NEMATODES OF THE ORDER DORYLAIMIDA FROM ANDALUCIA ORIENTAL, SPAIN. THE GENUS FUNARIA VAN DER LINDE, 1938, WITH DESCRIPTION OF TWO NEW SPECIES

by

R. Pena Santiago

Summary. In several soil samples collected in Southeastern Spain (provinces of Granada and Jaén), two new species belonging to the genus Funaria were found. The species are named *F. millani* sp. n. and *F. barcinai* sp. n. They are closely related to three previously known species: *F. obtusa*, *F. ouasphaira* and *F. maryanneae*. Additional material of these latter species was studied. Morphological features related to the cuticle, lateral chords and lateral pores are described and their taxonomic importance discussed. *F. millani* sp. n. is characterized by its medium size, slender odontostyle with clear lumen, 25-34 lateral pores located in a single row, tail convex conoid and presence of male. *F. barcinai* sp. n. is medium size, has a somewhat attenuated odontostyle, 19-24 lateral pores located in a single row, tail convex conoid and male unknown. The differential diagnosis of the genera Funaria and Leptonchus, including some taxonomic changes, is discussed, and a key to the species of *Funaria* is given.

Although there is no previous record in the region, the genus *Funaria* van der Linde, 1938 is relatively common in natural mediterranean areas. In surveys carried out in the province of Granada during 1980-1981 and in the province of Jaén during 1982-1983 four different populations of *Funaria* species were collected.

Two of the populations represent new species, close to a group of three known species [*F. obtusa* (Thorne, 1939) Goseco et al., 1974, *F. ouasphaira* Goseco et al., 1974 and *F. maryanneae* Goseco et Ferris, 1976] and together form a species complex in which species boundaries are difficult to establish.

Materials and methods

Nematodes from Granada samples were extracted by centrifugation-flotation method (De Grisse, 1969) and from Jaén by a modified Baermann funnel technique. All specimens were fixed in FAA and processed to anhydrous glycerin according to Seinhorst (1959, 1962).

The four different populations collected are named as follows:

Population 1. Holm-oak forest near the site Cerro de Don Luis, Cenes de la Vega, province of Granada.


Other material examined (from Purdue Nematode Collection, borrowed from V.R. Ferris):

*F. obtusa*: one female and two males from Sequoia National Park, California, USA.

*F. ouasphaira*: three female paratypes and two juveniles from Viento, Oregon, USA.

*F. maryanneae*: four female paratypes from Bad Sooden, West Germany.

Morphological notes

In the material examined the cuticle presents a uniform morphology. The outer cuticle has two layers with the same width and appearance under interference contrast microscope. In the case of *F. obtusa* and *F. maryanneae* there is a fine but conspicuous transverse striation, clearer near both extremities. In *F. ouasphaira* and the four Spanish populations the cuticle is apparently smooth and only in some specimens has it been possible to observe a fine but inconspicuous striation on the tail.

The inner cuticle (subcuticle?) is coarsely striated, with abundant irregularities in its outline and is often clearly separated from the outer cuticle. The existence of radial refractive elements in the outer and inner cuticles which apparently coalesce, without crossing them, is a constant feature in this genus. In lateral view these elements have the appearance of little rod-like structures and in frontal
Fig. 1 - A-C, location of the lateral pores near the vulval area; D, *Funaria obtusa*, female tail; E and F, *F. maryanuae*, female tail; G, *ourasphaira*: G-I, female tail; J, juvenile tail.
view of a series of lined dots; they are seen most easily near
the head and tail, but their abundance varies among indi-
viduals and populations of the same species. The abun-
dance and distribution of radial refractive elements in the
inner cuticle is variable between species. Arrangement in
one or two rows and total number of lateral pores are ap-
parently constant within a species.

The four Spanish populations of Funaria together with
F. obtusa, F. ourasphaira and F. maryanneae form a species
complex with very similar morphometry (Tables II and
III) and, as a consequence, with an intricate taxonomy.
The characteristics of the complex are: medium size (body
length 1-2 mm); body moderately slender, odontostyle
length 9-13 μm and delicate with very slender though vis-
ible lumen; vulva somewhat posterior (V = 48.6-59.8) and
convex conoid to hemispherical tail.

