Ital. J. Zool., 63: 73-79 (1996)

Italian marine Gastrotricha: III. Four new pentancrous species of the genus *Tetranchyroderma* (Macrodasyida, Thaumastodermatidae)

WILLIAM D. HUMMON
M. ANTONIO TODARO*
Department of Biological Sciences, Ohio University, Athens, Ohio 45701 (USA)

MARIA BALSAMO
Dipartimento di Scienze della Produzione Animale, Università di Udine
via S. Mauro 2 - I-33010 Pagnacco (Udine, Italy)

PAOLO TONGIORGI
Dipartimento di Biologia Animale, Università di Modena, via Università, 4 - I-41100 Modena (Italy)

ABSTRACT

Of the thaumastodermatid gastrotrichs that were collected in the years 1989-1991, during a faunistic survey of the Italian coasts, several have been placed in the genus *Tetranchyroderma*. On the basis of their distinctive morphological characters, four that bear pentancres are being described as new species, three with a complete dorsal covering of ancres: *T. kontosomum, T. polyprobolostomum, T. tanymesatherum*, and one with an incomplete covering: *T. anomalopsum*.

KEY WORDS: Gastrotricha - Macrodasyida - Italian meiofauna - Mediterranean fauna - Benthos - Taxonomy

ACKNOWLEDGEMENTS

This research was supported by grants from the Ohio University Research Committee (OUR 822) and the U.S. National Science Foundation (NSF BSR-9006798) to W. D. Hummon, and by grants from the Italian Ministero dell'Università e della Ricerca Scientifica e Tecnologica (MURST, 60% and 40% programmes 'Popolamento Animale del Mediterraneo Occidentale') and Consiglio Nazionale delle Ricerche (CNR contracts 90.03258.CT-04, 91.00673.CT.04, 92.02823.CT.04, 94.02929.CT.04) to P. Tongiorgi. The research also benefitted from a CNR grant (90.02408.CT-04) to M. Balsamo (Bilateral Project University of Modena-Ohio University), and a postdoctoral research grant to W.A. Evans from the Gladys K. Delmas Foundation. We thank Wayne Evans and Margaret Hummon for their valuable criticism during the analysis of the specimens and the writing of the manuscript. We wish especially to thank the Stazione Zoologica "A. Dohrn" of Naples and its Laboratory at the Isle of Ischia for their hospitality during our work there.

(Received 28 December 1995 - Accepted 26 February 1996)

* Present Address: Centro Interuniversitario di Biologia Marina «G. Bacci», piazzale Mascagni, 1 - I-57127 Livorno (Italy).

INTRODUCTION

This is the third of a series of papers, aimed to describe several new species of marine gastrotrichs from the Italian coasts that our group discovered in sandy samples collected in the summers of 1989-1991. Here we concentrate on four new *Tetranchyroderma* species. The other two previous papers have dealt with six new and one redescribed species of chaetonotids (Hummon *et al.*, 1992) and ten new species of macrodasyids (Hummon *et al.*, 1993), respectively.

MATERIALS AND METHODS

The readers should refer to our previous papers (Hummon *et al.*, 1992, 1993) for collecting sites and sampling and study methods. Two additional sites are here added to the previous list: LIGURIA-Albissola (Savona) (44°18' N; 08°29' E), sublittoral, collection made in 1991 by Group 10 (see Hummon *et al.*, 1993); ABRUZZI - Montesilvano Marina (Pescara) (42°25' N; 14°09' E), littoral and sublittoral, collections made in 1989 by Group 1 and in 1991 by Group 10.

The set of morphological symbols and conventions, and the key to ecological characteristics used in the text are given in Hummon *et al.* (1992, Table IIA, B).

Abbreviations

LT, total body length; U, percentage units of LT; PhJIn, junction between pharynx and intestine; TbA, adhesive tubes of the anterior series; TbL, adhesive tubes of the lateral series, including dorso and ventrolateral elements; TbV, adhesive tubes of the ventral series; TbP, adhesive tubes of the posterior series; CtD, dorsal 'cirrata' tubes; CtDL, dorsolateral 'cirrata' tubes; CtP, posterior 'cirrata' tubes.

TAXONOMIC ACCOUNT

Genus *Tetranchyroderma* Remane, 1926

Tetranchyroderma anomalopsum n. sp.

Fig. 1

Diagnosis – A *Tetranchyroderma* with an adult length of 330-470 µm. PhJIn at U37. Oral opening flared, hood scalloped; body of mid-length, pharynx narrow, trunk inflated, with a bilobed caudum of mid-length. Sensory hairs, dense on the lateral margin of the oral hood, are numerous and evenly spaced on the body, forming lateral and dorsal columns from about U09 to U95. Cephalic tentacles, dorsal cirrata and pestle organs are absent, but up to 11 filaments may be found trailing from either side along the posterior trunk region. Glands are numerous, mixed in size and scattered along the length of the body from U09 to U94. Cuticular armature is incomplete dorsally, with bare areas usually forming bilateral fields on either side of the midline, the pattern varying from specimen to specimen; pentancres, taller than wide, are somewhat smaller toward the ends of the body. Adhesive tubes: TbA, 6 per side, 1 medial and 5 forming lateral fan at U08-U09; TbL, 34 per side, a small one at U13, 1-4 in the posterior pharyngeal region and the remainder, of similar lengths, along the intestinal region from U37 to U91; TbD and TbV absent; TbP 14 in all, with paired feet having 2 + 1 each, 4 (or 6) TbP medially, and 2 TbP per side laterally behind the anus. Ventral locomotor cilia: a continuous field of transverse rows covering the entire surface. Reproductive system: testis, on the right, caudal organ, frontal organ and egg on the left.

