Systematics of the Trichodoridae (Nematoda) with keys to their species

Wilfrida Decraemer

Instituut voor Dierkunde, Rijksuniversiteit, Ledeganckstraat 35, 9000 Gent, Belgium.

SUMMARY

Keys are given for the identification of species in the Trichodoridae, partly based on the keys of Loof (1975) and Siddiqi (1974). Recent additions are included and for all species a drawing is given of the structure referred to in the key. The genus Paratrichodorus and the diagnostic value of the subgenera Paratrichodorus, Atlantadorus and Nanidorus are discussed.

Résumé

Systématique des Trichodoridae (Nematoda) et clés de détermination des espèces


The Trichodoridae are economically, a very important group of nematodes as ectoparasites on the roots of many crop plants and as vectors of tobacco rattle virus and pea early browning virus. Despite the ease with which nematodes can acquire viruses from plants there are relatively few vectors. Of some 35 species of Trichodoridae, at least eleven transmit tobra-viruses.

Superfamily TRICHODOROIDEA
(Thorne, 1935) Siddiqi, 1961

The genera of the Trichodoridae (Thorne, 1935) Clark, 1961

Until recently the family Trichodoridae con-
Genus Trichodorus Cobb, 1913 s. str.

Definition

Trichodoridae. Cuticle not strongly swollen upon fixation. Posterior ventrosublateral oesophageal glands not overlapping the intestine, nor does the intestine anteriorly partly overlap the oesophagus. Dorsal oesophageal gland

4. — Tail contour evenly rounded, terminal cuticle not conspicuously thickened; spicules not setose (Pl. II: Fig. 3)  
   T. aequalis Allen, 1957

5. — Spicules not setose, almost straight (Pl. II: Figs. 6, 7)  
   T. hooperi Loof, 1973
1. Oesophageal region in *Trichodorus* (scale = 20 μm).

2: *T. primitivus*.
4: *T. lusitanicus* (after Siddiqi, 1974).
5: *T. viruliferus* (specimen, courtesy D. De Waele).
6: *T. similis*.
12. — Two very similar species (synonymous? cf. remark 4). Third supplement 1.1 body width anterior to second supplement (Pl. III : Fig. 2) 
T. dilatatus Rodriguez-M. & Bell, 1978
— Third supplement 0.8-1.0 body width anterior to second supplement (Pl. III : Fig. 1; Pl. I : Fig. 3: oesophageal region)
T. californicus Allen, 1957
13. — One ventromedian cervical papilla located behind the excretory pore (Pl. I : Fig. 7; Pl. III : Fig. 5: tail region + copulatory apparatus)
T. castellanensis Arias et al., 1965
— No ventromedian cervical papilla located posterior to the excretory pore (Pl. I : Fig. 2) ........................................... 14
14. — Spicules distally very slender so that gubernaculum mainly appears ventral to spicules (Pl. III : Fig. 12; Pl. I : Fig. 2 : oesophageal region)
T. primitius (De Man, 1880) Micoletzky, 1922
— Gubernaculum never ventral to spicules . . 15
15. — Spicules transversely striated; tail with small caudal alae, narrow part of spicules with “bristles” (Pl. III : Fig. 4)
T. ciliatus Hooper 1963
ventromedian cervical papillae; (Pl. III : Fig. 13 : tail region + copulatory apparatus)
T. cedarus Yokoo, 1964

Remarks to the key of Trichodorus males

1. In the original figure of T. cedarus Yokoo, 1964 two ventromedian cervical papillae are located within the onchiostyle region. However, since the type specimens are badly fixed we cannot be certain that in well fixed animals no cervical papillae would be found within the onchiostyle region. Consequently I mentioned both possibilities within the key. Mamiya (1967) observed no cervical papillae within the onchiostyle region in other specimens than the type specimens.

