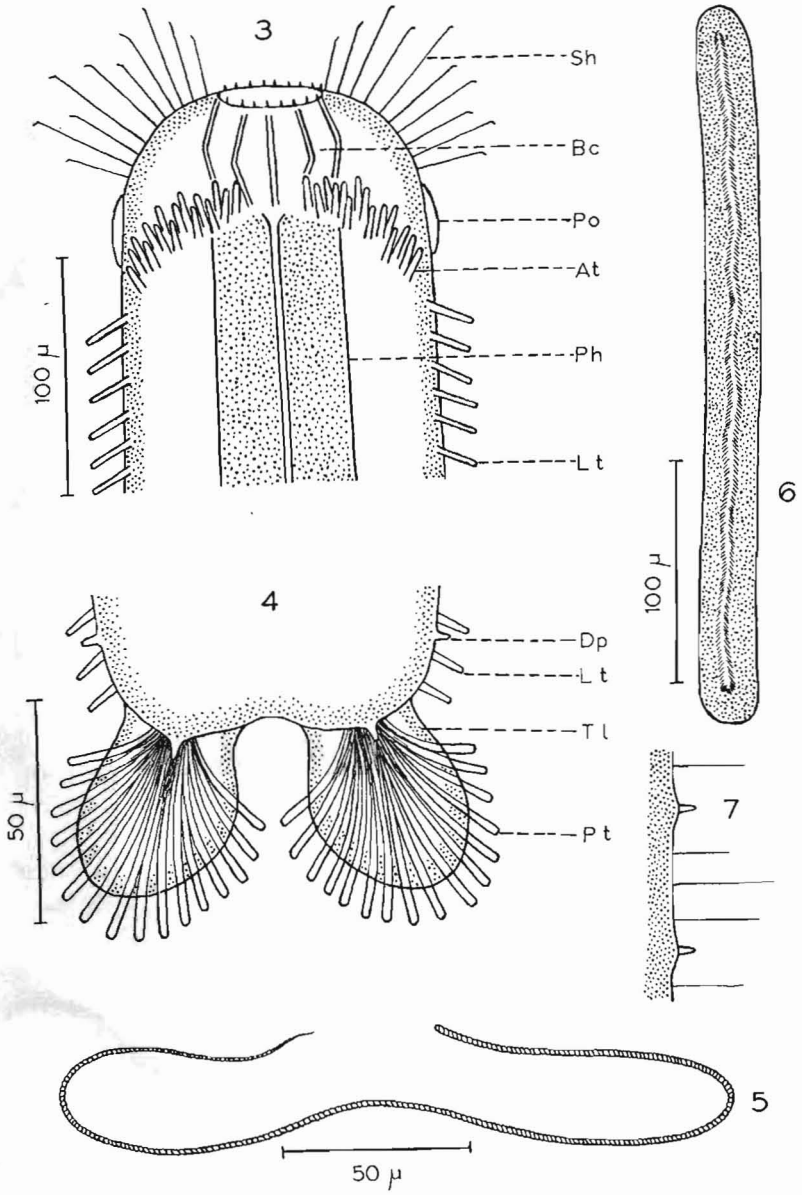
The gastrotrich is agile, sensitive to disturbances, and glides slowly over the surface of sand grains. The species is highly thigmotactic and feeds on fine particles of detritus with smaller protozoans and metazoans. The animal is negatively phototactic and gregarious in habit.

Other interstitial animals collected in the same biotope along with the new gastrotrich are the following: the ciliate *Tracheloraphis phoenicopterus* (Cohn); the coelenterate *Halammohydra octopodides* Remane; the turbellarian *Otoplana* sp.; the nematodes *Oncholaimus brachycercus* De Man, *Metepsilonema* sp., *Desmoscolex bengalensis* Timm, and *Rhynchonema cinctum* Cobb; the gastrotrichs *Dactylopodalia indica* Rao & Ganapati, *Turbanella bengalensis* Rao & Ganapati, and *Xenotrichula*




Figs. 1—2. *Planodasys marginalis*, adult. 1. Dorsal view. 2. Ventral view. *a* anus, *at* anterior tubule, *b* bursa copulatrix, *bc* buccal cavity, *dg* dorsal gland, *dp* dorso-lateral papilla, *i* intestine, *lh* lateral hair, *lt* lateral tubule, *o* ovary, *ph* pharynx, *po* pestle organ, *pp* pharyngeal pore, *pt* posterior tubule, *s* stomach, *sh* sensory hair, *t* testis, *tl* tail lobe.

