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Intestinal Ciliated Protozoa of African Rhinoceros: Two New Genera and Five New Species from the White Rhino (*Ceratotherium simum* Burchell, 1817)[1]

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ABSTRACT. This report represents the first published information on intestinal ciliated protozoa in the African white rhinoceros (*Ceratotherium simum* Burchell, 1817). Two new genera which do not relate to any known ciliated protozoa from the intestines of mammals and five new species are described. The ciliates were found in the colon of three of these free-living hindgut-fermenting grazers that were shot in widely spaced districts in southern Africa. *Paladinium digitalis* n. gen., n. sp., *Arachnodinium noveni* n. gen., n. sp., *Monoposthium vulgaris* n. sp., *M. bracchium* n. sp., and *M. latus* n. sp. constituted between 1% and 10% of the total ciliate population (ca. 1 × 10⁵/ml digesta) in the ascending colon. Exceedingly small numbers were observed in the descending colon, indicating temporary accommodation only.

A study is under way on the intestinal ciliated protozoa of African rhino. Two types of rhino occur in Africa: the white rhino (*Ceratotherium simum*), which is a grazer with a square upper lip, and the black rhino (*Diceros bicornis*), which is a hook-lipped browser. Both types, in particular the black rhino, are rapidly becoming rare. Rhinos are hindgut fermenters unlike ruminants, which are foregut fermenters. The only study published on the intestinal ciliated protozoa of African rhino is by Buisson in 1923 (2). He identified five species obtained from a black rhino in the then Belgian Congo. These included the new genera *Lavierella* and *Bozasella*, each with one species. The present report is the first published study on intestinal ciliates in the white rhino.

MATERIALS AND METHODS

Field samples of gastrointestinal digesta were collected from free-living white rhino that were shot by hunters in the Ellisras district (23°–24°S; 27°–28°E), Pilanesberg Game Reserve (25°–26°S; 27°–28°E) and Hluhluwe Game Reserve (28°–29°S; 31°–32°E) in southern Africa. One rhino was shot at each site. Sets of six samples from the stomach, small intestine, cecum, right ventral ascending colon, right dorsal ascending colon, and descending colon were collected from the Ellisras and Pilanesberg rhinos, but from the cecum only of the Hluhluwe rhino. Samples were taken within 2 h after the animal had been shot and while the carcass was still warm. A slit was made in the wall of the gastrointestinal tract at the sampling point, and the digesta was mixed by hand. Using a beaker, digesta was bailed out and strained through a 4-mm-mesh wire sieve. The strained fluid containing the protozoa was collected. For light microscopy, 25 ml of fluid was immediately added to 25 ml of formalin (14% aq.). For electron microscopy, 2 ml of fluid was added to 10 ml of instantaneous killing prefixative, which contained osmic acid (2% aq.) and $HgCl_2$ (sat. aq. soln.) mixed in the ratio of 5:1 (6) and which prevented retraction of cilia (7). Clumping of the protozoa was obviated by shaking the sample vigorously for 30 sec on addition of the preservative.

For light microscopy, the formalinized sample was diluted with mineral solution (1) and finally with equal parts of glycerol as stabilizing agent (9). Total counts were made at ×90 magnification with a 0.5-mm-Nageotte counting chamber (W. Schreck, Hofheim, W. Germany). The different ciliate species in a permanently sealed wet mount were counted at ×400 magnification and converted to a percentage of the total, which was in excess of 200 individuals. Detailed anatomy was studied at ×1000 magnification using oil immersion. Nuclei were stained with hematoxylin and skeletal plates with chlorzinc iodine (Merck). Drawings were made on the camera lucida principle and all measurements made with a calibrated eyepiece micrometer.