2. As Loof (1975) pointed out, the status of T. obtusus Cobb, 1913 has never been clear. As no redescriptions are available we can only rely on the original drawing and description of a male without ventromedian cervical papillae.
Rodríguez-M. & Bell, 1978) becomes negligible. *T. californicus* shows some variation in the position of the lateral cervical pore in relation to the single ventral cervical pore, the excretory pore and the nerve ring. I observed the lateral cervical pore varying between a position just behind the nerve ring, i.e. 12.5 μm anterior to the ventral cervical pore to a position slightly (3.5 μm) behind the excretory pore i.e. about 26 μm behind the nerve ring.

5. The measurements for *T. similis* and *T. variopapillatus* include personal measurements, that extend the range so far published.

**KEY TO Trichodorus FEMALES**

1. — Onchiostyle length 140-150 μm (Pl. IV: Fig. 1: vulva region)  
   *T. elegans* Allen, 1957
   — Onchiostyle length under 100 μm  
   2

2. — Sclerotized pieces at vagina rather close
   
7. — A pair of ventrosubmedian pores behind the vulva; sclerotization of vagina appearing parallel to the vaginal lumen in lateral view; onchiostyle length 58-62 μm (Pl. IV: Fig. 13)
   *T. cedars* Yokoy, 1964
   — No ventrosubmedian pores behind the vulva but a pair of lateral pores  
   8

8. — Sclerotization of vagina appearing as more or less triangular, prominent, pieces in lateral view  
   — Sclerotization of vagina differently structured and smaller (Pl. IV: Fig. 15); onchiostyle length 57-68 μm; body length 700-1,010 μm
   *T. coli* Allen, 1957

9. — Onchiostyle length 62-75 μm; body length 680-1,130 μm; sclerotization of vagina large, vaginal region rounded (Pl. IV: Fig. 14)
   *T. intermedius* Rodríguez-M & Bell, 1978
   — Onchiostyle length 66 μm; body length 1,170 μm; sclerotization of vagina smaller, vaginal region cylindrical (Pl. IV: Fig. 39)
   *T. obscures* Allen, 1957

10. — Sclerotized ring of vagina broad; in lateral view sclerotization of vagina appearing as...
16. — Onchiostyle length 39-46 μm; vaginal sclerotization dot-like; body length 820-1,220 μm (Pl. IV: Fig. 30; vaginal region) T. pakistanensis Siddiqi, 1962
   — Onchiostyle length 73-75 μm; vagina elongated (Pl. IV: Fig. 34); body length 570-640 μm T. longistylus Yokoo, 1964

17. — Sclerotization of vagina in lateral view reniform to pyriform; onchiostyle length 53-57 μm; body length 650-920 μm (Pl. IV: Fig. 35; vaginal region) T. borneensis Hooper, 1962
   — Sclerotization of vagina rounded; onchiostyle length 53-60 μm; body length 710-1,100 μm (Pl. IV: Fig. 36; vaginal region) T. hooperi Loof, 1973

18. — Sclerotization of vagina in lateral view as rounded equilateral triangles; onchiostyle length 41-44 μm; (Pl. IV: Fig. 37) T. lusitanicus Siddiqi, 1974
   — Sclerotization of vagina different; onchiostyle length over 50 μm (cf. remarks 2, 3). T. californicus Allen, 1957

19. — Sclerotization of vagina reniform with longest axis parallel to body wall in lateral view; onchiostyle length 55-80 μm; body length 720-1,250 μm (Pl. IV: Fig. 38; vaginal region) T. dilatatus Siddiqi, 1974; Loof, 1975.
   — Sclerotization of vagina reniform with longest axis parallel to vaginal wall in lateral view; onchiostyle length 61-69 μm; body length 720-1,030 μm (Pl. IV: Fig. 40; vaginal region) T. borneensis Hooper, 1962

Remarks to the key of Trichodorus females


2. Females of T. dilatatus are morphologically very similar to T. californicus (cf. Rodriguez-M. & Bell, 1978). They have a comparable shape of the vagina but slightly differ in the shape of the triangular sclerotization of the vulva: In T. californicus the longest axis is parallel to the body wall and in T. dilatatus the longest axis is parallel to the vaginal wall.