F. obtusa is known only from North America. It was
described originally by Thorne (1939) as Leptonchus ob-
tusus from USA (Utah and Idaho). Loof (1963) studied
abundant material from USA (Utah). Goseco et al. (1974)
collected and studied several other populations, emended
Thorne's description and transferred the species to the ge-
nus Funaria. Zullini (1973) described Leptonchus parisi
from Mexico (Chiapas), but Goseco and Ferris (1976) con-
sidered it a synonym of F. obtusa. These populations show
interesting variability in their morphology. The cuticle is
fine but clearly striated in the populations studied by
Thorne (1939) and Goseco et al. (1974) (my own observa-
tions confirm this); however, it is smooth according to
Zullini (1973). The pharynx is significantly shorter in Zull-
ini's material (b = 7.0-7.4 vs. b = 3.9-6.5 in USA popu-
lations). Males are present in populations studied by Gos-
eco et al. (1974) and Zullini (1973) but not in those studied
by Loof (1963), although he examined a large number of
specimens. Unfortunately, there is no information about
lateral pores in the populations. I doubt whether these
populations are conspecific, but this needs further study.

F. ourasphaira was originally described by Goseco et al.
(1974) from USA (Oregon) and no later record is known.

Table I - Number and distribution of lateral pores of different populations belonging to the genus Funaria.

<table>
<thead>
<tr>
<th>Population</th>
<th>F. barcinali sp. n.</th>
<th>F. millani sp. n.</th>
<th>F. maryanneae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pop. 1</td>
<td>Pop. 2</td>
<td>Pop. 3</td>
</tr>
<tr>
<td>n</td>
<td>8</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>neck</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>neck base-vulva</td>
<td>5.6(5-8)</td>
<td>10.2(9-12)</td>
<td>9.6(8-11)</td>
</tr>
<tr>
<td>vulva-prerectum</td>
<td>5.5(4-7)</td>
<td>9(8-10)</td>
<td>7.4(6-8)</td>
</tr>
<tr>
<td>prerectum</td>
<td>1.9(1-2)</td>
<td>4(3-5)</td>
<td>4.2(3-5)</td>
</tr>
<tr>
<td>tail</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
According to these authors, the species is close to *F. obtusa* and differs by having a hemispherical tail and by the absence of males. The shape and size of the tail is somewhat variable in *F. obtusa*: rounded conoid (tail length 22.5 μm, ABW 28 μm and c' = 0.8) in Thorne’s lectotype [see Fig. 16C and text in Goseco et al. (1974)] and conoid (tail length 27 μm, ABW 25 μm and c' = 1.1) in the female examined by the author (Fig. 1D). In *F. ourasphaira* the tail, said to be hemispherical, is (Fig. 1G-J) rounded conoid to hemispherical (tail length 18, 21, 26 μm; ABW 26, 28, 31 μm and c' = 0.7, 0.7, 0.9) in three paratypes examined by me. The males, although present, are rare in *F. obtusa* and, on the other hand, the known population of *F. ourasphaira* is small (n = 7). As a consequence, one cannot exclude the possibility that these species are conspecific, but more information is required to ascertain this.

### Table II - Measurements of three known species of the genus Funaria (from the literature).

<table>
<thead>
<tr>
<th>Species</th>
<th><em>Funaria obtusa</em></th>
<th><em>F. ourasphaira</em></th>
<th><em>F. maryannae</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>Thorne’s lectotype</td>
<td>Thorne’s paralecotypes</td>
<td>USA populations</td>
</tr>
<tr>
<td>n</td>
<td>?</td>
<td>1♀</td>
<td>2♀ ♀</td>
</tr>
<tr>
<td>L</td>
<td>1.6</td>
<td>1.5</td>
<td>1.63 1.7</td>
</tr>
<tr>
<td>a</td>
<td>30</td>
<td>37.5</td>
<td>35 39</td>
</tr>
<tr>
<td>b</td>
<td>6.0</td>
<td>5.5</td>
<td>5.5 6.1</td>
</tr>
<tr>
<td>c</td>
<td>60</td>
<td>66.9</td>
<td>54 68</td>
</tr>
<tr>
<td>V</td>
<td>52</td>
<td>54</td>
<td>53 55</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>head width (μm)</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>amphib. apert (μm)</td>
<td>6.4</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>odontostyle (μm)</td>
<td>11</td>
<td>9</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>phar. bulb. length (μm)</td>
<td>50</td>
<td>48 53</td>
<td>46.3(37-56)</td>
<td>44.6(40-48)</td>
</tr>
<tr>
<td>body width (μm)</td>
<td>40</td>
<td>43 46</td>
<td>41.7(31-46)</td>
<td>35</td>
</tr>
<tr>
<td>lateral fields (μm)</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>prerectum (μm)</td>
<td>206</td>
<td>198 243</td>
<td>140(109-162)</td>
<td>109-176</td>
</tr>
<tr>
<td>rectum (μm)</td>
<td>32</td>
<td>25</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>ABW (μm)</td>
<td>28</td>
<td>25</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>tail length (μm)</td>
<td>22.4</td>
<td>24 31</td>
<td>27(22-30)</td>
<td>26(24-28)</td>
</tr>
<tr>
<td>spicule (μm)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>40.6(37.8-43)</td>
</tr>
<tr>
<td>Supplements</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2 + [4-6]</td>
</tr>
</tbody>
</table>

