A new species of *Trichodina* (Ciliophora: Peritrichia) from the urinary bladder of *Bufo gutturalis* Power, 1927

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A taxonomic description of *Trichodina dampanula* sp. n. (Ciliophora: Peritrichia), an endoparasite infecting the urinary bladder and ureters of *Bufo gutturalis* Power, 1927, is provided.

'n Taksonomiese beskrywing van *Trichodina dampanula* sp. n. (Ciliophora: Peritrichia), 'n endoparasiet wat die urinêre blaas en ureters van *Bufo gutturalis* Power, 1927 besmet, word verskaf.

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The ciliophoran family Trichodinidae comprises nine genera of which seven are associated with aquatic hosts. These hosts include other ciliophorans, coelenterates, planktonic crustaceans, molluscs, echinoderms, amphibians and fish. Taxonomic works on waterborne trichodinids from southern Africa have so far mainly focussed on ectoparasites of fish (Basson, Van As & Paperna 1983; Basson & Van As 1987; Basson & Van As 1989), although some descriptions of trichodinids from other aquatic hosts have also been done; Fantham (1918, 1924) from frogs, Sandon (1965) from *Oxystele* species, *Rana* and *Xenopus laevis* and Van As & Basson (1986) from a limnocnidid medusa.

Until now only Fantham (1924) and Sandon (1965) described trichodinids from amphibians in southern Africa, i.e. *Trichodina xenopodos* Fantham, 1924 from the urinary bladder of the African clawed toad, *Xenopus laevis* and *T. bufonis* Fantham, 1924 from *Bufo regularis*. Although both these descriptions did not make use of silver-impregnation and the system of uniform specific characteristics as proposed by Lom (1958), *T. xenopodos* is accepted as a valid species owing to its recognizable high number of denticles, but *T. bufonis* is regarded as a *nomen nudum* owing to an inadequate description (Lom 1958).

In surveys carried out in the vicinity of the Rietspruit south of Johannesburg, South Africa, specimens of *Bufo gutturalis* Power, 1927 were found with an exceptionally high infection of urinary bladder trichodinids. This parasite does not conform to the characteristics of any of the known amphibian-associated trichodinids from elsewhere in the world and is described as a new species.

Taxonomic description

Material and Methods

The description is based on material prepared by haematoxylin staining and silver-impregnated specimens using the methods described by Basson *et al.* (1983). A modified protargol method was used to reveal the fine details of the infraciliature. All measurements given below are in micrometres and follow the uniform specific characteristic system proposed by Lom (1958). Minimum and maximum values are provided, followed in parentheses by the arithmetic mean, standard deviation and number of specimens measured. In the case of the number of denticles and number of radial pins per denticle the mode is given instead of the arithmetic mean.

Trichodina dampanula sp. n. (Figures 1 & 2)

Host and locality: Bufo gutturalis Power, 1927 near Rietspruit (26°25'S / 27°52'E), south-west of Johannesburg, South Africa.

Type material: Holotype, slide 87/02/01-01 and paratype slides 87/02/01-02 and 87/02/01-03 in the collection of the National Museum, Bloemfontein.

Position on host: Inner wall of the urinary bladder and ureters.

Description: A medium-sized parasite with a high, bell-to-cylinder-shaped body, 41,6–53,8 (47,2 ± 3,1; 25) in diameter. Adhesive disc concave, 37,6–48,1 (42,5 ± 2,8; 25) in diameter; surrounded by a finely striated border membrane 1,5–3,2 (2,4 ± 0,4; 25) wide. Diameter of denticle ring 22,4–30,7 (26,1 ± 2,3; 25). Number of denticles 28–35 (33, 25). Length of denticle 4,0–5,9 (4,9 ± 0,5; 25); length of ray 3,8–6,0 (4,9 ± 0,6; 25); width of central part 1,2–3,0 (1,9 ± 0,4; 25); length of blade 4,3–6,5 (5,8 ± 0,5; 25). Blade slightly curved towards posterior side, truncated distally. Connection between blade and central part characteristically weakly developed. Central part slender. Ray straight, slanted posteriorly. Although slightly narrow at point of attachment to central part, rest of ray of equal width, ending with rounded point. Number of radial pins per denticle 7–8 (8; 25). Nuclear apparatus consists of a C-shaped macronucleus, and an oval-to-round micronucleus. External diameter of macronucleus 33,1–52,1 (42,3 ± 5,2; 25); thickness 3,9–8,3 (5,8 ± 1,1; 25); distance between two ends of macronucleus 12,3–36,8