Etymology – The name refers to the uncommon look of this species that results from the reduced ancrous covering of its dorsum (*anomalos*, Gk. unusual; *opsis*, Gk. appearance).

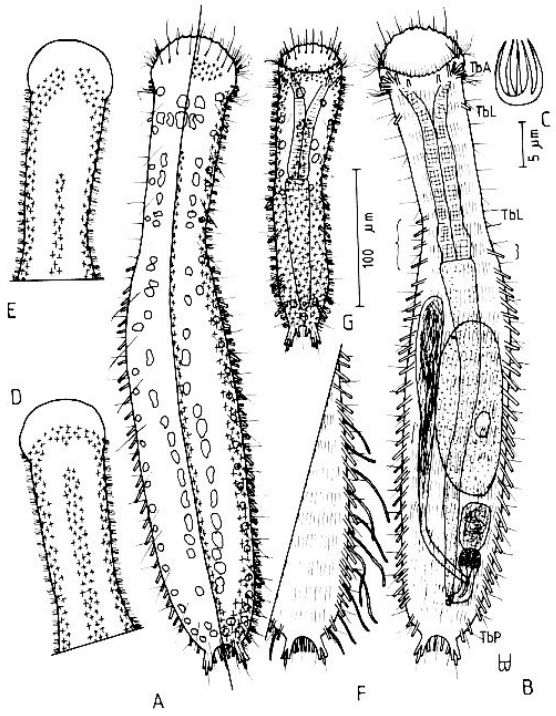

Fig. 1 - *Tetranchyroderma anomalopsum* n. sp. **A**, dorsal view, showing details of the body conformation, the pattern of cuticular armature on the right side of the body, the anterior, dorsal and lateral sensory hairs, the glands, and the lateral (TbL) and posterior (TbP) adhesive tubes; **B**, ventral view, showing details of the oral opening, digestive tract and anus, the male and female reproductive system, the ventral locomotor ciliary field and the anterior (TbA), lateral and posterior adhesive tubes; **C**, a pentancre; **D**, **E**, dorsal view, showing the different patterns of the cuticular covering; **F**, ventral view details of a specimen bearing a fringe of elongate filaments originating from the left side of the body and higher number of posterior adhesive tubes; **G**, dorsal view showing body conformation and pattern of the cuticular covering in a juvenile.

Description – Adult specimen may range in total length from 336 to 464 µm. Pharynx reaches 140 µm in length, to be measured in this family from the ventral border of the oral opening to the pharyngeo-intestinal junction; PhJIn at U37. Oral opening flared, hood scalloped; body of mid-length, pharynx narrow, trunk inflated, with a bilobed caudum of mid-length; widths of/at oral opening/pharynx/PhJIn/trunk/caudal base are as follows: 64/54-45/58/74/26 µm at U06/U09-U30/U37/U50/U96, respectively. Cephalic tentacles, dorsal cirrata and pestle organs are absent, but up to 11 filaments may be found trailing from either side along the posterior trunk region. Sensory hairs form an oral fringe (5-6 µm long), with longer ones (19-22 µm) on the oral hood and two clusters of 10-12 and 5 hairs laterally at the rear of the mouth and behind the TbA; other hairs form lateral and dorsolateral columns of ca. 28 and 16 on each side (11-14 and 28-32 µm) that are evenly spaced at U08-U95 and U10-U97. Glands are ca. 50 per side, in unevenly spaced lateral and dorsal columns (4 diameter to 13 × 7 µm long) at U09 to U94.

Cuticular armature: dorsal/lateral covering of pentancres is never complete, but would form ca. 17 columns, each having ca. 50 ancres, if all were present; bare areas occur as bilateral fields on either side of the body that merge in the pharyngeal region; ancres form medial and lateral longitudinal stripes that join in the front as well or form a transverse patch above the mouth; the pattern varies from specimen to specimen; ancres of medium thickness, outer tines curving inward toward the center, are taller than wide (7.5 × 5 µm), being slightly smaller (4 × 3 µm) at both ends of the body.