For scanning electron microscopy (SEM), the prefixed field sample was washed with tap water as soon as possible through stacked geological sieves (125–20 μm). The subsamples from each sieve were fixed for 24 h with Karnovsky fixative (5) and 1% picric acid (3) or, where necessary, stored in that fixative. From this stage, standard protocols were carried out in a holder containing a Nuclepore filter (10–12 μm) under slight negative pressure. During the last change of ethanol, the funnel was removed, and a similar filter was inserted to close the microchamber. After critical-point drying, both filters were removed and mounted on stubs for carbon and gold/palladium coating (2–3 nm). All preparations were viewed with a Cambridge Stereoscan microscope at 5–10 kV.

RESULTS

Monoposthium vulgaris n. sp.

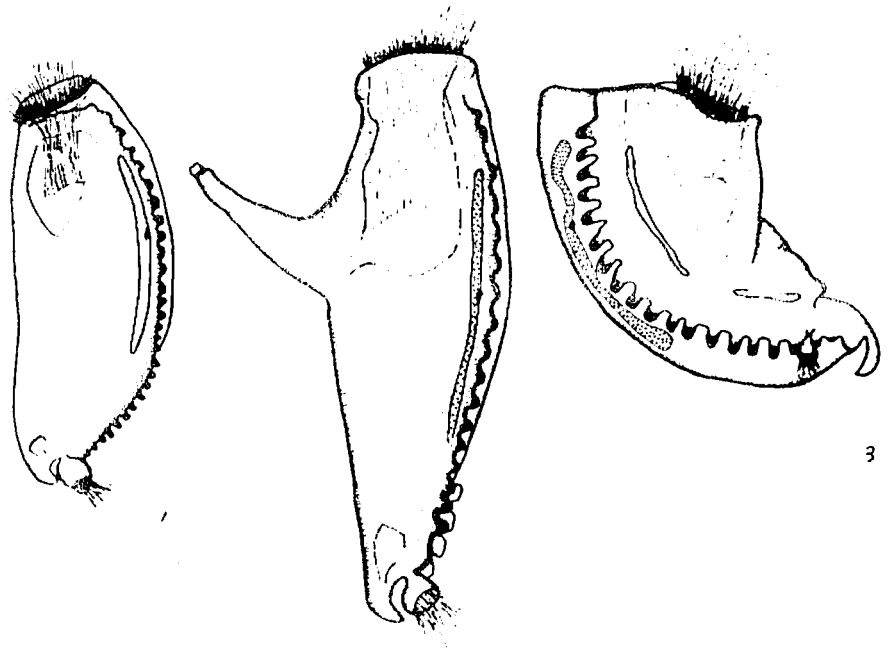
Structure. The oral opening is on average 10 μm wide with an adoral zone of cilia borne on a retractable cone, which can protrude beyond the rim of the mouth (Fig. 1). The overall body shape is that of an elongated oval. The average length is 74 (50–111) μm and width, 27 (19–38) μm, n = 45. The widest part of the body is in the middle; thereafter it tapers gradually to a narrow posterior (Fig. 6). The posterior end is in the form of an anal flap about 5 μm long, which turns back across the anal opening at an angle of almost 90° to the long axis of the body. A clearly defined funnel-shaped rectum opens into a wide cytoproct at the base of the tail flap.

A single caudalium is situated directly opposite the tail flap. The side of the body which terminates in the tail flap is generally straight while the opposite side is convex. A deep trough extends from the base of the caudalium along the convex side of the dorso-ventrally flattened body as far as the rim of the oral opening. The edge of one side of the trough is serrated along its entire length while the opposite side is serrated for only a short distance from the base of the caudalium. The serrations give the impression of short fingers (4 μm long and 3 μm wide) with equally wide gaps between them, so that the two edges can fold together (Fig. 7).

A long thin macronucleus (ave. length 50 μm) is located on the inside of the serrated edge. It tapers to a sharp termination, on the inside of which lies a small oval-shaped micronucleus. The micronucleus is not visible in all individuals. No contractile vacuoles could be seen. The body surface is smooth without skeletal plates or sculpturing.