F. *maryannae* is known from Europe (West Germany and Switzerland). This species is easily separated from *F. obtusa* and *F. ourasphaira* by the lateral pores located in a single row near the ventral margin of the lateral chords (two rows in other two species) and by a general larger body size.

**Description of new species**

**FUNARIA MILLANI** sp.n.
(Fig. 2; Table III)

*Female:* slender, of medium size. Body cylindrical, tapering towards anterior end. Habitus in general ventrally curved (Fig. 2C). Outer cuticle thin with two layers of the
same depth, smooth. Inner cuticle with irregular outline and often separated from the outer cuticle, coarsely striated. Radial refractive elements abundant, visible along the entire body but specially obvious near head and tail (Fig. 2A,N). Lateral chord about 40% of the body width near midbody, with irregular crenated margins and numerous rodlike structures. Lateral pores (Table I) located in a single row near the ventral margin of the lateral chord. Lip

<table>
<thead>
<tr>
<th>Species</th>
<th>Funaria millani sp. n.</th>
<th>Funaria bairini sp. n.</th>
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<tbody>
<tr>
<td>Population</td>
<td>Holotype</td>
<td>Paratypes</td>
</tr>
<tr>
<td>n</td>
<td>1.53</td>
<td>1.58(1.29-1.91)</td>
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<tr>
<td>a</td>
<td>34.9</td>
<td>33.8(30.0-38.1)</td>
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<tr>
<td>b</td>
<td>5.6</td>
<td>5.9(4.5-6.9)</td>
</tr>
<tr>
<td>c</td>
<td>46.5</td>
<td>53.3(41.6-68.6)</td>
</tr>
<tr>
<td>V</td>
<td>57.7</td>
<td>54.8(48.6-59.8)</td>
</tr>
<tr>
<td>G1 (T1)</td>
<td>16.0</td>
<td>16.1(12.0-20.4)</td>
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<tr>
<td>G2 (T2)</td>
<td>16.4</td>
<td>15.9(11.0-18.8)</td>
</tr>
<tr>
<td>c'</td>
<td>1.1</td>
<td>1.0(0.8-1.2)</td>
</tr>
<tr>
<td>head width (µm)</td>
<td>11</td>
<td>10-11</td>
</tr>
<tr>
<td>amph. apert. (µm)</td>
<td>7</td>
<td>6-7</td>
</tr>
<tr>
<td>odontostyle (µm)</td>
<td>9</td>
<td>9.8(9-11)</td>
</tr>
<tr>
<td>stoma (µm)</td>
<td>7</td>
<td>7-8</td>
</tr>
<tr>
<td>nerv. ring-ant. end (µm)</td>
<td>108</td>
<td>113(108-125)</td>
</tr>
<tr>
<td>pha. bulb length (µm)</td>
<td>56</td>
<td>53(47-59)</td>
</tr>
<tr>
<td>cardia (µm)</td>
<td>9</td>
<td>7-10</td>
</tr>
<tr>
<td>neck length (µm)</td>
<td>272</td>
<td>269(273-289)</td>
</tr>
<tr>
<td>body width (neck base) (µm)</td>
<td>35</td>
<td>39(35-45)</td>
</tr>
<tr>
<td>body width (midbody) (µm)</td>
<td>44</td>
<td>47(41-52)</td>
</tr>
<tr>
<td>lateral fields (µm)</td>
<td>13</td>
<td>13-20</td>
</tr>
<tr>
<td>vagina (µm)</td>
<td>19</td>
<td>15-52</td>
</tr>
<tr>
<td>vulva-anterior end (µm)</td>
<td>886</td>
<td>864(702-928)</td>
</tr>
<tr>
<td>prerectum (µm)</td>
<td>200</td>
<td>189(163-219)</td>
</tr>
<tr>
<td>rectum (µm)</td>
<td>31</td>
<td>30(28-33)</td>
</tr>
<tr>
<td>ABW (µm)</td>
<td>29</td>
<td>31(26-36)</td>
</tr>
<tr>
<td>tail length (µm)</td>
<td>33</td>
<td>30(25-33)</td>
</tr>
<tr>
<td>spicules (µm)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>guiding pieces (µm)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>copulatory muscles</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>sperm (µm)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
region well offset, twice as wide as high and about 1/3-
1/4th of the body width at neck base (Fig. 2A,D). Labial
and cephalic papillae distinct, ten outer angular and six in-