Adhesive tubes: there are 6 TbA per side, inserting directly on the body surface; at U08-U09, 1 (5 µm) medial, and 5 (8-9 µm) lateral, forming a fan-like arc directed from forward to the side. There are 31-34 TbL per side, 1 (8 µm) in the anterior pharynx region at U13, 1 varying to 4 (Fig. 1B right and left) (9-13 µm) in the posterior pharynx region, and 29 (13-18 µm) unevenly spaced in the intestinal region at U35-U91. TbD and TbV are absent. Caudum, indenting medially to U96, is formed from two feet borne on short lobes, each comprised of 2 TbP fused at their bases, with a third longer middorsal tube that inserts between them; 4 TbP (8-11 µm) lie medially between the feet, with 2 (10-12 µm) per side laterally behind the anus, continuing the TbL series to the rear.

Ventral ciliation: a continuous field of cilia arranged in transverse rows that cover the entire ventral surface from just behind the forward row of anterior adhesive tubes to the base of the caudum; individual cilia are ca. 11 µm in length.

Digestive tract: the oral opening is broad (58 µm in width); length of oral hood 36% of head width, extending forward above the mouth from U00 to U07; the pharynx narrows to 19-22 µm, its pores opening basally at U35; the intestine is broadest anteriorly (30 µm), narrowing gradually over its length (to 6 µm); the anus opens ventrally at U91.

Reproductive tract: simultaneous hermaphrodites; single elongate testis on the right (viewed from the above); vas deferens opens into the middle of the caudal organ, which is pyriform (43 × 15 µm) and hooked medially at the middle of the base toward the anus; frontal organ ovoid, hyaline (35 × 22 µm), often containing mobile sperm; maturing egg (128 × 50 µm in size, germinal vesicle 18 × 8 µm) is located dorsally in the midintestinal region.

Ecology – Frequency of occurrence - sparse in fine littoral and sublittoral sands, containing detritus, at 1.5 m

water depth along the Adriatic coast of Italy. Abundance - scarce in the littoral samples; scarce to numerous in sublittoral samples where found.

Distribution – Type locality - MARCHES: San Benedetto del Tronto (lat. 42°47' N; long. 13°53' E), the public beach south of the town (S). Other locations: Foce dell'Isonzo (S); Montesilvano (L); Porto Nuovo (S), and Siponto (see Table I and Fig. 1 of Hummon *et al.*, 1992)

Remarks - High resolution video sequences are available in the Ohio University Museum of Invertebrates Zoology, Athens, OH, representing several locations. *Tetranchyroderma anomalopsum* is a member of the enigmatic group of species that are scantily clad with ancres (the "bikini-trichs"), and are thus far restricted to Italian waters. Ancres distribution generally includes more than a third of the dorsal/lateral surface, but specimens vary widely in the pattern of ancres distribution (see Fig. 1A, D and E for three patterns in adults, and 1G for one in a juvenile, LT = 214 µm). Additional variability occurs with the TbP in the mediocaudal region, occasionally numbering 6 (Fig. 1F), a character that is independent of the filaments that trail from either side along the posterior trunk region (Fig. 1F), which have thus far been found only in scattered specimens and may be a sign of hybridization with *T. thysanophorum*.

Taxonomic affinities – Tetranchyroderma anomalopsum is the only mid-sized species in the genus having an incomplete dorsal covering of pentancres that form medial and lateral longitudinal stripes, that lacks cephalic tentacles, dorsal cirrata and pestle organs, but may show trailing filaments from the rear trunk region, whose PhJIn is at U37, whose length of oral hood is 56% of the head width, and whose pharyngeal region is only 75% the width of the intestinal region.

Tetranchyroderma kontosomum n. sp.

Fig. 2

Diagnosis – A *Tetranchyroderma*, with an adult length to at least 210 µm. PhJIn at U39; head broadly rounded, border smooth; body short and broad, swollen in the pharyngeal and intestinal regions, with fleshy bilobed caudum. Sensory hairs, dense on the medial margin of the oral hood, are sparse but evenly distributed on the body, forming lateral, and dorsolateral and ventrolateral columns from about U09 to U95. Cephalic tentacles, dorsal cirrata and pestle organs are absent. Glands are few, mixed in size and scattered along the body from U23 to U88. Cuticular armature is of pentancres, taller than wide, but of similar size all along the body. Adhesive tubes: TbA, 6 per side, most forming a transverse row inserting at U10-U11 but with the outermost displaced rearward to U14; TbL, ca. 7 of different lengths per side, scattered throughout the intestinal region from U41 to U80; TbD and TbV absent; TbP, 7 per side, forming an arc from U88 laterally, through U96 posteriorly to U94 medially, but without comprising a clearly defined foot having paired toes. Ventral locomotor cilia: a continuous field of transverse rows covering the entire surface. Reproductive system: testis not seen; egg in dorsal mid intestinal region; caudal/frontal organ not seen.

