**Makatinus heynsi** n. sp. (Dorylaimida : Aporcelaimidae) from Goa, India.

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**Summary** — *Makatinus heynsi* n. sp. is described and illustrated. It is characterized by: L = 1.96-2.42 mm; a = 37-43; b = 4.5; c = 82-110; V = 46-52; odontostyle = 21-25 μm; odontophore = 33-38 μm; spicules = 57-67 μm. *M. heynsi* n. sp. differs from the other species in having a shorter body and a transverse vulva.

**Résumé** — *Makatinus heynsi* n. sp. (Dorylaimida : Aporcelaimidae) provenant de Goa, Inde — *Makatinus heynsi* n. sp. est décrit et figuré. Il est caractérisé par: L = 1.96-2.42 mm; a = 37-43; b = 4.5; c = 82-110; V = 46-52; odontostyle = 21-25 μm; odontophore = 33-38 μm; spicules = 57-67 μm. *M. heynsi* n. sp. diffère des autres espèces du genre par un corps plus court et la vulve en fente transversale.

**Key-words** : Makatinus.

A soil sample collected from around the roots of paddy near Mangeshi temple, Goa, yielded a large number of specimens of an unknown dorylaim nematode. Because of the presence of a thick cuticle with fine punctations, a large odontostyle with aperture about 50 % of its length, unscerotized (plicated) guiding ring and two pairs of adanal supplements, it fits best in the genus *Makatinus* Heyns, 1965 (Aporcelaimidae : Dorylaimoidea). The present species has a transverse vulva instead of a longitudinal one reported in the three known South Africa.

The present species has a transverse vulva instead of a longitudinal one reported in the three known species. However, the presence of a transverse or longitudinal vulva in members of the same genus is common in Dorylaimoidea (*Mesodorylaimus*, *Eudorylaimus*, etc.). The shape of lip region and odontostyle and the arrangement of supplements is similar to *Makatinus* especially *M. punctatus* Heyns, 1965, the type species. Hence the present species is placed in the genus *Makatinus* and described as *M. heynsi* n. sp.

The genus *Makatinus* differs from *Aporcelaimus* Thorne & Swanger, 1936 mainly in having an amalgamated lip region (except in *M. macropunctatus*), punctate cuticle, longitudinal vulva, absence of cardiac disc and the presence of two adanal pairs of supplements (except in *M. macropunctatus*). The present species though having a transverse vulva cannot be accommodated in *Aporcelaimus* because of the shape of lip region, punctations on cuticle, absence of cardiac disc and the nature of adanal supplements (lip region distinctly set off, cuticle with criss-cross lines, cardiac disc present and a single pair of adanal supplements in *Aporcelaimus*).

All three known species of *Makatinus*, viz., *M. punctatus* Heyns, 1965, *M. capensis* Heyns, 1965, and *M. macropunctatus* Heyns, 1967 have been reported from South Africa. *M. heynsi* n. sp. represents the first species being reported from outside Africa.

**Materials and methods**

Specimens for light microscopy were killed and fixed in hot 4 % formalin, dehydrated by the slow method and mounted in glycerin. Measurements were made with an ocular micrometer. For SEM, formalin fixed specimens were washed in buffer, post-fixed in osmium tetroxide, dehydrated in an alcohol series and critical point dried in CO₂. Dried specimens were mounted on aluminium stubs and coated with 30 nm gold and observed on a Hitachi S 2300 SEM at 15 kV.

*Makatinus heynsi* n. sp. (Fig. 1 & 2)

**DIMENSIONS**

**Female** (Paratypes; n = 10). L = 1.96-2.42 (2.25) mm; a = 37-43 (39); b = 4.0-5.0 (4.5); c = 82-110 (92); c' = 0.62-0.72 (0.67); V = 46-52 (50); G₁ = 11-14 (13); G₂ = 9-14 (12); odontostyle = 21-25 (23) μm; odontophore = 33-38 (37) μm; oesophagus = 472-518 (499) μm; prerectum = 114-156 (130) μm; rectum = 32-40 (36) μm; tail = 22-28 (25) μm; ABD = 35-41 (37) μm.