Location in host. In the Ellisras rhino, *M. vulgaris* formed 9% of the total ciliate population in the ascending ventral colon (0.8 × 10⁵/ml digesta) and 10% in the ascending dorsal colon (1.3 × 10⁵/ml digesta). In the Pilanesberg rhino, it comprised 7% in the ascending dorsal colon (0.4(0.4–0.5) × 10⁵/ml digesta) only. It was not found in the cecal fluid of the Hluhluwe rhino.

[1] The authors wish to acknowledge the competent assistance of Celia Guillaume, professional hunter, at Ellisras and Kjetil Johansen at Pilanesberg. W. van Hoven is the author to whom all correspondence should be sent.



Figs. 1–3. 1. *Monoposthium vulgaris* n. sp. 2. *Monoposthium bracchium* n. sp. 3. *Monoposthium latus* n. sp.

Taxonomic characterization. Monoposthium vulgaris n. sp.

Diagnosis. Body elongated, 74 (50–111) μm long and 27 (19–38) μm wide; single oral ciliary zone; single caudalium; deep trough stretches from anterior to posterior on one side; one edge of the trough serrated along its entire length, the other edge serrated only at the posterior end; apart from anal flap no other appendages.

Habitat. Colon of white rhinoceros in southern Africa.

Type material. Type material is deposited in the intestinal protozoa collection of the Dept. of Zoology, University of Pretoria.

Monoposthium bracchium n. sp.

Structure (Fig. 2). The most striking feature of this species is a single long arm (length 32 [26–37] μm) (Fig. 10), which is located in a constant position one third of the way from the anterior end of the elongated oval-shaped body and on the opposite side to the longitudinal trough, which extends along the entire length of the convex side of the body. In other respects, the structure of *M. bracchium* closely resembles that of *M. vulgaris* except, firstly, that it is about 30% larger, being on average 115 (99–132) μm long and 35 (28–40) μm wide, n = 27 (Fig. 8), and, secondly, that where serrations occur on both sides of the trough near the base of the single caudalium, the protruding portions on one edge fit into the gaps on the other, thus in this region the two edges can actually clamp together (Fig. 9).

As in *M. vulgaris*, the long thin macronucleus (ave. 62 μm long) is located on the inside of the serrated edge of the trough. It tapers similarly to a sharp termination, on the inside of which lies the small oval micronucleus. The body surface is smooth without skeletal plates or sculpturing.

Location in host. Monoposthium bracchium constituted 2% of the total ciliated protozoa in the ascending dorsal colon (1.3 × 10⁵/ml digesta) of the Ellisras rhino only.

Taxonomic characterization. Monoposthium bracchium n. sp.

Diagnosis. Body elongated, 115 (9–132) μm long and 35 (28–40) μm wide, thus larger than *M. vulgaris*; single side-arm present, length 32 (26–37) μm; single oral ciliary zone; single caudalium; deep trough stretches from anterior to posterior on one side; one edge of the trough serrated along its entire length, the other edge serrated only at the posterior end; anal flap present.

Habitat. Colon of white rhinoceros in southern Africa.

Type material. Type material is deposited in the intestinal protozoa collection of the Dept. of Zoology, University of Pretoria.

Monoposthium latus n. sp.

Structure. The anterior end of the body forms a flat rectangular area perpendicular to the long axis of the body and is unusually wide for *Monoposthium* (Fig. 3). The mouth, on average 23 μm in width, is situated in the middle of the anterior end. The adoral zone of cilia is borne on a retractable cone, which can protrude beyond the rim of the mouth.

The body shape is stumpy, short, and wide as compared to the rest of the genus (Fig. 11). The average length is 89 (71–120) μm and width, 45 (40–56) μm, n = 26. The shape of the body, particularly the 45° bend

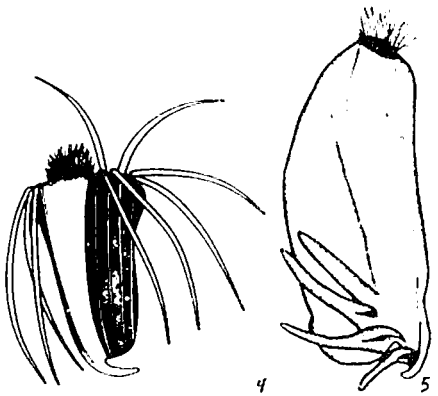


Fig. 4, 5. 4. *Arachnodinium noveni* n. gen., n. sp. 5. *Phalodinium digitalis* n. gen., n. sp.