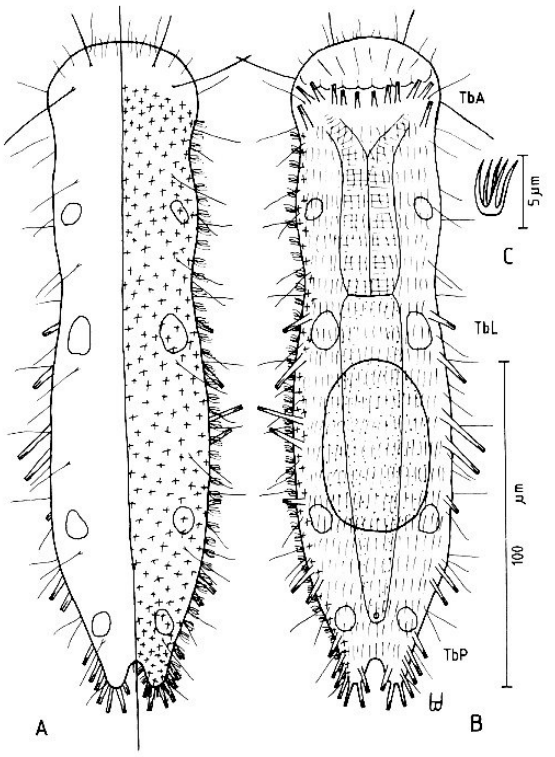

Fig. 2 - *Tetranchyroderma kontosomum* n. sp. **A**, dorsal view, showing details of the body conformation, the pattern of cuticular armature on the right side of the body, the anterior, dorsal and lateral sensory hairs, the glands, and the lateral (TbL) and posterior (TbP) adhesive tubes; **B**, ventral view, showing details of the oral opening, digestive tract and anus, an egg, the ventral locomotor ciliary field and the anterior (TbA), lateral and posterior adhesive tubes; **C**, a pentancre.

Etymology – The name refers to the short body length of this species (*kontos*, Gk. short; *soma*, Gk. body).

Description – The description is based on an adult specimen, 206 µm in total length. Pharynx length in this specimen was 68 µm; PhJIn at U39. Head broadly rounded anteriorly, width smooth border; body short and broad, swollen in the pharyngeal and intestinal regions, with fleshy bilobed caudum; widths of oral opening/at neck behind mouth, at mid-pharynx/PhJIn/mid-trunk/caudal base are as follows: 50/45, 48/43/52/22 µm at U09/U16, U26/U39/U63/U93, respectively.

Cephalic tentacles, dorsal cirrata and pestle organs are absent. Sensory hairs include a fringe around the oral opening ventrally (ca. 3 µm long), a row just behind the leading edge of the oral hood dorsally (ca. 8-14 µm), most dense in the medial third, and longer and thicker vibratile bristles (19 and 29 µm) dorsally on either side inserting in the bare region anterior to the cuticular armature, with the second one also initiating the column on the dorsolateral surface of the body; other sensory hairs form lateral (8 per side, U13-U95), dorsolateral (7 per side,

U07-U89) and ventrolateral (10 per side, U09-U95) columns that are evenly spaced within columns; individuals hairs are 12-17 μm long in the lateral columns, 16-20 μm in the dorsolateral columns and 13-17 μm in the ventrolateral columns, the first in each column being the longest. Glands are few, 4 per side, scattered laterally along the body length from U23 to U88; they are round to oval in shape, mixed in size (from 8 μm diameter up to 12 × 10 μm) and are packed with two-several dozen elongate rods (each 6.0 × 1.25 μm in size).

Cuticular armature: dorsal/ lateral covering of pentancres is complete, wrapping around beneath the lateral margins of the body, with 17 columns, each having 38 ancres; anterior-most border of ancres parallels the curvature of the oral hood, beginning at U07 medially, being preceded by a broadly curved band that is bare of ancres; posteriorly ancres extend to cover the entire fleshy part of the caudum and laterally they wrap around onto the ventral surfaces of the body; ancres thin, outer tines flaring somewhat distally and all being slightly curved toward the rear, are taller than wide (4 × 2.5 μm) and are of similar size throughout the length of the body.

Adhesive tubes: there are 6 TbA per side, inserting directly on the body surface at U10-U14; 10 of the 12 tubes occur evenly spaced in a transverse row that lies just behind the oral opening, one pair medially, 6 μm in length, four pairs, 7 μm, that lie lateral to these, with a sixth outermost pair, 9 μm, that lies displaced rearward behind the lateral-most tubes of the transverse row. There are 7 TbL per side, 7-20 μm, all occurring with uneven size and spacing throughout the intestinal region from U41 to U80. TbD and TbV tubes are absent. The caudum indents medially to U93 and is formed by two fleshy lobes that bear an arc of 7 TbP per side, 9-11 μm, inserting in evenly-spaced increments from U88 laterally, through U96 posteriorly, around to U94 medially, but without forming the clearly defined two-toed feet that are typical for the genus. All adhesive tubes are distinctly of the duo-gland form (see Tyler & Rieger, 1980, Fig. 1C).

Ventral ciliation: a continuous field of cilia arranged in transverse rows that covers the entire ventral surface, from just behind the forward row of anterior adhesive tubes to the base of the caudum; individual cilia are ca. 5 μm in length.

Digestive tract: the oral opening is broad (43 μm in width); length of oral hood is 34% of the head width, extending forward above the mouth from U00 to U08; the pharynx narrows over its anterior half to 16 μm, its pores opening basally at about U36; the intestine is broadest anteriorly (20 μm), narrowing gradually over its length (to 6 μm); the anus opens ventrally at U86.