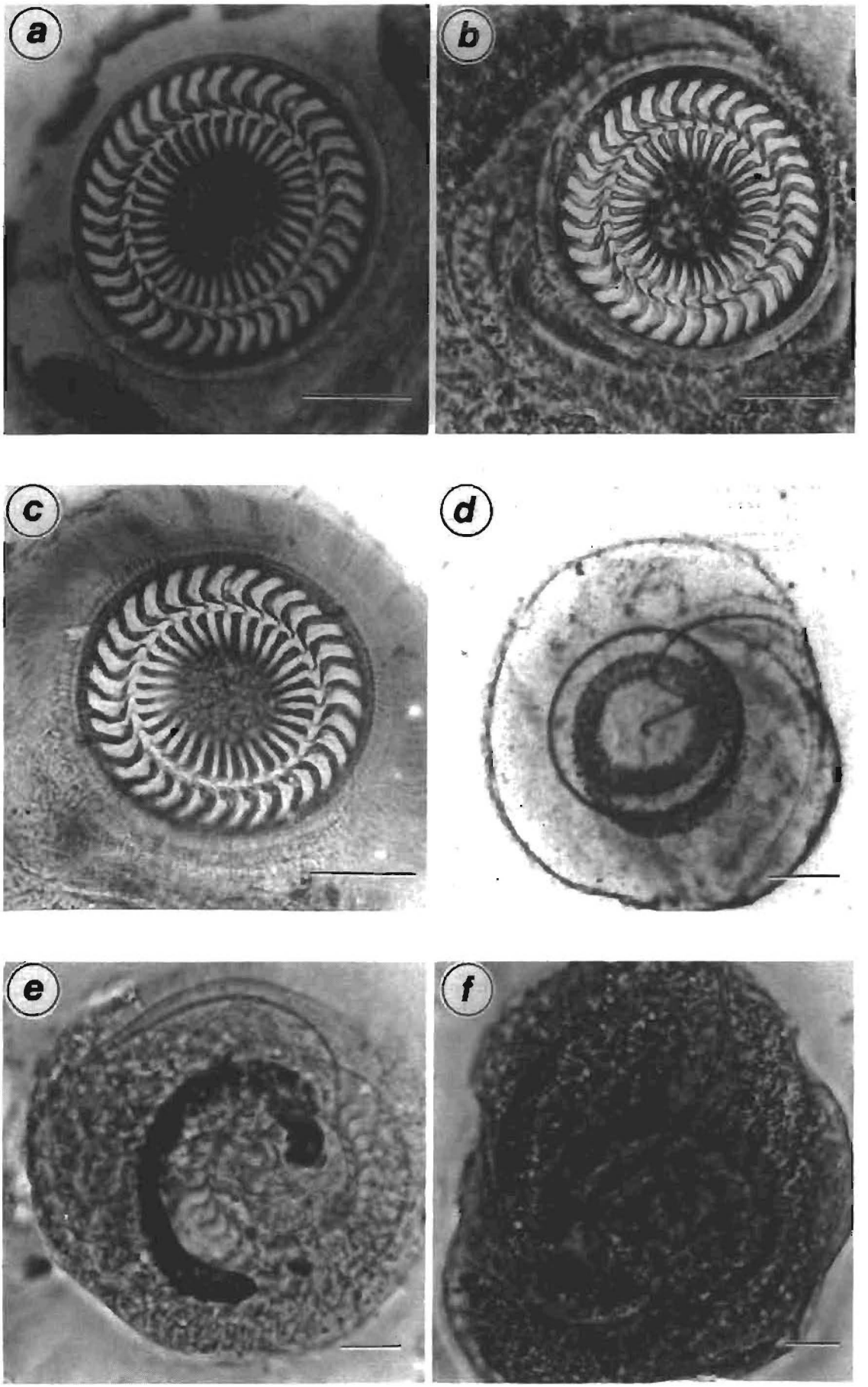

Figure 1 Photomicrographs of *Trichodina dampanula* sp. n. (a–c) Silver impregnated adhesive disc. (d) Protargol stained infundibular infraciliature. (e) Haematoxylin stained nuclear apparatus. (f) Silver impregnated adoral spiral. Scale in all figures indicates 15 μm.

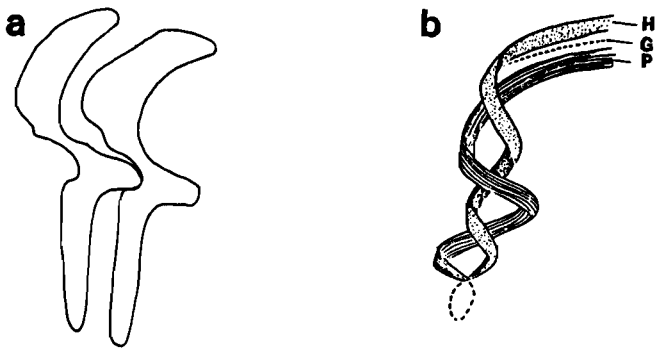

Figure 2 Diagrammatic drawings of (a) the infundibulum and (b) the denticles of *T. dampanula* sp. n. G – germinal row, P – polykinety, and H – haplokinety (paroral membrane).