**Male** (Paratypes; n = 5). L = 2.04-2.29 (2.16) mm; a = 39-43 (41); b = 4.3-4.8 (4.5); c = 71-90 (78); c' = 0.62-0.80 (0.70); T = 45-57 (52); odontostyle = 20-23 (22) μm; odontophore = 35-38 (37) μm; oesophagus = 462-501 (476) μm; spicules = 57-67 (64) μm; lateral guiding pieces = 14-15 (15) μm; ventromedian supplements = 9-11 (11); prerectum = 157-172 (160) μm; tail = 26-30 (28) μm; ABD = 35-39 (37) μm.

*Holotype* (female). L = 2.17 mm; a = 41; b = 4.1; c = 85; c' = 0.62; V = 52; G₁ = 13; G₂ = 12;

* Named after Prof. J. Heyns in recognition of his work on aporcelaimid nematodes.
odontostyle = 25 \mu m; odontophore = 36 \mu m; oesophagus = 518 \mu m; prerectum = 126 \mu m; rectum = 35 \mu m; tail = 26 \mu m; ABD = 41 \mu m.

**DESCRIPTION**

**Female:** Body ventrally curved upon fixation, tapering anteriorly from base of oesophagus. Cuticle finely striated, its thickness 3-5 \mu m at midbody and 5-6 \mu m at tail. Each stria 0.7 \mu m apart, bearing fine punctations. Punctations distinct towards extremities, more so in the striated, its thickness 3-5 \mu m about one fourth of body width at midbody. Lateral, dorsal and ventral papillae distinct under SEM. Lip region set off by a slight depression, 15-16 \mu m wide and 5-6 \mu m high. Oral aperture a dorso-ventral slit surrounded by six closely amalgamated equal-sized lips. Labial papillae arranged in a 6 \pm 3 pattern. Amphids stirrup shaped, their apertures 10-11 \mu m or about two thirds of the corresponding body width. Oesophageal expansion gradual, expanded part occupying 44-45 % of total oesophageal length. Cardia elongate conoid, 15-18 \mu m long. Oesophageal gland nuclei and their orifices located as follows:

- **DO** = 50-52
- **SN1** = 68-70
- **SN2** = 86-87

**DN** = 54-55

- **SN2** = 75-76
- **SO** = 88-89

**DO-DN** = 3-4

Reproductive system amphidelphic. Vulva a transverse slit, 8-9 \mu m wide, vagina 28-30 \mu m or about half of corresponding body width. Two triangular, strongly cuticularized pieces present at the vulva-vagina junction. Both sexual branches equally developed. Prerectum about 3-4 anal body widths long. Rectum about one anal body width long. Anus a short transverse slit about 8 \mu m wide. Tail short, hemispheroïd, 0.6-0.7 anal body widths long with a pair of caudal papillae on each side.

**Male:** Similar to females in general morphology except for a more curved posterior region. Spicules dorylaimoid, 1.6-1.8 anal body widths long. Lateral guiding pieces about one fourth of spicule length. Supplements poorly developed, arranged in a demarcated midventral area. Ventromedians 9-11 in number, regularly spaced. Adanals consisting of two pairs about 7 \mu m apart. Six or seven ventrolateral papillae on both sides of the supplement region. Prerectum about four anal body widths long. Anus crescent-shaped, about 8 \mu m wide, with a slightly swollen posterior lip. Tail short conoid with a bluntly rounded terminus, about 0.6-0.7 anal body widths long with three caudal papillae on each side.

**TYPE MATERIAL**

**Holotype:** Female (and a paratype male) on slide in the nematode collection of the Department of Zoology, Aligarh Muslim University, Aligarh.