3. According to Allen (1957) females of T. obscurus cannot be distinguished from those of T. californicus. I have studied a few specimens of T. californicus from Allen’s collection and a few specimens of T. obscurus from Beltsville collected by Schindler in 1957. I noticed a small difference in shape of the sclerotized vaginal ring (Pl. IV: Figs 38, 39) and in the distance between the sclerotized pieces in lateral view although I do not know if these differences will be found in a larger number of specimens and in the type material of T. obscurus (the difference in vaginal shape: rounded or elongated is probably due to fixation).

Genus Paratrichodorus Siddiqi, 1974

Validity of subgenera

Siddiqi (1974) distinguished among the species of the genus Paratrichodorus three subgroups for which he proposed three subgenera: Paratrichodorus, Atlantadorus and Nanidorus.

The basic diagnostic characters in the identification of Paratrichodorus and Atlantadorus are the posterior ventrosublateral oesophageal glands overlapping the intestine in Paratrichodorus and an anterior overlap of the intestine dorsally and dorsolaterally over the posterior part of the oesophagus in Atlantadorus (cf. Siddiqi, 1974; key on p. 270).

Other diagnostic characters in the identification for the males of Paratrichodorus and Atlantadorus are:

— the number of pairs of postcloacal ventrosubmedian papillae: one pair in Paratrichodorus and usually two pairs in Atlantadorus (Siddiqi, 1974; Loof, 1975).
— the presence of lateral cervical pores located near the level of the excretory pore in Atlantadorus, and their usual absence in Paratrichodorus (Siddiqi, 1974).

In females the subgenera are characterized on the base of the vulva-shape: a short longitudinal slit in Paratrichodorus and a pore-like opening in Atlantadorus.

The subgenus Nanidorus is distinguished from the other subgenera mainly by the posterior position of the excretory pore near or posterior to the base of the oesophagus. The male specimens differ from the other subgenera by the very long spicules and the presence of only one ventromedian papilla; the females by the absence of lateral and caudal pores and by the shape of the vulva: a short transverse slit.
Discussion

In a population of *Paratrichodorus* (probably a new species, close to *P. teres*) specimens were found with posterior ventro-sublateral oesophageal glands overlapping the intestine either slightly or distinctly, together with an anterior overlapping by the intestine dorsally and dorsolaterally over the oesophageal bulb. Both characters were however used as important diagnostic characters for distinguishing *Paratrichodorus* from *Atlantadorus*; as they have been found together in the same specimens they are no longer diagnostic. In *Nanidorus* the posterior ventrosublateral oesophageal glands may overlap the intestine; the intestine does not overlap the oesophagus anteriorly.

The number of pairs of postcloacal ventro-submedian papillae is not useful in distinguishing the subgenera (especially *Atlantadorus*) since of the five known species of *Atlantadorus* (*P. atlanticus*) is described with two pairs of postcloacal ventrosubmedian papillae. The other species of *Atlantadorus* possess only one pair as in *Paratrichodorus* and *Nanidorus*.

The pair of lateral cervical pores in *Atlantadorus* is not always located near the level of the excretory pore. I observed in *P. pachydermus* and *P. anemones* the pair of lateral cervical pores at some distance anterior to the ventromedian cervical pore. In *P. grandis* and *P. porosus* it lies at the level of the ventromedian cervical pore. In *Nanidorus* cervical pores are absent. In *Paratrichodorus* lateral cervical pores were not described. Siddiqi (1974) considered the pair of lateral cervical pores as very rarely present in the subgenus *Paratrichodorus*.

The difference in vulva-shape between the subgenera is very difficult to interpret. The vulva opening is always very small in trichodorids. In lateral view the vulva shape may be difficult to determine e.g. in *P. anemones* the funnel-shaped vulva (Pl. VI: Fig. 13) may be considered as a large pore; it is however difficult to distinguish it from a short longitudinal slit as is found in the subgenus *Paratrichodorus*.