(24,0 ± 4,6; 25). Micronucleus lies in –y position; length 2,2–5,8 (4,1 ± 0,8; 25); width 1,5–10,9 (4,8 ± 2,3; 25); value of –y distance 1,1–10,9 (4,8 ± 2,3; 25). The buccal ciliature is well developed. The adoral ciliary groove turns 385 to 405 degrees. As it enters the mouth, the paroral membrane (haplokinety) is joined by a short germinal row. The infundibular course of both rows makes 2,5 turns.

Remarks: The existing literature on urinary bladder trichodinids from Anura comprises two species from Europe, i.e. *T. ranae* da Cunha, 1950 and *T. entzii* Breitschneider, 1935, both occurring in three species of *Rana* (Kazubski 1980), one species from North America, i.e. *T. urinicola* Fulton, 1923 from a *Bufo* species (Fulton 1923) and one species from the holartic region *T. vesicola* Suzuki, 1950 from *Rana rugosa* (Suzuki 1950).

The question arises whether *T. dampanula* sp. n. may possibly be the same species as observed by Fantham (1924) in the urinary bladder of *B. regularis*, i.e. *T. bufonis*. Owing to the fact that none of the characteristics provided by Fantham (1924) were sufficiently elucidated to enable a comparison with *T. dampanula*, as well as the fact that his specimens were collected from a different host, i.e. *B. regularis* of which the locality was not mentioned, it was decided to describe it as a separate species and not to reinstate the *nomen nudum* species *T. bufonis*.

Lom (1958), in discussing host specificity of trichodinids, was of the opinion that trichodinids in general are not host specific. Kazubski (1980), however, has the opposing opinion, i.e. that urinary bladder trichodinids of fish and amphibians are strictly specific towards their hosts. In an article dealing with host specificity of trichodinid ectoparasites of fish, Van As & Basson (1987) come to the conclusion that trichodinids can be divided into four categories concerning their host / parasite relationships. One of these categories includes parasites which are not only host specific towards a species, but also to a specific site occurrence on a host.

In our opinion the urinary bladder of toads and frogs requires a unique and highly specific adaptation for parasites to survive. Our laboratory observations showed that *T. dampanula* can survive for only a few minutes in pond water. These parasites rapidly absorb water, resulting in the cells bursting. This suggests that their osmoregulation is adapted to the higher salinity in the bladder.

It is highly unlikely that toads, which are adapted for survival in a terrestrial environment, only returning to water for breeding, and *Rana* species, which in most cases spend the larger part of their life in water, can host the same parasites.

T. dampanula can easily be distinguished from all other amphibian urinary bladder parasites based on its morphological characteristics discussed above and is in our opinion host specific to *B. gutturalis*.

References

BASSON, LINDA & VAN AS, J.G. 1987. Trichodinid (Ciliophora; Peritricha) gill parasites of freshwater fish in South Africa. *Syst. Parasitol.* 9: 143–151.

BASSON, LINDA & VAN AS, J.G. 1989. Differential diagnosis of the genera in the family Trichodinidae (Ciliophora: Peritrichia) with the description of a new genus ectoparasitic on freshwater fish from southern Africa. *Syst. Parasitol.* 13: 153–160.

BASSON, LINDA; VAN AS, J.G. & PAPERNA, I. 1983. Trichodinid ectoparasites of cichlid and cyprinid fishes in South Africa and Israel. *Syst. Parasitol.* 5: 245–257.

FANTHAM, H.B. 1918. Some parasitic Protozoa found in South African fishes. *S. Afr. J. Sci.* 15: 338–446.

FANTHAM, H.B. 1924. Some parasitic Protozoa found in South Africa VII. *S. Afr. J. Sci.* 21: 435–444.

FULTON, J.F. 1923. *Trichodina pediculus* and a new closely related species. *Proc. Boston Soc. Nat. Hist.* 37: 1–29.

KAZUBSKI, S.L. 1980. *Trichodina ranae* da Cunha, 1950 (Ciliata, Peritrichida), a parasite of *Rana esculenta* s.l. and its morphological variability. *Acta Protozool.* 19: 207–224.

LOM, J. 1958. A contribution to the systematics and morphology of endoparasitic trichodinids from amphibians, with a proposal of uniform specific characteristics. *J. Protozool.* 5: 251–263.

SANDON, H. 1965. Some species of *Trichodina* from South Africa. *Acta Protozool.* 3: 39–56.

SUZUKI, S. 1950. Studies on the urceolariid ciliates of Japan. *Bull. Yamagata Univ. (Nat. Sci.).* 2: 181–218.

VAN AS, J.G. & BASSON, LINDA. 1986. A new species of *Trichodina* (Ciliophora: Peritricha) from a limnocnidid medusa in the Zambesi system. *S. Afr. J. Zool.* 21: 76–78.

VAN AS, J.G. & BASSON, LINDA. 1987. Host specificity of trichodinid ectoparasites of freshwater fishes. *Parasitology Today* 3: 88–90.