in its long axis, is characteristic of the species. A deep trough on the outer convex side of the body runs along its entire length and terminates at the base of a short anal flap. The single caudalium is situated near the edge of the trough about 14 μm from the anus on the left side of the dorso-ventrally flattened body. This particular edge of the trough is equipped with serrations in the form of small finger-like projections, which can fold against the flat inner surface of the opposite unserrated trough wall (Fig. 12). Two ridges are located on the flattened side of the body where the single caudalium occurs (Fig. 11). The concave right side of the body has two cuticular folds in its surface.

A long macronucleus, of about half the body length, is found close to the edge of the convex side of the body. The micronucleus lies a third of the way from the front end of the macronucleus. No contractile vacuoles could be seen.

Location in host. *Monoposthium latus* formed between 1% and 2% of the total ciliate population in the ascending dorsal colon of the Ellisras rhino (1.3 × 10⁷/ml digesta) and the Pilanesberg rhino (0.4 [0.4–0.5] × 10⁷/ml digesta) only.

Taxonomic characterization. Monoposthium latus n. sp.

Diagnosis. Body shape of the species is typical, convex on one side and bent at 45° in the middle of the concave side; length 89 (71–120) μm, width 45 (40–56) μm; two longitudinal cuticular ridges present on upper side; two cuticular folds on the concave right side; deep trough on the convex side with only one edge serrated; anal flap and single caudalium present; no other appendages.

Habitat. Colon of white rhinoceros in southern Africa.

Type material. Type material is deposited in the intestinal protozoa collection of the Dept. of Zoology, University of Pretoria.

Arachnodinium noveni n. gen., n. sp.

Structure (Fig. 4). The oral opening is oval in shape owing to the fact that the body is slightly flattened dorso-ventrally. The mouth is about 28 μm wide. Inside the mouth there is a typical zone of cilia borne on a retractable cone, which can protrude beyond the rim of the mouth.

The body shape is an elongated triangle, 72 (61–79) μm long and 48 (42–61) μm wide, n = 5. It is widest at the oral end and tapers toward the rear (Fig. 13). Nine appendages, in the form of cylindrical tentacles tapering to sharply pointed ends, constitute a striking characteristic feature of this species. These tentacles are always nine in number (Fig. 14) and are about as long (ca. 75 μm) as the body. They are arranged characteristically in a specific pattern: six on one side of the mouth and three on the opposite side (Fig. 14). Corresponding with each of the tentacles are troughs extending along the entire length of the body and into which the tentacles can fold away (Fig. 15). The rear of the body terminates in a typical anal flap about 10 μm long, which folds around the rear end. The anal opening is at the base of the tail flap.

No obvious contractile vacuoles or macronucleus could be seen.

Location in host. It formed 1% of the total ciliate population in the ascending ventral colon of the Ellisras rhino (0.8 × 10⁷/ml digesta) and the Pilanesberg rhino (1.2 [1.1–1.3] × 10⁷/ml digesta) and 2% in the ascending dorsal colon of the Ellisras rhino (1.3 × 10⁷/ml digesta) and the Pilanesberg rhino (0.4 [0.4–0.5] × 10⁷/ml digesta). It was not found in the cecal fluid of the Hluhluwe rhino.

Taxonomic characterization. Arachnodinium noveni n. gen., n. sp.

Genus characterization. Cycloposthiid without caudalia possessing nine tentacles around the mouth.

Diagnosis. Elongated triangular body, average length 72 (61–79) μm, width 48 (42–61) μm; nine tentacles around the mouth, six on one side and three on the opposite side; corresponding with each tentacle is an elongated groove into which the tentacle can fold away; tentacle length 45 (33–61) μm; anal flap present; no caudalium.