In *Nanidorus* the excretory pore is not always near or posterior to the base of the oesophagus. In some specimens of *P. (N.) minor* it was seen opposite the middle of the posterior oesophageal bulb.

The absence of cervical pores is a character that is also found in the subgenus *Paratrichodorus*.

Conclusion

Since most differences between the three subgenera are very small and since even the main diagnostic character may be doubtful I prefer not to split up the genus *Paratrichodorus* into subgenera.

Definition

Trichodoridae. Cuticle strongly swollen when treated with acid fixative. Posterior subventral oesophageal glands overlap the intestine (except in *P. nanus*) or intestine anteriorly partly overlaps oesophageal bulb or both types of
2. — Posterior subventral oesophageal glands not or only slightly hardly overlapping the intestine; posterior oesophageal bulb small; onchoistyle length 21-23 μm; spicule length 42-44 μm (Pl. V : Fig. 1; Pl. V : Fig. 2 : oesophageal region)

P. nanus [Allen, 1957] Siddiqi, 1974

— Posterior subventral oesophageal glands overlapping the intestine; oesophageal bulb large, elongated (Pl. V : Fig. 3); onchoistyle length 28-39 μm; spicule length 48-65 μm (Pl. V : Fig. 4)

P. minor [Colbran, 1956] Siddiqi, 1974

3. — Posterior subventral oesophageal glands overlapping the intestine; intestine anteriorly not overlapping the oesophagus (Pl. V : Fig. 5); males with one pair of large ventrosubmedian postcloacal papillae ........................................... 4

— Intestine anteriorly overlapping oesophageal bulb dorsally and dorsolaterally; posterior subventral oesophageal glands not overlapping the intestine (Pl. V : Fig. 6); males with two pairs of large ventrosubmedian postcloacal papillae ........ 11

— Intestine anteriorly overlapping oesophageal bulb and posterior subventral oesophageal glands overlapping the intestine (Pl. V : Fig. 7); onchoistyle length 53-57 μm; spicule length 44-48 μm; no cervical papillae

Paratrichochodon sp. cf. teres

4. — Onchoistyle length 75-78 μm; no ventromedian cervical papillae; body length 750-845 μm (Pl. V : Fig. 8: tail region + copulatory apparatus)

P. acuatus [Siddiqi, 1960] Siddiqi, 1974

— Onchoistyle length under 55 μm........ 5

5. — Three ventromedian cervical papillae; onchoistyle length 29-34 μm; length spicules 33 μm; (Pl. V : Fig. 9; tail region + copulatory apparatus)

P. mirzai [Siddiqi, 1960] Siddiqi, 1974

— One or no ventromedian cervical papillae 6

6. — One ventromedian cervical papilla (Pl. V : Fig. 5); onchoistyle length 48-49 μm; body length over 800 μm; (Pl. V : Fig. 12: tail region + copulatory apparatus)

P. tunisiensis [Siddiqi, 1963] Siddiqi, 1974

— No ventromedian cervical papilla...... 7

7. — Testis degenerate, without sperm; onchios- tyle length 47-52 μm; spicule length 45-52 μm (remark 2) (Pl. V : Fig. 10: tail region + copulatory apparatus)

P. teres (Hooper, 1969) Siddiqi, 1974
— Testis with well developed sperm

8. — Spicule length over 50 μm

P. lobatus (Colbran, 1965) Siddiqi, 1974
— Spicule length 50 μm or less

9. — Distance second supplement to anus about 45 % of spiculum length; spicule length 50 μm (Pl. V : Fig. 13)

P. alleni (Andrés, 1968) Siddiqi, 1974
— Distance second supplement to anus about 90 % of spiculum length

10. — Spicule length 31 μm; onchios- style length 45 μm (Pl. V : Fig. 14: tail region + copulatory apparatus)

