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## A new species of *Paradella ovatis* sp. nov., (Isopoda: Flabellifera: Sphaeromatidae) from Karachi coast, Pakistan

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### Abstract

This paper describes a new microscopic Isopod species belonging to the genus *Paradella*. The holotype was collected from the intertidal region of Sandspit, Karachi. The species can be diagnosed on the basis of the following characters: Cephalon wider with rostrum pointed; Pleotelson wider than long, dorsal surface of pleotelson scattered with granules, distal part of pleotelson expanded, with dorsal ovate ventilation slit. Each side of ventral pleotelsonic margins with ridge; both uropodal rami having sinuate lateral and mesial margins; pleon with upturned lateral margins. The species will also be the first representatives from Pakistan.

**Keywords:** Crustacean new species, isopoda, sphaeromatidae, *Paradella*, taxonomy, Karachi coast, Pakistan

### Introduction

The 14 species of the genus *Paradella* with a wide distribution in warm-temperate and tropical waters of the tropical Pacific Ocean, Indian Ocean and Caribbean.

Many species of both *Paradella* and *Dynamenella* have the posterior margin of pereonite 7 raised to form a distinct transverse knife-edged rim, usually with a median indentation [see figures of *Paradella diana* Menzies, 1962a; Holdich and Harrison, 1982; Kensley and Schotte, 1989. In all other generic characters the species conforms to *Paradella* as defined by Harrison and Holdich, 1982; Bruce and Wetzer, 2004 and 2007.

The genus *Paradella*, like *Dynamenella*, is best identified by having a dorsally directed subapical foramen on the pleotelson of males and lacks dorsal processes on the pereon and pleon. *Paradella* is recognized by out-turned ridges on the ventral margins of the pleotelson which do not meet in the posterior midline distinct dorsally-directed and posteriorly closed pleotelson foramen, long, tapering and basally fused penial processes, a long (extending well beyond pleopod 2 endopod) and basally narrow appendix masculina, both sexes with two fused pleonal sutures, pleopod 1 rami lamellar (without thickened margins) and pereopod dactyli with a simple secondary unguis.

The present paper describes fifteenth species of the genus. Nevertheless no report of any Flabelliferan has been published except only one report *Paradella diana* Javed and Ahmed, 1987 from Pakistan. This paper describes a new species of the genus *Paradella*, and also represents the first time from the coast of Pakistan (Northern Arabian Sea).

The type material has been deposited in the Museum of Marine Reference Collection and Resource Centre, University of Karachi, Pakistan.

### Materials and Method

Holotype Adult males ♂ (4.8 mm), Paratypes Adult females ♀♀ (1.5-3.0 mm), Subadult males ♂♂ 1.5-2.0 mm. All the material examined from sand of the intertidal zone of Sandspit, (24<sup>th</sup> January, 2015) Karachi, Pakistan.

### Result

Order Isopoda Latreille, 1817

Suborder Flabellifera Sars, 1882

Family Sphaeromatidae Latreille, 1825

*Paradella* Harrison and Holdich, 1982: 99; Harrison, 1984: 386; Harrison & Ellis, 1991: 943;

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Kensley and Schotte, 1989: 223; Storey, 2002: 139; Bruce and Wetzer, 2004: 2; Wetzer and Bruce, 2007: 39.

*Paradella ovatis* sp. nov.

**Etymology:** This specific name *ovatis* (Latin) word meaning ovate ventilation slit.

#### Diagnostic features

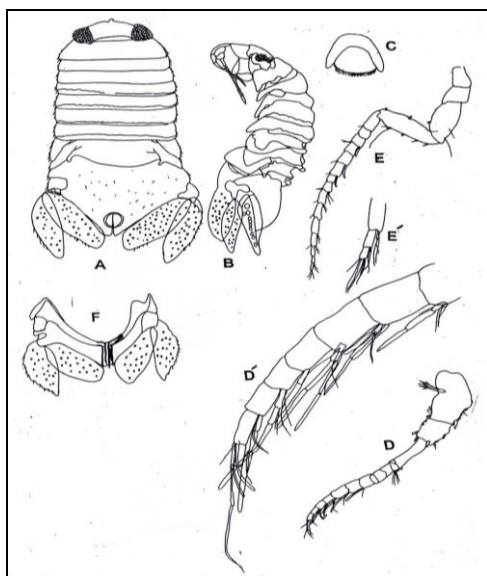
Body with dorsal surfaces smooth, without ornamentation, setae; strongly sexually dimorphic. Pleon consisting of 4 visible segments (as determined by lateral sutures); pleonite 1 entire; sutures (except first) running to posterior margin, merging, short; dorsal surface without process; posterior margin. Pleotelson anteriorly as wide as pleon, without dorsal process; posterior margin with subapical Y-shaped foramen connected to posterior by narrow slit, with ventral thickened rim; lateral margins forming ridge. Epistome anteriorly narrow, without median constriction. Penial processes basally fused, long (extending to pleopod1 rami). Pleopod 1 rami not operculate; exopod lamellar. Pleopod 2 endopod about as long as exopod; appendix masculina inserted basally, on short proximal lobe of endopod. Uropod rami broad, lamellar.