*velox* REMANE; the kinorhynch *Cateria gerlachi* HIGGINS; the archiannelids *Protodrilus indicus* AIYAR & ALIKUNHI, *Diurodrilus benazzii* GERLACH, and *Trilobodrilus* sp.; the polychaetes *Hesionides arenarius* FRIEDRICH and *Petitia amphophthalma*




Figs. 3—7. *Planodasys marginalis*. 3. Anterior region, ventral view. 4. Posterior region, dorsal view. 5. Spermatozoon. 6. Bursa copulatrix. 7. Portion of body wall showing dorsolateral papillae and lateral hairs. For explanation of legends see Figs. 1—2.

SIEWING; the copepods *Arenopontia indica* RAO and *Psammastacus spinicaudatus* RAO & GANAPATI; the isopod *Microcerberus predatoris* (GNANAMUTHU); the acarine *Halacarus anomalus* TROUESSART.

*Discussion*

In the disposition of adhesory tubules, shape of tail lobes, and the structure of reproductive system, *Planodasys marginalis* fails to fit into any known genera of the order Macrodasyoidea, for which reason it is assigned to the new genus, *Planodasys*. The lateral tubules numbering 120—140 pairs represents the largest number recorded in the macrodasyoids. The tail lobes are unique among Gastrotricha in that they are oval lappets distinct from the hind end of the body; where as in the hitherto known species, the tail lobes are mere bifurcations of the hind end of the body. The distribution of posterior tubules is characteristic in that they are radiate-veined, emerging on the margin of the tail lobes. The reproductive system presents mixed characters of genera of different families and does not fit into any known genus.

However, the general organization of *Planodasys* shows some affinities with other macrodasyoid genera, especially *Turbanella* SCHULTZE, 1853; *Macrodasys* REMANE, 1924; *Mesodasys* REMANE, 1951; and *Crasiella* CLAUSEN, 1968. *Planodasys* resembles *Turbanella* in having a ribbon-like body, bi-lobed hind end and paired gonads located lateral to the intestine, but differs in the disposition of the anterior tubules, direction of the vasa deferentia, presence of bursa and the apparent lack of a seminal receptacle. *Planodasys* approaches *Macrodasys* in the disposition of the anterior and lateral tubules, testes, vasa deferentia, and bursa but differs in the bi-lobed hind end and in the absence of a penis. *Planodasys* agrees with *Mesodasys* in body shape, disposition of the anterior and lateral tubules and testes, but differs in the presence of a bi-lobed hind end, lateral organs with pestle, paired lateral ovaries, and the position of the bursa.

*Planodasys* most closely approaches *Crasiella* in body shape, tail lobes, pharynx, pestle organs, adhesory tubules, testes and ovaries (see p. 79), disposition of the vasa deferentia and bursa, but differs in the body size, shape of tail lobes and bursa, and the apparent lack of a seminal vesicle and a seminal receptacle. As *Crasiella* also combines characters of genera of various families, CLAUSEN (1968) provisionally placed the genus in the family Lepidodasyidae. However, the two genera, *Planodasys* and *Crasiella*, agree in major morphological and anatomical features but fail to fit into any one of the existing five families (see next section).

## FAMILY PLANODASYIDAE NOV.

Two monotypic genera *Planodasys* nov. and *Crasiella* CLAUSEN of the order Macrodasyoidea have been established with the two species *Planodasys marginalis* sp. nov. and *Crasiella diplura* CLAUSEN, 1968 respectively. It is interesting to note that both genera show morphological and anatomical features characteristic of genera of different families. It is therefore difficult to include them in any one of the five existing families established by REMANE (1936), viz., Lepidodasyidae, Macrodasyidae, Turbanellidae, Thaumastodermatidae, and Dactylopodaliidae.