P. allitus (Jensen, 1963) Siddiqi, 1974
— Spicule length 42-44 μm; onchios- style length 39-41 μm (Pl. VI : Fig. 1: tail region + copulatory apparatus)

P. rhodesiensis (Siddiqi & Brown, 1965) Siddiqi, 1974

11. — Two ventromedian preanal supplements, both within spicular range; spicule length 36-39 μm; onchios- style length 43-48 μm (Pl. VI : Fig. 2: tail region + copulatory apparatus)

P. porosus (Allen, 1957) Siddiqi, 1974
— Three ventromedian preanal supplements, anterior supplement well anterior to head of retracted spicules

12. — Onchios- style length more than 60 μm

13. — Spicule length 79-87 μm; spicules straight with rounded offset capitulum; onchios- style length 68-82 μm (Pl. VI : Fig. 3: tail region + copulatory apparatus)

P. atlanticus (Allen, 1957) Siddiqi, 1974
— Spicule length 39-43 μm; spicules curved, capitulum not offset; onchios- style length 64-72 μm (Pl. VI : Fig. 4: tail region + copulatory apparatus)

P. grandis Rodriguez-M. & Bell, 1978

14. — Tail short, round; spicules fine, 46-53 μm long (Pl. VI : Fig. 6); distance second preanal supplement to anus 38-64 % of spiculum length

P. anemones (Loof, 1965) Siddiqi, 1974
— Tail longer, narrower (trapezoid); spicules broader with different shape, 40-45 μm long (Pl. VI : Fig. 5); distance second preanal supplement to anus 75-94 % of spicule length

P. pachydermus (Seinhorst, 1954) Siddiqi, 1974

Remarks to the key of Paratrichodorus males


2. Males of P. teres (Syn. P. flevensis Kuiper & Loof, 1962) can show a body length smaller than 800 μm, this being in contradiction with the key of Loof (1975).

KEY TO Paratrichodorus FEMALES

1. — Intestine anteriorly partly overlapping posterior oesophageal bulb dorsally and dorso-laterally, posterior subventral oesophageal glands not overlapping the intestine (Pl. VII : Fig. 1) .......... 2

— Intestine anteriorly not overlapping the oesophagus; posterior subventral oesophageal glands usually clearly, or rarely slightly, overlapping the intestine (Pl. VII : Fig. 3) .............. 6

— Intestine anteriorly overlapping posterior oesophageal bulb and posterior subventral oesophageal glands overlapping the intestine (Pl. VII : Fig. 8); onchios- style length 50-60 μm; one pair of lateral pores (5.5-8.2 times the body width posterior to the vulva)

Paratrichodorus sp. (cf. teres)

2. — Spermatheca present .......... 3

— Spermatheca absent .......... 4

3. — One pair of subventral body pores behind the vulva (Pl. VII : Fig. 12); onchios- style length 64-70 μm; body length 760-1130 μm

P. atlanticus (Allen, 1957) Siddiqi, 1974
— Lateral body pores anterior and posterior to vulva 0-2 on each body side; onchios- style length 42-53 μm; body length 650-970 μm (Pl. VII : Fig. 13: vaginal region)

P. anemones (Loof, 1965) Siddiqi, 1974

4. — Onchios- style length 65-72 μm; body length 900-1,040 μm (Pl. VII : Fig. 17: vaginal region)

P. grandis Rodriguez-M. & Bell, 1978
— Onchios- style length under 65 μm .... 5

5. — Ventromedian pores near vulva present (2 pairs) (Pl. VII : Fig. 14); onchios- style length 39-47 μm; body length 420-570 μm

P. porosus (Allen, 1957) Siddiqi, 1974
— No ventromedian body pores near vulva; lateral body pores posterior to vulva 2-5 on each body side; onchios- style length 44-54 μm; body length 690-1,020 μm (Pl. VII : Fig. 2: part genital system; Fig. 1 : posterior end of oesophagus)