Reproductive tract: probably protogynous hermaphrodites; male reproductive system not seen, nor was the caudal/frontal organ complex; the egg (57 by 36 μm; germinal vesicle not seen) is located dorsally in the mid-intestinal region.

Ecology – Frequency of occurrence - sparse in fine to medium sublittoral sands, mixed with shell and coral gravel, at 4 m water depth along the Ionian coasts of Italy. Abundance - rare in sublittoral samples where found.

Distribution – Type locality - APULIA: Santa Maria di Leuca (lat. 39°47' N; long. 18°18' E), just northwest from the cape of the same name, that lies south of Lecce (M) (see Table I and Fig. 1 in Hummon *et al.*, 1992).

Remarks – The lateral-most TbA may be homologous with the often found solitary TbL that occurs just behind the TbA series, which as a laterally-directed tube is lacking in this species. The TbP series is interpreted here to include all tubes that occur posterior to the anus, thus yielding a gap between the TbL and TbP series. While the caudal lobes lack well-defined feet, it is possible to determine the two terminal tubes that would form the toes of each foot, though they lack a mid-dorsal element, yielding a formula of 4l/2t + 0d/1m per side (4 tubes lateral to the toes and posterior to the anus, 2 terminal toes without a mid-dorsal element, and 1 medial tube).

Taxonomic affinities - Tetranchyroderma kontosomum is the only species thus far described in the genus that lacks dorsal cephalic tentacles and trunk cirrata, lacks both TbD and TbV, lacks the dorsal digit between the toes of the caudal feet, and which also lacks TbL in the posterior pharyngeal region. In addition, at maturity it is one of the smallest species in the genus.

Tetranchyroderma polyprobolostomum n. sp.

Fig. 3

Diagnosis – A *Tetranchyroderma*, with an adult length to 445 μm. PhJIn at U38; head rounded, oral hood with deeply scalloped border; body of mid-length, pharynx broader than the mouth and of similar width throughout, trunk slightly inflated, with a short bilobed caudum. Paired cephalic papillae occur at U03; dorsal and dorsolateral cirrata, 2 [sometimes 3] and 3 per side, insert at U11, U35 [and sometimes U56] and at U38, U62 and stop the caudal feet at U99, respectively; paired ventrolateral pestle organs insert at U06. Sensory hairs include a fringe borne at the tips of the escalloping protuberances that border the oral opening, a dozen long vibratile hairs that insert atop the oral hood, and 3 stout bristles that insert under the oral hood; other hairs form lateral and dorsolateral columns of 12-13 each per side that are evenly spaced from U06 to U94. Glands small, 26 per side, are scattered along the body from U09 to U93. Cuticular armature is of pentancres, whose central tine is just longer than the outer four; ancres are barely taller than wide, of similar in size in the mid-body, but are reduced in size at both ends. Adhesive tubes: TbA 6 per side at U07-U08, 1 medial and 5 forming an arc laterally; TbL ca. 14 per side, none in the pharyngeal region, 1 seen prominently at U42, and the others forming a more ventrolateral series at U43-U62; TbD absent; TbV, 5 per side, 1 at U73, 1 at U76, and a transverse row of 3 at U83; TbP, 16 in all, with paired feet having 2 + 0 each, 4 TbP per side laterally behind the anus. Ventral locomotor cilia: a continuous field of transverse rows covering the entire ventral surface. Reproductive system: testis on the right; caudal organ elongate-oval, frontal organ sac-like; egg dorsal in the mid-intestinal region.