ner protruding (Fig. 2B). Amphids cup-shaped, opening at
level of the cephalic constriction, and occupying about
2/3th of corresponding body width. Stoma a truncate cone
to cylindrical, somewhat wider in the base and with thick-
ened walls in the perioral area. Odontostyle delicate but
with very clear lumen; its aperture about 1/3th of its total
length; slightly bent and length equal to or somewhat less
than head width. Odontophore also bent. Cervical pores
two pairs, the first at the level of the odontostyle base and
the second at the level of middle odontophore. Anterior
part of the pharynx slender (Fig. 2D) and not muscular.
Bulb cylindroid, about 18-25% of the pharynx total legh;
3-4 times as long as wide (Fig. 2L). Pharyngeal gland nuclei
and outlets clear: one dorsal and one pair ventrosobilateral.
Cardia rounded, somewhat wider than long. Nerve ring
located at 38-47% of the neck length. At the level of the
pharynx slender (Fig. 2D) and not muscular. Bulb cylindroid, about 18-25% of the pharynx total length;
3-4 times as long as wide (Fig. 2L). Pharyngeal gland nuclei
and outlets clear: one dorsal and one pair ventrosobilateral.
Cardia rounded, somewhat wider than long. Nerve ring
located at 38-47% of the neck length. At the level of the
nerve ring or somewhat before it there is a lateral pore.
Genital system didelphic-amphidelphic (Fig. 2E). With re-
flexed ovaries; oocytes at first in two rows, then in a single
row. Oviduct with a slender part and a moderately de-
veloped pars dilatata. Oviduct and uterus are joined by a well
developed sphincter. Uterus wider than oviduct, without
specializations. Vagina cylindrical, its inner wall cuticular-
ized surrounded by circular musculature; extending in-
ward over 50% of the corresponding body width; and with
a sclerotized area near the vulva (Fig. 2G;J,K). Vulva lon-
gitudinal (Fig. 2H, I). Genit al tract often containing sperm, mostly in the pars dilatata of the oviduct. Prerectum
4.6-8.7 anal body widths long; intestine-perirectum junc-
tion guarded by three prominent cells (Fig. 2F). Rectum
about one anal body width long. Tail convex-conoid with
broadly rounded tip (Fig. 2N-P); about one anal body
width long. Two pairs of caudal pores are present, one sub-
dorsal, the other subterminal.

Male: general morphology similar to female (Fig. 2M).
Genital system dioecious. Spermatozoa elliptical (Fig. 2T).
Supplements an adanal pair and 6-9 well-space ventrome-
dian ones (Fig. 2Q). Spicules stout, curved; 1-1.5 anal
body widths long (Fig. 2R). Prerectum 6.3-7.8 anal body
width long. Tail dorsally convex, ventrally concave conoid
with rounded end (Fig. 2S). Two pairs of caudal pores in
posterior half of tail.

Juveniles: resembling adults in general morphology.

Differential diagnosis: F. millani sp.n. is close to F. ob-
tusa, F. ourasphaira and F. maryaanneae. It differs from F.
obtusa in having a single row of lateral pores (vs. two rows)
and smooth cuticle (vs. finely but clearly striated). From F.
ourasphaira in having a single row of lateral pores (vs. ap-
parently two rows), tail convex-conoid and relatively longer (vs. hemispheroid and relatively shorter) and males
present (vs. males absent). From F. maryaanneae in having
convex-conoid tail (vs. hemispherical) and shorter odonto-
style.

Type habitat and locality: alkaline soil around roots of
Paeonio-Quercetum rotundifolii Rivas Martínez (hol-oak
forest) in Piedra del Aguila, Valdepeñas de Jaén, Province
of Jaén, Spain.