P. pachydermus (Seinhorst, 1954) Siddiqi, 1974

6. — Caudal pores present (Pl. VII : Fig. 4) .... 7

— Caudal pores absent (Pl. VII : Fig. 5) .... 14
7. — Onchiostyle length over 80 μm; body length 910-950 μm sclerotized vaginal ring 2 μm thick (Pl. VII: Fig. 6)
   *P. acaudatus* (Siddiqi, 1960) Siddiqi, 1974
   Onchiostyle length under 80 μm ....... 8

8. — Spermatheca present (two very similar species; see remark 3) ..................... 9
   — No spermatheca .......................... 10

9. — Oesophageal overlap one body width long (Pl. VII: Fig. 3); one lateral body pore postvulvar; onchiostyle length 47-52 μm; body length 630-1,035 μm (Pl. VII: Fig. 7: vaginal region)
   *P. lobatus* (Colbran, 1965) Siddiqi, 1974
   — Oesophageal overlap shorter than one body width; two lateral body pores; onchiostyle length 22-26 μm; body length 375-610 μm
   — *P. acaudatus* (Siddiqi, 1960) Siddiqi, 1974
     Excretory pore more anteriorly situated; onchiostyle length 30-34.5 μm; body length 480-510 μm; sclerotization of vagina in lateral view kidney-shaped (Pl. VIII: Fig. 3: vaginal region)

10. — Tail acute (Pl. VIII: Fig. 2); onchiostyle length 22-26 μm; body length 375-610 μm
    — *P. acutus* (Bird, 1967) Siddiqi, 1974

11. — Tail hemispherical ........................ 16

12. — Posterior subventral oesophageal glands more or less overlapping the intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

13. — Excretory pore opposite oesophageal base (Pl. VII: Fig. 3); onchiostyle length 27-42 μm (mean 32 μm); body length 440-1,530 μm (mean 650 μm) (Pl. VIII: Fig. 3: vaginal region)
    — *P. minor* (Colbran, 1956) Siddiqi, 1974
    Excretory pore more anteriorly situated; onchiostyle length 30-34.5 μm; body length 490-1,300 μm; two lateral body pores; onchiostyle length 47-52 μm; body length 375-610 μm

14. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VII: Fig. 6)
    — *P. renifer* (Siddiqi, 1974)

15. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979

16. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

17. — Excretory pore opposite oesophageal base (Pl. VII: Fig. 3); onchiostyle length 27-42 μm (mean 32 μm); body length 440-1,530 μm (mean 650 μm) (Pl. VIII: Fig. 3: vaginal region)
    — *P. minor* (Colbran, 1956) Siddiqi, 1974
    Excretory pore more anteriorly situated; onchiostyle length 30-34.5 μm; body length 490-1,300 μm; two lateral body pores; onchiostyle length 47-52 μm; body length 375-610 μm

18. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979

19. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

20. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979

21. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

22. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979

23. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

24. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979

25. — Excretory pore opposite anterior part of intestine (slightly or clearly) (Pl. VIII: Fig. 4) 17
    — Non-overlapping base of oesophagus..... 18

26. — Excretory pore opposite posterior part of oesophageal region. 2
    — *P. obesus* (Razjivin, 1956) Siddiqi, 1979
Systematics of the Trichodoridae

width in all other species (including *P. tunisiensis*) of the genus *Paratrichodorus* and by the possession of only one lateral body pore (postvulvar) compared with two lateral body pores (one pre- and one postvulvar) in *P. tunisiensis*.

**Genus Monotrichodorus** Andrássy, 1976

Siddiqi (1974) presumed that *Trichodorus monohystera* Allen, 1957 with a posteriorly located vulva and a single anterior female gonad possibly belongs to a separate genus. Andrássy (1976) proposed a new genus *Monotrichodorus* based on *Trichodorus monohystera* Allen, 1957; the diagnosis of the new genus was shortly given under a footnote as: 'very similar to *Trichodorus* but ovary one, straight.'