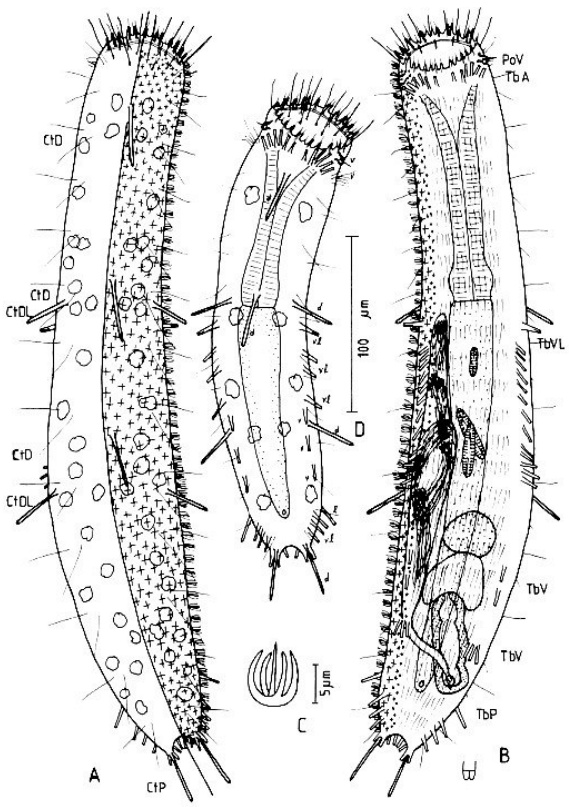

Fig. 3 - *Tetranchyroderma polyprobolostomum* n. sp. **A**, dorsal view, showing details of the body conformation, the pattern of cuticular armature on the right side of the body, the anterior, dorsal and lateral sensory hairs, the glands, and the lateral (some) (TbL), dorsal cirrata (CtD), dorsolateral cirrata (CtDL), and posterior cirrata (CtP) adhesive tubes; **B**, ventral view, showing details of the oral opening, ventral pestle organs (PoV), digestive tract and anus, the male and female reproductive system, the ventral locomotor ciliary field and the anterior (TbA), ventrolateral (TbVL), ventral (TbV), and posterior (TbP) adhesive tubes; **C**, a pentancre; **D**, composite of a sub-adult (cuticular covering omitted).

Etymology – The name refers to the finger-like protrusions that form the scalloping around the oral opening (*poli*, Gk. numerous; *probolos*, Gk. prominence; *stoma*, Gk. mouth).

Description – Adult specimens reach 445 µm in total length. Pharynx length reaches 136 µm; PhJIn at U38. Head rounded, mouth opening not flared, oral hood with deeply scalloped border, the protuberances appearing to be reinforced by thickenings; body of mid-length, pharynx slightly broader than the mouth and of similar width throughout, trunk slightly inflated, with a short bilobed caudum; widths of/at oral opening/pharynx/trunk/caudal base are as follows: 48/51-58/73/22 µm at U04/U06-U38/U67/U98, respectively. Dorsal cephalic sensory papillae, 1 per side, occur at U03; dorsal and dorsolateral cirrata, 2 [sometimes 3] (30-34 µm long) and 3 per side (26-30 µm long), insert at U11, U35 [and sometimes U56] and at U38, U62 and atop the caudal feet at U99, respectively. Ventrolateral pestle organs, 1 per side (6 µm long), insert at U06. Sensory hairs include a fringe around the oral opening (3-5 µm long), nearly all borne at the tips of the escalloping protuberances, a dozen vibratile hairs (18-30 µm) that insert atop the oral hood, and 3 stout bristles (5 µm) that insert under the oral hood; other hairs form lateral and dorsolateral columns of 12-13 each per side (18-25 and 18-30 µm) that are evenly spaced at U08-U93 and U06-U94. Glands ca. 26 per side (4-9 µm diameter) are scattered along the body from U09 to U93.

Cuticular armature: dorsal/lateral covering of pentancres is complete, wrapping around beneath the lateral margins of the body, with 25 columns, each having ca. 50 ancres; the covering begins on the oral hood with a sinuous border and ends by continuing onto the short caudal lobes; ancres are of medium heft, with curved grasping outer tines and nearly straight central tine that is slightly longer than the others; excluding the central tine, ancres are slightly taller than wide (7 × 6 µm), being smaller (2 × 1.7 µm) at both ends of the body.

Adhesive tubes: there are 6 TbA per side, inserting directly on the body surface, at U07-U08, 1 (5 µm) medial and 5 (6-8 µm) lateral, forming a wavy transverse row. There are ca. 14 TbL per side, none in the pharyngeal region, 1 (11 µm) seen prominently at U42, and the others (8-11 µm) forming a more ventrolateral series that is restricted to U43-U62. TbD are absent. There are 5 TbV per side (9-11 µm), 1 per side at U73, 1 at U76, and a transverse row of 3 at U83. The caudum indents medially to U97, and bears a total of 16 TbP; two feet borne on short lobes are each comprised of 2 TbP fused at their bases, the third longer mid-dorsal tube that would insert between them being replaced by a dorsal cirratum (CtP); 4 TbP (5-6 µm) lie medially between the feet, with 4 (8-12 µm) per side laterally behind the anus, continuing the TbL series to the rear, the first being longest and truly lateral, the others being shorter and inserted ventrolaterally.

Ventral ciliation: cilia in transverse rows that cover the entire ventral surface from TbA to the caudal base; individual cilia are ca. 12 µm long.

Digestive tract: the oral opening is broad (46 µm in width); length of oral hood 40% of head width, U00-U05; pharynx narrows to 17-25 µm, pharyngeal pores basal at U35; intestine broadest in front (25 µm), where it may contain diatom frustules, narrowing gradually to the anus, which opens ventrally at U91.

Reproductive tract: simultaneous hermaphrodites; single elongate testis on the right; vas deferens opens into the rear of the caudal organ, which is elongate oval in shape, is oriented from right rear to median forward (58 × 21 µm), and possesses a lumen with three enlargements; frontal organ sac-like, hyaline (24 µm high × 34 µm wide), sagging over the forepart of the caudal organ; small egg (30 µm diameter) is located dorsally in the mid-intestinal region.

Ecology – Frequency of occurrence - sparse in fine to medium sublittoral sands, at 1.5-3 m water depth, along the southern coasts of the Tyrrhenian Sea in Italy. Abundance - rare in sublittoral samples where found.