Due to the combination of characters of genera of various families and the incomplete information on the female genital system, the genus *Crasiella* had been provisionally placed within the family Lepidodasyidae (see CLAUSEN, loc. cit). But a subsequent study of the material of *Crasiella diplura* has revealed the presence of paired ovaries occupying the same position as in *Planodasys marginalis*, i.e. just posterior to the testes and dorsal to the vasa deferentia. Thus, as the two genera, *Planodasys* and *Crasiella*, agree in major characters permitting their inclusion in a single family, it is proposed to accommodate both the genera in the new family, Planodasyidae.

The characters of Planodasyidae are as follows: body dorso-ventrally flattened and ribbon-like, without cuticular armament. Pestle organs present. Hind end with paired tail lobes flanked by adhesory tubules. Anterior tubules occur in two diagonal rows. Lateral tubules numerous. Testes and ovaries paired, lying lateral to the intestine in the middle third of the body region. Vasa deferentia directed backwards and the male genital pore located on the ventral surface just posterior to the egg cells. Penis absent. Posterior bursa copulatrix. Seminal receptacle present or absent. Pharyngeal pores at the hind end of pharynx. Anus subterminal. Type genus: *Planodasys* nov.

Key to the genera

1. Tail lobes distinct and oval. Seminal vesicle and seminal receptable absent. Bursa cylindrical ..... Gen. *Planodasys* nov.
   Tail lobes bifurcations of hind end. Seminal vesicle and seminal receptacle present. Bursa oblong ..... Gen. *Crasiella* CLAUSEN, 1968

Among the five known families of the order Macrodasyoidea, the new family, Planodasyidae, shows affinities with Turbanellidae, Macrodasyidae, and Lepidodasyidae, in certain morphological and anatomical features.

The Planodasyidae resemble Turbanellidae in having a ribbon-like body, bi-lobed hind end, pharyngeal pores, piston pits, lateral tubules, paired testes and ovaries, and seminal receptacle, but differ in the disposition of anterior tubules, direction of vasa deferentia, and the presence of bursa.

The Planodasyidae approach Macrodasyidae in the disposition of anterior and lateral tubules, pestle organs, pharyngeal pores, paired testes, vasa deferentia, male genital pore and bursa, but differ in the presence of bi-lobed hind end and seminal receptacle and the absence of penis.

The Planodasyidae agree with Lepidodasyidae in body shape, disposition of anterior and lateral tubules, pharyngeal pores, paired testes, seminal receptacle and bursa, but differ in the presence of a bi-lobed hind end, lateral ovaries, and the position of male genital pore(?)

## Key to the families

The key to the families of Gastrotricha Macrodasyoidea as given by BOADEN (1963), is modified as follows to include the new family:

### Order Macrodasyoidea[1]

With pharyngeal pores. Usually with anterior, lateral and at least six posterior tubules.

1. Single testis. Single ovary. Never with stalked pharyngeal knobs. Pronged scales present or absent ..... Family Thaumastodermatidae
— Testes paired. Ovary paired or single. Pronged scales absent .....2
2. Ovary single, dorsal. Male pore usually conjacent with or close to anus. Lateral organ without pestle ..... Family Lepidodasyidae
— Ovary paired. Male pore distant from anus. Lateral organ with or without pestle .....3
3. Body with head that includes all the pharynx. Hind body bi-lobed or with bi-furcated tail ..... Family Dactylopodaliidae
— Head when distinct encloses only anterior part of pharynx. Hind body bi-lobed, rounded or with simple tail .....4
4. Hind end rounded or tail-like. Pharyngeal pores at mid or hind region of pharynx ..... Family Macrodasyidae
— Hind end bi-lobed. Pharyngeal pores at hind end of pharynx .....5
5. Anterior tubules occur as ventral feet or tufts. Vasa deferentia bent forward. Bursa absent ..... Family Turbanellidae
— Anterior tubules occur in a diagonal row. Vasa deferentia directed backwards. Bursa present ..... Family Planodasyidae

[1] The name connotes a superfamily taxon within the meaning of Art. 29A of The international code of zoological nomenclature (1961:29); it is preferable to emend it as Macrodasyida and the other order Chaetonotoidea as Chaetonotida.

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