Habitat. Colon of white rhino in southern Africa.

Type material. This is deposited in the intestinal protozoa collection of the Dept. of Zoology, University of Pretoria.

Phalodinium digitalis n. gen., n. sp.

Structure (Fig. 5). The oral opening is on average 28 μm wide with an adoral zone of cilia borne on a retractable cone, which can protrude beyond the rim of the mouth. The cilia create suction whereby fiber particles are ingested. These particles are often large and protrude from the oral opening.

The body shape is oval in cross section. It is on average 183 (139–240) μm long, n = 8. It widens backward to an average maximum of 73 (52–106) μm in the middle. From about a third of the distance from the mouth, a deep trench runs along the length of the body to the rear. The edges of this trench are parallel. On the opposite side of the trench, the body curves smoothly to the rear and terminates in a smoothly convex tail flap about 45 μm long. The base of the tail flap is wide and concave on the inside, where the anus is situated.

A striking feature of this species is the four finger-like projections, which occur posteriorly on one side of the trench rim (Figs. 16, 17). The smallest of these projections originates where the trench rim terminates at the base of the tail flap. This finger is about 44 μm long and usually stands out at an angle of about 90° to the long axis of the body (Fig. 17). The second finger is longer (ca. 82 μm) with a wider base and bent slightly more to the anterior end at an angle of about 75° to the long axis. The third and fourth fingers are of about equal length (ca. 100 μm), but the fourth is thicker than the third. They are also directed anteriorly, the angles to the long axis being about 45° and 30° for the third and fourth finger respectively.

A further striking feature is the presence on the inside of each finger of a sickle-shaped hook curving backwards toward the finger base like a spur. The size of each spur is relative to the size of the finger, and except for the smallest finger, the spurs are in the order of 35 μm long.

A true skeletal plate is absent. The outer body surface, however, has an hexagonal cuticular pattern. A long thin macronucleus occurs on the opposite side to that with the trench.

Location in host. *Phalodinium digitalis* constituted 1% of the total ciliated protozoa in the ascending dorsal colon of the Ellisras rhino (1.3 × 10⁷/ml digesta) and the Pilanesberg rhino (0.4 [0.4–0.5] × 10⁷/ml digesta) only.

Taxonomic characterization. Phalodinium digitalis n. gen., n. sp.

Genus characterization. Cycloposthiid without caudalia and possessing multiple caudal appendages.

Diagnosis. Body length 183 (139–240) μm by 73 (52–106) μm wide. Single adoral ciliary zone. Tail flap present. Four finger-like projections directed towards the anterior, each having a hook-like spur. The projections are mostly as long or longer than the body is wide.