Distribution – Type locality - CAMPANIA: Lido di Procida (lat. 40° 45' N; long. 14° 00' E), the only sandy beach on the Island of Procida, near Naples (S). Other locations: Palinuro (S) and Spiaggia degli Inglesi (S) (see Table I and Fig. 1 of Hummon *et al.*, 1992).

Remarks – Two high resolution video sequences are available in the Ohio University Museum of Invertebrate Zoology, Athens, OH. While the dorsolateral cirrata are readily seen, the dorsal cirrata are not. Since their occurrence is unexpected, they are seldom searched for, and indeed they may be able to be seen only with differential interference contrast optics. Similarly, the dorsal papillae and the ventral pestle organs near the mouth, as well as the ventral adhesive tubes, are not easily seen, but at least their occurrence are sufficiently common that one tends routinely to seek their presence.

Taxonomic affinities - *Tetranchyroderma polyprobolostomum* is the only mid-sized species in the genus having a complete covering of pentancres, which has a mouth opening that is not flared and an oral hood with a deeply scalloped border, that has a pair of cephalic papillae, has both dorsal (2 or 3) and dorsolateral cirrata (3), and pestle organs, which has ca. 14 TbL that are restricted to U43-U62, and which has 5 TbV that form both a longitudinal column and a transverse row.

Tetranchyroderma tanymesatherum n. sp.
Fig. 4

Diagnosis – A *Tetranchyroderma* with an adult length to 320 µm. PhJIn at U43; head rounded, oral hood scalloped; body of mid-length, slightly inflated in the intestinal region, with bilobed caudum. Sensory hairs, dense on the oral hood, are numerous but evenly spaced on the body, forming lateral and dorso-lateral columns from about U10 to U91. Cephalic tentacles, dorsal cirrata and pestle organs absent. Glands, 23 per side, are mixed in size and scattered along the body from U12 to U94. Cuticular armature is of pentancres, whose central tine is two-three times the length of the outer four; ancres are taller than wide, of similar in size along most of the body, but reducing markedly in size at both ends. Adhesive tubes: TbA, 6 per side, at U06-U08, 1 medial and 5 forming an arc laterally; TbL, 18 per side, 1 at U12, 2 in the posterior pharyngeal region, and 15 of different lengths and spacing located along the intestinal region from U43 to U89; TbD absent; TbV, 1 per side at U77; TbP, 14 in all, with paired feet having 2 + 1 each, 4 TbP medially, and 2 TbP per side laterally behind the anus. Ventral locomotor cilia: a continuous field of transverse rows covering the entire ventral surface. Reproductive system: testis on the right; caudal and frontal organs small, central; egg dorsal in the mid-intestinal region.

Etymology – The name refers to the shape of the pentancres (*tany*, Gk. long; *mesos*, Gk. middle; *ather*, Gk. point).

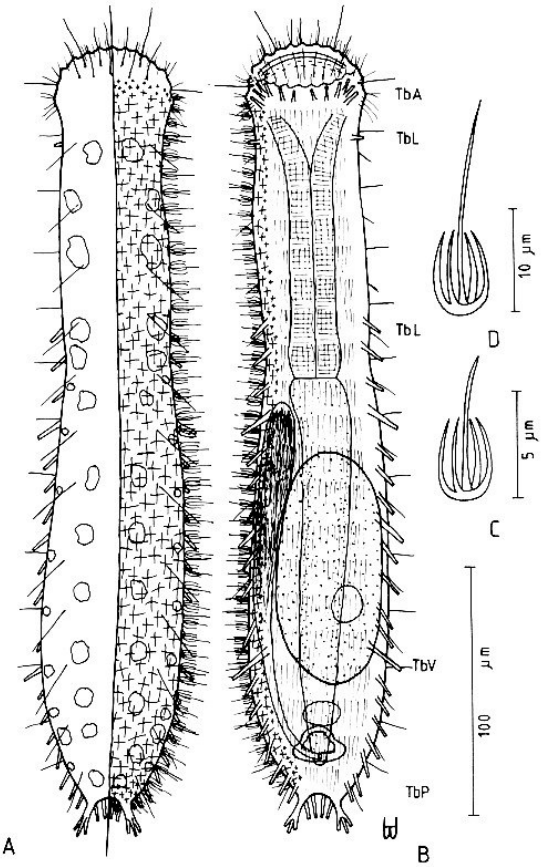

Fig. 4 - *Tetranchyroderma tanymesatherum* n. sp. **A**, dorsal view, showing details of the body conformation, the pattern of cuticular armature on the right side of the body, the anterior, dorsal and lateral sensory hairs, the glands, and the lateral (TbL) and posterior (TbP) adhesive tubes; **B**, ventral view, showing details of the oral opening, digestive tract and anus, the testis and an egg, the ventral locomotor ciliary field and the anterior (TbA), lateral, ventral (TbV) and posterior adhesive tubes; **C**, **D**, pentancres.