Other habitats and localities: 1) soil around roots of
Santolino-Salvietum oxyspondit Rivas Goday et Rivas
Martínez (brushwood) and Andryalion agardhii Rivas Mar-
tínez (brushwood) in Sierra de la Pandera, Valdepeñas de
Jaén, Province of Jaén, Spain. 2) soil around roots of
Paeonio-Quercetum rotundifolii Rivas Martínez (holmo-
ak forest) and 3) of Ulci-Geristemum speciosae Rivas Go-
day et Rivas Martínez in Sierra de Jabalcuz, Jaén, Province
of Jaén, Spain. All alkaline soils.

Etymology: the specific epithet millani is a patronymic
honoring F. Jiménez Millán, the eminent Spanish nema-
tologist.

Type material: holotype female, two paratype females
and allotype male deposited in the collection of Instituut
voor Dierkunde, Rijksuniversiteit Gent, Belgium, slides
n° 3291-3293. One paratype female and one paratype
male in the following collections: Departamento de Biolo-
gia Animal, Universidad de Granada, Granada, Spain,
slide n° 0010; Istituto di Nematologia Agraria, Bari, Italy;
Museum national d'Histoire naturelle, Paris, France; and
Commonwealth Institute of Parasitology, St. Albans, UK.

FUNARIA BARCINAI sp.n.
(Fig. 3; Table III)

Female: medium size, generally less than 1.5 mm long.
Body cylindrical and rather slender, tapering towards an-
terior end (Fig. 3A). Habitus slightly ventrally arcuate.
Outer cuticle thin with two layers of similar width, smooth. Inner cuticle coarsely striated, with irregular out-
line and often separated from the outer cuticle. Radial
refractive elements scarce, more visible in posterior region.
Lateral chords about 1/3th of the body width near mid-
body, with irregular crenated margins; rod-like structures
not abundant. Lateral pores (Table I) located in a single
row near the ventral margin of the lateral chord. Head off-
set by a constriction, cap-shaped (Fig. 3B,E), about twice
as wide as high and about 1/3th of the body width at neck
base. Labial and cephalic papillae rounded. Amphids cup-
shaped, opening at level of cephalic constriction, and oc-
cupying almost 2/3th of the corresponding body width
(Fig. 3F). Stoma a truncate cone, slightly wider at the base,
about three times as long as wide; its walls somewhat scle-
rotized and thickened in the perioral area. Odontostyle
delicate, attenuated with lumen not visible in its anterior
part, slightly arched and its length somewhat less than
Fig. 3 - *Funaria barcinai* sp.n. (female): A, entire body; B, neck region; C, genital system; D, posterior body region; E, head in median view; F, head in surface view; G, vagina in lateral view; H, vulva in ventral view; I and J, vagina in ventral view; K-M, tail; N, pharyngeal bulb and cardia.
head width. Odontophore arched; its length similar to odontostyle. Guide ring simple. Cervical pores two, one at level of the odontostyle base and the other at level of the odontophore base. Pharynx (Fig. 3B) with a slender not muscular anterior part and a basal bulb. The latter about 20-25% of total neck length, 3-4 times as long as wide (Fig. 3O). Pharyngeal gland nuclei and outlets usually clear: one dorsal and a pair ventrolateral ones. Cardia rounded. Nerve ring located at 37-43% of total neck. At the level of the nerve ring there is another lateral pore. Genital system didelphic-amphidelphic with ovaries reflexed (Fig. 3C); oocytes initially in two rows, then in a single row. Oviduct with slender part and moderately developed pars dilatata. Sphincter present between oviduct and uterus. Uterus wider than oviduct without specializations. Vagina cylindrical to a truncate cone (Fig. 3G, I, K); its wall somewhat cuticularized and with circular muscles; extending inwards over half of the corresponding body width, with sclerotized area near the vulva. Vulval opening surrounded by cuticular membrane.

Male: unknown

Juveniles: general morphology similar to females.

Differential diagnosis: F. barcinai sp.n. resembles F. obtusa, F. ourasphaera, F. maryanneae and F. millani sp.n. From F. obtusa it differs in having a single row of lateral pores (vs. two rows) and smooth cuticle (vs. finely but clearly striated). From F. ourasphaera in having a single row of lateral pores (vs. apparently two rows) and tail convex conoid and relatively longer (vs. tail hemispheroid and relatively shorter). From F. maryanneae in being smaller, tail convex conoid (vs. hemispherical) and less lateral pores. Finally, it differs from F. millani sp.n. in having less lateral pores (Table I), absence of males (vs. males present and females with sperm in their genital tract) and differently shaped odontostyle.