**Paratypes:** Ten females and four males on slides *Makatinus* n. sp./2-8; in the same collection. A paratype female and a male deposited at Muséum National d'Histoire Naturelle, Laboratoire des Vers, Paris, France.

**TYPE HABITAT AND LOCALITY**


**DIAGNOSIS AND RELATIONSHIP**

*Makatinus heynsii* n. sp. differs from all the known species of *Makatinus* Heyns, 1965 in having a smaller body and a small transverse slit-like vulva.

It further differs from *M. punctatus* in having a slightly shorter odontostyle, anteriorly located vulva, differently shaped tail, smaller spicules and smaller number of ventromedian supplements (*L* = 2.4-3.1 mm; odontostyle = 25-27 \mu m; *V* = 56-59; spicules = 75-80 \mu m; ventromedian supplements = 21-23; vulva longitudinal and tail convex-conoid with a prominent hyaline tip in *M. punctatus*). From *M. macropunctatus* Heyns, 1967 it differs in shape of lip region, in having weaker cuticular punctations, a smaller c value, smaller spicules and in the arrangement of ventromedian supplements (*L* = 3.19 mm; cuticular punctations prominent; *c* = 133; spicules = 76-80 \mu m; lip region offset by a constriction, lips not closely amalgamated and adanal supplements a single pair in *M. macropunctatus*).

**Key to species of *Makatinus* Heyns, 1965**

1. — Lip region offset by a deep constriction; lips conspicuously separated; punctations prominent (*\phi* : *L* = 3.19 mm; *a* = 38; *b* = 4.3; *c* = 133; *V* = 54.5; *cf* : *L* = 2.76-2.80 mm; *a* = 39-42; *b* = 3.8-4.1; *c* = 91-118; odontostyle = 26 \mu m; spicules = 76-80 \mu m; supplements = 10 + 2).................... *macropunctatus* Heyns, 1967 — Lip region offset by a depression or slight constriction, lips amalgamated; punctations weak ..................... 2

2. — Vulva transverse (*\phi* : *L* = 1.9-2.4 mm; *a* = 37-43; *b* = 4.0-5.0; *c* = 82-110; *V* = 46-52; *cf* : *L* = 2.0-2.3 mm; *a* = 39-43; *b* = 4.3-4.8; *c* = 71-90; odontostyle = 21-25 \mu m; spicules = 57-67 \mu m; supplements = 9-11 + 2 + 2) .................... *heynsii* n. sp.

— Vulva longitudinal ............................................ 3

3. — Tail convex-conoid with digitate tip; vulva post-equatorial (*\phi* : *L* = 2.4-3.1 mm; *a* = 36-42; *b* = 4.2-4.4; *c* = 84-92; *V* = 56-59; *cf* : *L* = 2.8-3.6 mm; *a* = 40-45; *b* = 4.7-4.9; *c* = 89-91; odontostyle = 25-27 \mu m; spicules = 75-80 \mu m; supplements = 19 + 2 + 2) .................... *punctatus* Heyns, 1965 — Tail short, bluntly rounded; vulva median (*\phi* : *L* =
Fig. 1. *Makatinus heynsi* n. sp. A: Anterior region; B: Expanded part of oesophagus; C: Oesophago-intestinal junction; D: Female gonad (anterior branch); E: Female posterior region; F: Male posterior region.

3.6-3.7 mm; a = 32-34; b = 4.4-5.0; c = 103-107; V = 48-50; odontostyle = 25-27 µm; males not known) .................................................... *capensis* Heyns, 1965

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Fig. 2. *Makasinus heynsi* n. sp. A, B: Face views; C: Anterior end; D: Male posterior region showing supplements; E: Body striations showing punctations; F: Vulva; G: Male cloacal region showing adanal supplements and first ventromedian supplements, situated in a demarcated midventral area. (Bar is equal to 5 μm in A, B, C, D, F; 2 μm in E and 10 μm in G.)

References