Description – Adult specimens may range in total length from 275 to 318 µm. Pharynx length reaches 118 µm; PhJIn at U43. Head rounded, oral hood scalloped; body of mid-length, pharynx narrower than mouth and of similar width throughout, trunk slightly inflated, with a bilobed caudum of mid-length; widths of/at oral opening/pharynx/trunk/caudal base are as follows: 49/42-45/57/17 µm at U06/U11-U40/U73/U96, respectively. Cephalic tentacles, dorsal cirrata and pestle organs are absent. Sensory hairs include a fringe around the oral opening (4-6 µm long), two rows that insert behind the front margin (15-18 µm), several of varying lengths lying laterally, with one pair (14 µm) inserting laterally just behind the mouth at U05, and 2 tactile hairs (8 µm) that insert laterally under the oral hood; other hairs form lateral and dorsolateral columns of 12-13 per side (9-13 and 17-23 µm) that are evenly spaced at U11-U90 and

U12-U92. Glands ca. 22 per side, small ones laterally (3-4 μm diameter) at U43-U93 and larger ones dorsally (5 × 6 to 14 × 8 μm) at U12-U94.

Cuticular armature: dorsal/lateral covering of pentancres is complete, wrapping around beneath the lateral margins of the body, with 17 columns, each having 34 ancres; thin ancres, with curved grasping outer tines and a nearly straight central tine that is 2-3 times the length of the others; excluding the central tine, ancres are taller than wide (8 × 5.5 μm), being smaller (3 × 2 μm) at both ends of the body.

Adhesive tubes: there are 6 TbA per side, inserting directly on the body surface, at U08-U09, 1 (5 μm) medial and 5 (5-7 μm) lateral, forming an inverted V-shaped arc directed from forward to diagonally lateral. There are 18 TbL per side, 1 (5 μm) in the anterior pharynx region at U12, 2 (9-12 μm) in the posterior pharynx region, and 15 of varying length (9-16 μm) and uneven spacing in the intestinal region at U43-U89. TbD are absent. There is 1 (19 μm) TbV per side at U77. The caudum indents medially to U95, and bears a total of 14 TbP; two feet borne on short lobes are each comprised of 2 TbP fused at their bases, and a third longer mid-dorsal tube that insert between them; 4 TbP (7-10 μm) lie medially between the feet, with 2 (8-9 μm) per side laterally behind the anus, continuing the TbL series to the rear.

Ventral ciliation: cilia in transverse rows that cover the entire ventral surface from TbA to the caudal base; individual cilia are ca. 10 μm long.

Digestive tract: the oral opening is broad (42 μm in width); length of oral hood 34% of the head width, U00-U05; pharynx narrows to 18-21 μm, pharyngeal pores basal at U39; intestine broadest in front (22 μm), narrowing gradually to the anus, which opens ventrally at U91.

Reproductive tract: simultaneous hermaphrodites; single elongate testis on the right (viewed from above); vas deferens opens into the rear of the caudal organ, which is broadly pyriform (21 × 14 μm); frontal organ small, hyaline, broadly ovoid (15 × 9 μm); maturing egg (94 × 42 μm in size, germinal vesicle 13 μm in diameter) is located dorsally in the mid-intestinal region.

Ecology – Frequency of occurrence - sparse in medium littoral sand, sparse to occasional in fine to medium sublittoral sands, at 1.5-3 m water depth, along the Tyrrhenian coasts of Italy. Abundance - rare in littoral samples; scarce in sublittoral samples where found.

Distribution – Type locality - CAMPANIA: Lido di Procida (lat. 40° 45' N; long. 14° 00' E), the only sandy beach on the Island of Procida, near Naples (S). Other locations: Albissola (S), Bagnetielli (S), Cala della Mortola (S), Cefalù (S), Chiaia (S), Citara (S), Pozzuoli (S), and Punta del Recisello (S) (see Table I and Fig. 1 of Hummon *et al.*, 1992).

Remarks – One high resolution video sequence is available in the Ohio University Museum of Invertebrate Zoology, Athens, OH. The central tine of the pentancres is proportionately longer along most of the body than near the ends; the 1 TbV per side at U77 may easily be overlooked, since it appears to be part of the TbL series, though if the specimen being observed is not compressed one can see that it has a more truly ventral insertion than the others.

Taxonomic affinities - Tetranchyroderma tanymesatherum is the only mid-sized species in the genus having a complete covering of pentancres, whose central tine is two-three times the length of the others, that has its PhJIn at U43, that lacks cephalic tentacles, dorsal cirrata and pestle organs, and that also has 2 TbL aft in the pharyngeal region and 15 along the length of the intestine.

REFERENCES

Hummon W. D., Balsamo M., Todaro M. A. , 1992 - Italian marine Gastrotricha: I. Six new and one redescribed species of Chaetonotida. Boll. Zool., 59: 499-516.

Hummon W. D., Todaro M. A., Tongiorgi P., 1993 - Italian marine Gastrotricha: II. One new genus and ten new species of Macrodasyida. Boll. Zool., 60: 109-127.

Tyler S., Rieger R. M., 1980 - Adhesive organs of the Gastrotricha. I. Duo-gland organs. Zoomorphologie, 95: 1-15.