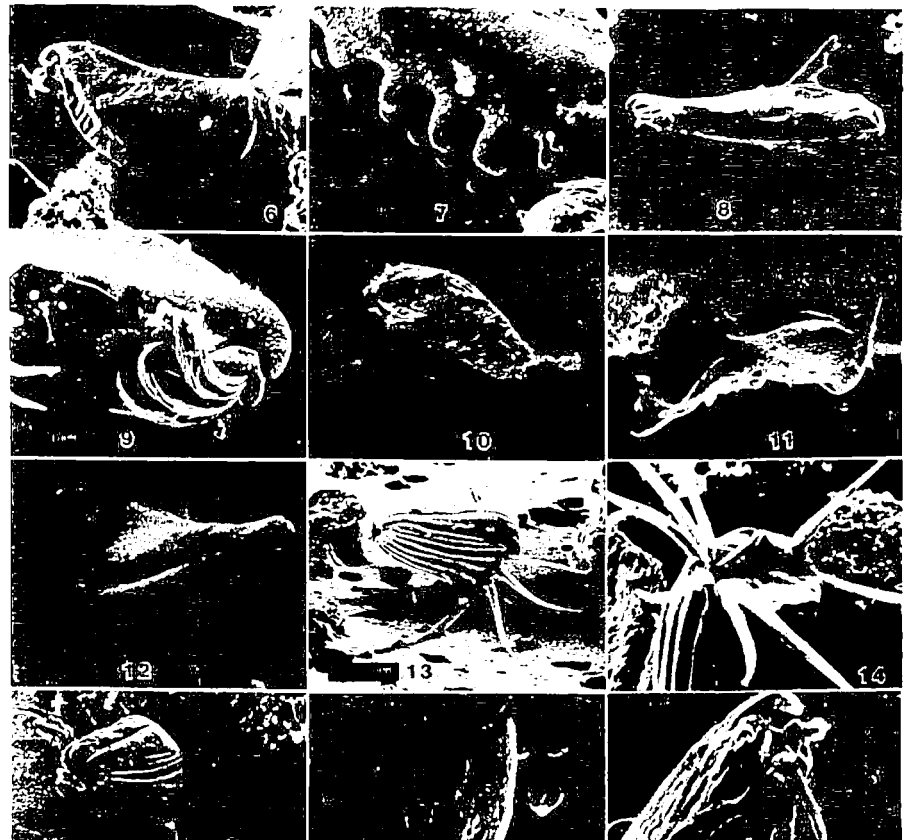
Habitat. Colon of white rhino in southern Africa.

Type material. Type material is deposited in the intestinal protozoa collection of the Dept. of Zoology, University of Pretoria.

DISCUSSION

Phalodinium digitalis and *Arachnodinium noveni* do not relate to any known ciliated protozoa from the intestine of mammals. Thus their unique anatomy merited the creation of two separate new genera. *Phalodinium digitalis* is named after its posterior finger-like projections. The function of these forward directed projections is not clear, and this also applies to the spur-like appendages on each projection. The ciliate itself seems to feed regularly on fibrous particles, which were often seen projecting from the oral opening. In the case of *A. noveni*, the species name refers to its regularly occurring nine tentacles. Both these new genera are devoid of caudalia and are thus placed in the Family Cycloposthiidae together with *Parentodinium* from the hippopotamus and *Lavierella* from the rhino since these two genera are also devoid of caudalia.

The genus *Monoposthium* was created by Thurston & Noirot-Timothée (8) to accommodate the only known cycloposthiid



Figs. 6–17. Scanning electron micrographs of new species. 6. *Monoposthium vulgaris* n. sp. 7. *Monoposthium vulgaris*, posterior showing double serration. 8. *Monoposthium bracchium* n. sp. 9. Posterior end of *M. bracchium* 10. *Monoposthium bracchium*, the arm. 11. *Monoposthium latus* n. sp. 12. Posterior end of *M. latus*. 13. *Arachnodinium noveni* n. gen., n. sp. 14. Anterior end of *A. noveni*. 15. Posterior view of *A. noveni*. 16. *Phalodinium digitalis* n. gen., n. sp. 17. Lateral trench with appendages on *P. digitalis*.

with a single caudalium, *M. acanthum*, from the hippopotamus. The three new species described also feature a single caudalium but differ from *M. acanthum* in having a longitudinal trough with serrated edges extending from the tail flap to the oral zone, as is the case with *Trincadalia brumpti* (2).

All five species of ciliated protozoa reported in this paper occupied an ecological niche in the colon of the free-living white rhino examined. *Arachnodinium noveni* and *Monoposthium vulgaris* were not found in gastrointestinal compartments proximal to the ascending ventral colon. *Monoposthium bracchium*, *M. latus*, and *Phalodinium digitalis* did not occur proximal to the ascending dorsal colon. The ciliate population in the descending colon was exceedingly small, indicating temporary accommodation only. The need to dilute extensively the colloidal particles of digesta in order to see the protozoa rendered it impossible to make meaningful counts. Nevertheless, it was possible to recognize in wet mounts under ×400 magnification representatives of the species described in this paper of *Monoposthium*, *Arachnodinium*, and *Phalodinium*. Among other species seen was *Triplumaria hamertoni*, a cyclosposthiid, first described by Hoare (4), who found it in the feces of an Indian rhino (*Rhinoceros unicornis*) in the London Zoo. This indicates that the excretion of intestinal protozoa in rhino feces can take place.