*Paradella ovatis* sp. nov.

#### Description

**Cephalon:** Wider than long, anterior margin rounded with rostral point present, laterally situated large eyes well pigmented. Dorsal surface of pereon and pleon smooth bearing no setae.

Pereonites subequal in length, sutures between coxae and pereonites 2-7 distinct, Pereonite1 lateral margins anteriorly produced, laterally enclosing head; pereonites 2-7 or 5-7, posterior margin not raised anteriorly. Pereonite 6 simple, dorsally without bosses, processes or marginal extensions. Pereonite 7 as wide as pereonite 6, forming part of body outline, dorsally without bosses, processes or marginal extensions or with bifid posteriorly directed process. Pleon posterior margin even. Fused pleonite section shorter than pereonite 7, a pair of suture lines merging posteriorly to one line of Y-shaped appearance (Fig.1A, 1B, 1F).



**Fig 1:** *Paradella ovatis* sp. nov. Adult male Holotype A, dorsal view; B, lateral view; C, Epistome; D, D', Antennule; E, E', Antenna; F, ventral view.

**Pleotelson:** Dorsal surface with scattered granules, distal part of pleotelson expanded, with dorsal ovate ventilation slit (Fig.1A). Each side of ventral pleotelsonic margins with ridge; ventral pleotelsonic cavity deep, posterior margin thickened (Fig.1F). Ovate ventilation slit on dorsal pleotelson shaped with cuticular thickening especially around anterior edges, posteriorly completely closed.

**Epistome:** Anteriorly not prominently extended, elongate, posteriorly enclosing labrum (Fig.1C).

**Antenna 1:** 3 - articulate, barely setose and spines on peduncle; two proximal articles wider than article 3; flagellum with 11 articulate; proximal article short and wider than long; articles 4-7 bearing 2 distal aesthetascs, articles 8-11 with single aesthetasc (Fig.1D,D').

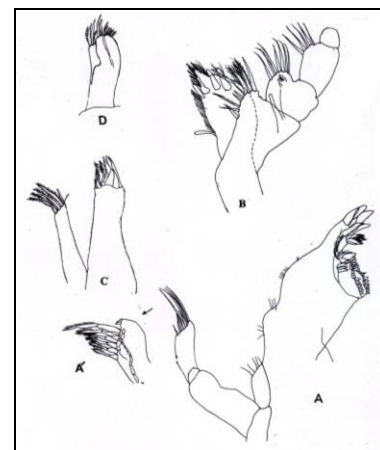
**Antenna 2:** Peduncle 5- articulate with 3 short, subequal proximal articles, and 2 longer distal articles, article 5 longer than 4 article; flagellum longer than peduncle with 15 setose articles, articles 11-14 bearing 1 distal aesthetascs (Fig.1E,E').

**Mandible:** Incisor wide, with 6-cuspidate; lacinia mobilis with spine row of 5 slender fringed spines; molar process gnathal surface with transverse ridges, rounded, denticulate margins and 4 short marginal setae, palp small, 2<sup>nd</sup> article with 7 fringed setae in distal half, terminal one with 9 fringed setae in distal two-thirds (Fig.2A,A').

**Maxillule:** With small ramus 1 with 6 distal plumose setae; outer ramus bearing 11 distal, partly denticulate spines, and several setules along medial margin (Fig.2C).

**Maxilla:** Both inner and outer lobe of outer ramus with 6 slender distal fringed spines; inner ramus slightly extending beyond outer lobe, rounded distal margin with 7 fringed spines; medial margin of inner ramus setulose (Fig.2D,D').

**Maxillipedal endite:** Single coupling hook; distal part of endite widening, bearing several distal setules, 6 fringed spines and 4 apically rounded spines. Palp articles 2 to 4 with setose lobes. Maxillipedal palp articles 2-4 mesial margins lobate, article 2 expanded; endite distal margin truncate, with clubbed robust setae, anteromesial (upper) marginal ridge without long curved serrate robust setae (Fig.2B).