Type habitat and locality: acid soil around roots of Quercus fagineo-suberis (Braun Blanquet, Silva et Rozeira) Rivas Martínez (holm-oak forest) in Cerro de Don Luis, Cenes de la Vega, Province of Granada, Spain.

Etymology: the specific epithet barcinai is a patronymic honoring A. Gómez Barcina, the eminent Spanish nematologist.

Type material: holotype female and two female paratypes deposited in collection of Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium, slide n° 3294 and 3295; one female paratype deposited in each of the collections as listed for F. millani sp.n.

Additional notes on the taxonomy of the genus Funaria.

Goseco et al. (1974) and Bajaj and Bhatti (1982) have indicated that the genus Funaria is morphologically close to Leptonchus Cobb, 1920. According to Goseco et al. (1974), Funaria differs from Leptonchus by having a longitudinal vulva (vs. transverse), a long and cylindrical pharyngeal bulb (vs. pyriform) and large distinct cardia (vs. small). I agree with Bajaj and Bhatti (1982) that the shape of the pharyngeal bulb is quite variable in some species of both genera; for example it is cylindrical in Leptonchus punctulatus Goseco, Ferris et Ferris, 1974. In the same paper, Bajaj and Bhatti (1982) described Funaria indica from India, as a species with transverse vulva (a feature of Leptonchus), large cardia (a feature of Funaria) and long prerectum with its junction with the intestine posterior to the vulva (a feature of Funaria but also present in Leptonchus transvaalensis Heyns, 1963). They stated that «only the length of prerectum is a good taxonomic character to separate the genera» (Leptonchus and Funaria) and transferred Leptonchus microdens Thorne, 1974 and Leptonchus capitatus Baqri et Jairajpuri, 1968 (two species with long prerectum and with the junction to intestine posterior to vulva) to the genus Funaria. I disagree with this action because, in my opinion, the shape of the vulva (by definition transverse in Leptonchus and longitudinal in Funaria) is a more consistent character for distinguishing the two genera. This character has also been used in the taxonomy of other dorylaimid genera such as Paravulvus Heyns, 1968.

As a consequence, the following taxonomic changes are proposed:

1. Leptonchus indicus (Bajaj et Bhatti, 1982) n. comb.  
   syn. Funaria indica Bajaj et Bhatti, 1982

2. Leptonchus microdens Thorne, 1974  
   syn. Funaria microdens (Thorne, 1974) Bajaj et Bhatti, 1982

3. Leptonchus capitatus Baqri et Jairajpuri, 1968  
   syn. Funaria capitata (Baqri et Jairajpuri, 1968) Bajaj et Bhatti, 1982

The genus Funaria thus contains twelve species which can be separated with the following key [modified after Goseco et al. (1974)]:

1 - Vulval opening surrounded by cuticular membrane  
   - Vulval opening not surrounded by cuticular membrane 3

2 - Tail mucronate  
   - Tail not mucronate F. fimbriata (Thorne, 1939) Goseco et al., 1974
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Literature cited


3 - Tail mucronate or terminus acute
   - Tail bluntly conoid to hemispherical
4 - Tail mucronate
   - F. thornei van der Linde, 1938
   - Tail acute
5 - Tail as long as anal body width, terminus less acute
   - F. acuta (Zullini, 1973) Goseco et Ferris, 1976
   - Tail twice as long as anal body width
   - F. apitica (Thor, 1964) Goseco et al., 1974
6 - Lateral pores located in two rows
   - Lateral pores located in a single row
7 - Spear wider (1 μm), with lumen distinct
   - Spear narrower (0.5 μm), lumen less distinct
8 - Spear robust; prerectum 6 anal body-widths long; tail relatively longer (one and a half anal body-width long); tail terminus blunt
   - F. cacti Goseco et al., 1974
   - Spear less robust; prerectum 7 times anal body width long; tail less than one anal body width long and ending in a rounded terminus
   - F. orientalis Khan et Khan, 1987
9 - Tail bluntly conoid, male known
   - F. obtusa (Thorne, 1939) Goseco et al., 1974
   - Tail hemispherical, male unknown
   - F. ourasphaira Goseco et al., 1974
10 - Lateral pores 20-24, male unknown
    - F. barcinai sp.n.
    - Lateral pores 25-34, male known
11 - Tail hemispherical, odontostyle 13 μm long
    - F. maryanneae Goseco et Ferris, 1976
    - Tail rounded conoid, odontostyle 9-11 μm long
    - F. millani sp.n.

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