Rodriguez-M., Sher and Siddiqi (1978) reviewed the genus *Monotrichodorus* based on specimens of *M. monohystera* (Allen, 1957) Andrássy, 1976 and on a new species *M. van-gunstyi*; the diagnosis of the genus was expanded.

Rodriguez-M., Sher and Siddiqi (1978) included the following character within the diagnosis of *Monotrichodorus*: 'Dorsal oesophageal gland nucleus anterior to, and the same size as, the posterior subventral gland nuclei'; they differentiated *Monotrichodorus* from *Trichodorus*.
DEFINITION

Trichodoridae. Cuticle not swollen upon fixation. Posterior ventrosublateral oesophageal glands not overlapping the intestine. Female reproductive system monodelphic, prodelphic; with flexure at the oviduct; postvulvar uterine sac present. Vagina anteriorly directed, more than one-half body width, with strong musculature; vaginal sclerotization well developed. Lateral aдуvlar body pores present. Vulva a transverse slit at about 80% of body length. Males with well developed diagonal copulatory muscles. Spicules long, slender, setose. Three ventromedian preanal supplements, at least one anterior to retracted spicule. Paired ventrolateral postcloacal papillae present. Single ventral cervical papilla anterior to excretory pore. In both sexes a single caudal pore present.

TYPE SPECIES

Monotrichodorus monohystera (Allen, 1957)
Andrásy, 1976
Syn. Trichodorus monohystera Allen, 1957

Other species


Remark

Both species are also very similar in females; they possess a comparable shape of the vagina and vaginal sclerotization. As far as I know the observation of lateral cervical pores in females of M. vangundyi Rodriguez-M., Sher & Siddiqi, 1978 is unique and until now only known in males (however not found in such a far anterior position).

Genus Allotrichodorus Rodriguez-M., Sher & Siddiqi, 1978

DEFINITION

Trichodoridae. Cuticle swollen upon fixation. Intestine anteriorly overlapping oesophageal bulb dorsally and dorsolaterally. Female reproductive system monodelphic, prodelphic with flexure at oviduct; postvulvar uterine sac present. Spermatheca conspicuous. Vagina more than half body width in length with strong musculature; vaginal sclerotization conspicuous. Vulva a transverse slit at about 85%. In males caudal alae present. Ventral cervical papilla, if present, anterior to excretory pore. Spicules transversely striated, elongate, slender, setose; capitular extension having a dorsal groove or depression leading into proximal opening of spicule. Three ventromedian supplementary papillae within range of retracted spicules. Large paired lateroventral postcloacal papillae present. Caudal pores present.

TYPE SPECIES

Allotrichodorus campanullatus Rodriguez-M., Sher & Siddiqi, 1978

Other species A. guttatus Rodriguez-M., Sher & Siddiqi, 1978
KEY TO Allotrichodorus males

— One ventromedian cervical papilla; onchiostyle length 45-57 μm; spicule length 46-59 μm; body length 540-690 μm

A. campanullatus Rodríguez-M., Sher & Siddiqi, 1978

— No ventromedian cervical papilla; onchiostyle length 65-72 μm; spicule length 65-76 μm; body length 670-740 μm

A. guttatus Rodríguez-M., Sher & Siddiqi, 1978

KEY TO Allotrichodorus females, based on Rodríguez-M., Sher & Siddiqi (1978)

— Onchiostyle length 46-55 μm; body length 630-680 μm; vaginal sclerotization appears as two small bells in lateral view

A. campanullatus Rodríguez-M., Sher & Siddiqi, 1978

— Onchiostyle length 63-71 μm; body length 650-720 μm; vaginal sclerotization appears as two rather unequal drops in lateral view

A. guttatus Rodríguez-M., Sher & Siddiqi, 1978

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SZCZYGIEL, A. (1968). Trichodorus sparsus sp. n