**Fig 2:** *Paradella ovatis* sp. nov. A, A', left mandible; B, right mandible; C, maxillule; D, maxilla; E, maxilliped.

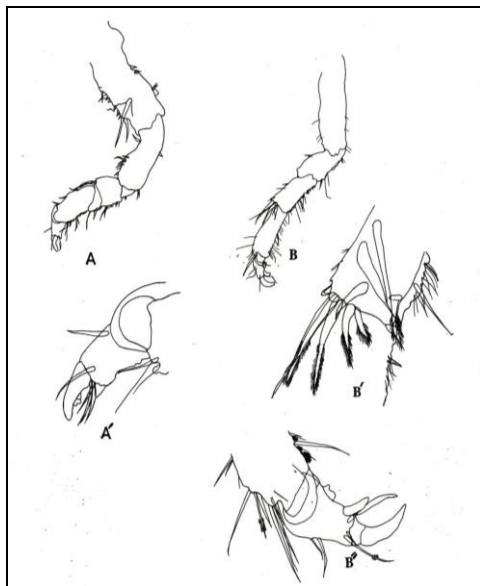
**Pereopod 1:** More robust than remaining pereopods; short carpus, propodus, carpus and merus of all pereopods not densely setulose and spinules; dactylus secondary unguis simple (Fig.3.A,A').

**Pereopod 2:** Similar in proportion to pereopod 3, dactylus with secondary unguis simple, short and stout.

**Pereopods 3-7:** Dactylus with secondary unguis simple.

**Pereopod 7:** Long, medial margin of ischium and merus produced into lobes, beset with long setae, distal margin of carpus bearing long spines.

Pereopods with inferior margin of ischium to carpus bearing dense setulose fringe; ischium superior margin with sinuate acute robust setae, pereopod 1-3 or 1-4 ischium superior margin without long stiff slender setae (Fig.3.B,B'B'').



**Fig 3:** *Paradella ovatis* sp. nov. A, pereopod 1; A', dactylus of pereopod 1; B, pereopod 7; B', dactylus of pereopod 7.

**Penes:** On posterior margin of 7<sup>th</sup> pereonite elongate, almost parallel-sided with narrowly rounded distal part, separated from one another proximally. Fig.4A.

**Pleopod 1:** endopod and exopod with approximately 27 and 20 plumose setae endopod subtriangular as long as exopod, 1.5 times as long as greater width, proximolateral margin straight; exopod with oblique axis, distal margin subtruncate; peduncle mesial margin with 3 coupling hooks (Fig.4B,B').

**Pleopods 1-3:** Peduncle with 3 coupling hooks bearing setules, exopod with a prominent spine at proximolateral angle (Fig. 4B, B', C, C'D, D').

**Pleopod 2:** Endopod subtriangular and subequal to exopod in length, endopod with 26 plumose marginal setae; exopod similar to that of pleopod 1, outer and distal margin bearing 28 plumose setae (Fig.4C,C').

**Appendix masculine:** Straight margins, longer than and extending beyond endopod, distally acute, proximally articulating appendix masculina with subapical denticle, extending beyond ramus with ¼ of its length, distal

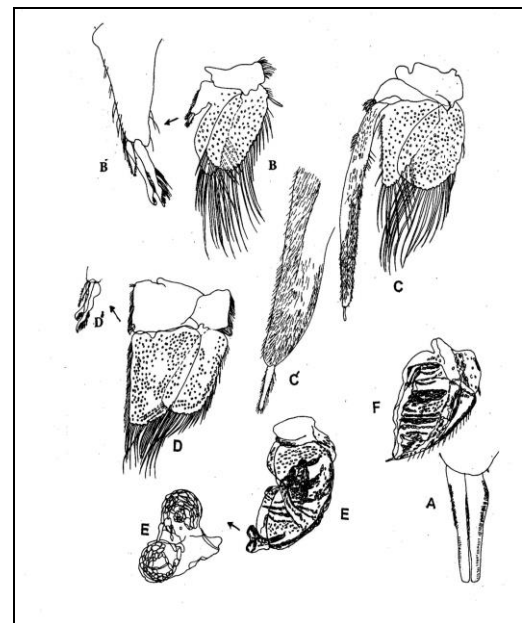
part of appendix masculina tapering to rounded apex, extending slightly beyond distal margin of endopod, proximal half of its length setulose; peduncle mesial margin with 3 coupling hooks (Fig.4C,C').