Monoposthium brachium, *Arachnodinium noveni*, and *Phalodinium digitalis* have undergone unique but different forms of specialization. The study of live specimens or successful culturing would reveal how these specializations are used.

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Trypanosoma humboldti n. sp. from the Chilean Catshark, *Schroederichthys chilensis* (Guichenot, 1848)[1]

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ABSTRACT: The morphology of *Trypanosoma humboldti* n. sp. is described from living and stained specimens obtained from the blood of a catshark, *Schroederichthys chilensis*. This represents the first report of a trypanosome in fish from the eastern Pacific Ocean. It is distinguished by its size and apparent lack of pleomorphism. The presence of a leech, *Branchellion ravenelli*, attached to the catshark, raises the possibility that it can act as a vector. Additionally, this leech is recorded for the first time from the Pacific Ocean.

DURING studies on the blood of elasmobranch fishes occurring off the Pacific coast of Chile, a trypanosome was encountered in a Chilean catshark *Schroederichthys* (=*Halaelurus*) *chilensis*. A review of the literature indicates that at least six species of trypanosomes have been described from elasmobranch fishes (five in skates and rays and one in sharks). *Trypanosoma rajae* Laveran & Mesnil (2) is known to infect several species of skates, *Raja* spp., off the European (5, 6, 16) and North American coasts (9, 11, 13, 21). *Trypanosoma ganteum* and *T. variable* have been reported from two species of skates, *Raja* spp., that inhabit the Mediterranean Sea (18). *Trypanosoma variable* has been considered identical with *T. rajae* (13). Laird (12) designated *T. gargantua* for a parasite that occurred in a south Pacific skate, *Raja nasuta*, taken close to the New Zealand coast. Bacigalupo & De la Plaza (1) described *T. marplatensis* from the blood of *Psammotics microps* from the Atlantic Ocean off the Argentinean coast. The only trypanosome known from sharks is *Trypanosoma scyllii* Laveran & Mesnil (14) occurring in the blood of *Scyliorhinus stellaris* and *S. canicula* off the French coast. it was noted subsequently by Henry (6), Coles (5), and Pulsford (19), who provided a detailed description from living and stained preparations. The purpose of this communication is to characterize the new trypanosome and report its prevalence in *Sch. chilensis*.

MATERIALS AND METHODS

Ninety-two marine sharks of 12 species were caught off the Pacific coast of Conception Bay, Chile (36°40′S, 73°02′W) between 1975 and 1980 by scuba divers, gillnet, or trawl. All the specimens of *Sch. chilensis* were caught by diving at depths not exceeding 10 m from an area that included 80 km of coastline. Number of specimens examined, total length, range, and sex were recorded for each specimen of each species collected (Table I).

Blood smears were prepared from blood samples obtained by means of a heparinized needle and syringe from the caudal artery and/or the heart, air-dried, fixed with methanol, and stained with May-Grunwald Giemsa. Each smear was examined for 10 min using an oil immersion objective and phase contrast. Those which were found to be uninfected were reviewed at least five times more. Morphometrics of parasites followed the nomenclature and methodology proposed by Hoare (7). Values (μm) quoted in the species description are the mean, standard deviation, and the range in parentheses. Photomicrographs were obtained with a Leitz Orthomat camera using ISO-100 film. All the specimens collected were surveyed for leeches, and when found, the body locations were recorded. Shark species were determined according to Kato et al. (8), Chirichigno (4), and Springer (22).

RESULTS

Of 92 sharks of 12 species examined, only *Sch. chilensis* was infected with trypanosomes (Table I). No haemogregarines were observed. Morphometrics were obtained from 50 specimens of the trypanosome found in 95% of infected fishes.

Species Description

Trypanosoma Gruby, 1843
Trypanosoma humboldti n. sp.