**Pleopod 3:** Endopod triangular with well extending beyond exopod, with straight medial and narrowly rounded distal margin; outer distal and distal margin bearing 14 plumose setae; elongate-ovate exopod with transverse suture in distal fourth outer and distal margin bearing 28 plumose setae (Fig.4D,D').

**Pleopods 4 and 5:** Both rami of pleopods pleated and subequal in length, endopod of pleopod 4 wider than exopod, exopod bearing minute terminal seta.

**Pleopod 4:** Endopod distomesial margin with prominent excision, exopod lateral margin approximately 12 fine simple setae, peduncle medial margin with 1 simple seta, exopod with thickened transverse ridges present, transverse suture absent, lateral margin not thickened, with short simple marginal setae; endopod with thickened transverse ridges present (Fig.4E,E',F).

**Pleopod 5:** with exopod 2 distal denticulate bosses and 14 short setae along outer proximal two-thirds. Plumose marginal setae of pleopodal rami drawn as simple setae. Pleopod 5 exopod with thickened transverse ridges present, endopod with thickened transverse ridges present (Fig.4F).



**Fig 4:** *Paradella ovatis* sp. nov. A, pleopod 1; B', B, pleopod 2; B', appendix masculine; C, pleopod 3; C', D, pleopod 4; E, pleopod 5; E, F, penes.

**Uropodal rami:** Elongate-ovate, dorsal surfaces granular; exopod margins serrate, sinuate, apically narrowed, somewhat longer than endopod; endopod margins serrate only anterior most mesial margin smooth.

**Female:** Total length 3.5 mm. Similar to male, Pleon without granulations; distal pleotelsonic margin not so strongly expanded as in male. Pleotelson without dorsal subapical foramen, apex emarginated. Ventral pleotelsonic margins

without distal notch. Uropod rami of similar proportions, lateral margin of exopod not upturned. Endopod of uropod extending to level of apex of pleotelson; exopod shorter than endopod; both rami acutely rounded terminally with obvious marginal setae.

### Discussion

There are, including the new species described here, thirteen species in the genus. Of these only one have been recorded from the Arabian Sea. However, we are aware that many undescribed species are held in collections around the world and that there are several species of 'Dynamenella-like' sphaeromatids described from the Pacific coast of North America that may, when redescribed, be found to belong to *Paradella*. It comprises ten species recorded intertidally and subtidally from Chile, Puerto Rico, Panama, California, USA, Kenya and Queensland Australia Harrison and Holdich, 1982; Muller, 1991, 1905; Kensley and Schotte, 1997; Harrison and Holdich, 1982 provided a key to the genera related to *Paradella* as did Kensley and Schotte, 1989 who used rather easier to observe characters than did Harrison and Holdich, 1982; Bruce and Wetzer, 2004.

The character for identification of uropod of *Paradella octaphymata* and *P. ovatis sp. nov.* are closely similar broad, extending well beyond apex of pleotelson; externally and distally serrate margins to the uropods, particularly the exopod which appears apically narrow and sub-acute. In contrast the similar *P. diana* has ovate uropods, which appear subequal in length, with an evenly convex lateral margin on the uropodal exopod.

The specimens at hand agree well with the description and illustrations given by Holdich and Harrison (1981) except that antenna 2 has 8 articles instead of 12, and pereopods are relatively less setose and the carpus of pereopod 7 differs in having non-plumose spine like setae on medial and distal margins.

No species of *Paradella* has been described in which the male has a huge, flat and distally bifid process on pereonite 7. Further identifying characters include the large posteriorly expanded coxae on pereonite 7, the large and broadly rounded uropods which extend well past the posterior margin of the pleotelson, the endopods of which have strongly raised margins giving a bowl-like appearance, and the pleotelson dorsum having four distinct acute sub-medial nodules and two weak lateral nodules. Females can be identified by having two pairs of sub-medial nodules on the dorsum of the pleotelson, these being laterally flanked by weak and poorly defined nodules. The male is further characterized by two apparently unique characters: the plumose marginal setae on the distal margins of the endopod of pleopod 1 are short, stout and formed much as robust setae other than that they are plumose; the lateral margins of the pleon are extended forming a dorsally bent and flat lobe.

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Furthermore, *Paradella ovatis sp. nov.* closely resemblance to endopod of pleopod 2 with *P. octaphymata* with appendix masculina almost twice length of endopod, narrow ,with margins subparallel and rounded apex (fig. 129; Harrison & Holdich, 1982: 100, fig. 5).The most striking difference from setose and one seta on apex of appendix masculina of pleopod 2.

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