The cytoplasm, kinetoplast, and nucleolus are basophilic and stain deep blue with May-Grünwald Giemsa (Fig. 1). The nucleus is vesiculate and hyaline. The kinetoplast, when observed with phase contrast, is birefringent. The undulating membrane runs through the length of the body with 7–12 undulations. The width of the undulating membrane fluctuates between 2 to 3 μm. Body length including the free flagellum, 87.0 ± 3.8 (78–93); body width including the undulating membrane, 7.4 ± 1.5 (4–10); posterior extremity to nucleus (PN), 55 ± 3.9 (47–64); nucleus to anterior extremity (NA), 26.4 ± 2.2 (22–30); kinetoplast to nucleus (KN), 36.6 ± 3.7 (31–46), posterior extremity to kinetoplast (PK), 18.8 ± 2.36 (16–25); nuclear diameter, 5.3 ± 0.4 (5–6); kinetoplastic index (PK/KN), 1.5 ± 0.9 (1.2–1.7); nuclear index (PN/NA), 2.1 ± 0.2 (1.7–2.9); free flagellum, 6.8 ± 1.9 (5–11); myonemes, 20–25; body more often "C" (85%) than "S" shaped. No dividing forms were observed.

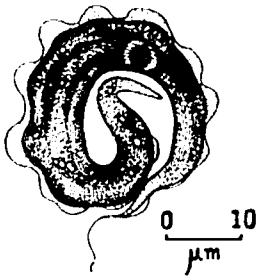

FIG. 1. *Trypanosoma humboldti* n. sp. from the blood of the Chilean shark, *Schroederichthys chilensis*.

TABLE I. *Sharks from the Pacific Coast of Chile that were examined for trypanosomes.*

Family Scientific name	Length range (cm)	Number examined: Sex ♂	Sex ♀	Total	Number infected
Chlamydoselachidae					
Chlamydoselachus anguineus Garman	141	—	1	1	0
Hexanchidae					
Hexanchus griseus Bonnaterre	120–160	—	4	4	0
Squalidae					
Squalus acanthias L.	64–75	1	3	4	0
Aculeola nigra De Buen	41–68	5	8	13	0
Centroscyllum granulosus Günther	29–43	4	5	9	0
Alopiidae					
Alopias vulpinus Bonnaterre	300	1	—	1	0
Cetorhinidae					
Cetorhinus maximus Gunner	250–650	1	1	2	0
Lamnidae					
Isurus oxyrhinchus Rafinesque	80–116	1	1	2	0
Carcharhinidae					
Prionace glauca L.	130–305	6	1	7	0
Scyliorhinidae					
Apristurus nasutus De Buen	52–58	2	1	3	0
Halaelurus canescens Günther	60–75	3	3	6	0
Schroederichthys chilensis (Guichenot)	30–58	5	35	40	38

Type host. *Schroederichthys chilensis* (Guichenot) (Elasmobranchii: Scyliorhinidae).

Type locality. Conception Bay, Chile (36°40′S, 73°02′W) in the Pacific Ocean.

Vector. Unknown but possibly the hirudinid *Branchellion ravenelli* (Girard).

Type specimens. Syntypes deposited in the Museo Nacional de Historia Natural at Santiago, Chile, with the catalogue numbers MNHN-PR- No. 3001 to 3005.

In April 1977, two leeches were found in the oral cavity of a male catshark but only one was fixed and stored. In November 1980, another specimen (female) was found to be infected with two leeches on the pelvic fins. They were identified as *Branchellion ravenelli* (Girard) (see ref. 15). Between 1982 and 1983, no additional leeches were observed on more than 150 catsharks that were examined for ecto- and endoparasites.

DISCUSSION

While more than 40 exist from marine teleosts, only six species of trypanosomes have been reported from elasmobranchs (2). These flagellates have been reported more frequently in rays and skates than in sharks, and more often from the Atlantic Ocean and Mediterrean Sea than from any other regions. This report

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