

The Ciliate Fauna in the Digestive System of *Rana ridibunda* (Amphibia: Anura) I: *Balantidium* (Balantidiidae, Trichostomatida)

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Abstract: *Balantidium* spp. living in the digestive system of *Rana ridibunda* in Van were determined. Five species belonging to the genus *Balantidium* were distinguished. Of these, one new species was recognized, described as *Balantidium vanensis* n. sp. This study reports for the first time the presence of *B. helenae*, *B. claperedei* and *B. giganteum* in the digestive system of *R. ridibunda*. These species are also new records for the protozoan fauna of Turkey. There was only *B. duodeni* in the duodenum and *B. elongatum* in the intestinal part next to the duodenum. The species of the genus *Balantidium* in the rectum constituted 50.21% of *B. helenae*, 28.41% of *B. claperedei*, 9.06% of *B. vanensis*, 7.16% *B. elongatum* and 4.98% of *B. giganteum*. The species determined in the study were compared with the available information in the original descriptions and the previous reports and the similarities and differences were discussed. It was determined that the digestive system microfauna of the genus *Balantidium* from *R. ridibunda* in Van is similar to the fauna of Asiatic frogs in terms of diversity.

Key Words: *Rana ridibunda*, Turkey, Rectal ciliates, *Balantidium*, *Balantidium vanensis* n. sp.

Rana ridibunda (Amphibia:Anura)'nın Sindirim Sistem Siliyat Faunası I: *Balantidium* (Balantidiidae, Trichostomatida)

Özet: Bu çalışmada, Van'daki *Rana ridibunda*'nın sindirim sisteminde yaşayan *Balantidium* türleri belirlenmiştir. Araştırma sonucunda *Balantidium* genusuna ait beş tür tespit edilmiştir. Bunlardan biri olan *Balantidium vanensis* n. sp. ilk kez tanımlanmıştır. *B. helenae*, *B. claperedei*, *B. giganteum* *R. ridibunda*'nın sindirim sisteminde ilk kez kaydedilmiştir. Bu türler aynı zamanda Türkiye protozoon faunası için yeni kayıttır. Duodenumda *B. duodeni*, duodenumdan sonraki bağırsak kısmında *B. elongatum* tek olarak bulunur. Rektumdaki *Balantidium*'ların %50.21'ini *B. helenae*, %28.41'ini *B. claperedei*, %9.06'sını *B. vanensis*, %7.16'sını *B. elongatum*, %4.98'ini *B. giganteum* oluşturmaktadır. Bu çalışmada belirlenmiş olan türlere ait örnekler orijinal tanım ve literatürdeki mevcut bilgilerle karşılaştırılarak benzerlik ve farklılıklar tespit edilmiştir. Van'daki *R. ridibunda*'nın *Balantidium* genusuna ait sindirim sistem faunası, tür çeşitliliği açısından Asya kurbağalarının sindirim sistem faunasına benzer olduğu saptanmıştır.

Anahtar Sözcükler: *Rana ridibunda*, Türkiye, Rektal siliyatlar, *Balantidium*, *Balantidium vanensis* n.sp.

Introduction

Many studies have been carried out on ciliates (Protozoa: Ciliophora) living endocommensally in the digestive system of amphibians. However, research on the ciliate fauna of the digestive system of amphibians in Turkey or on protozoan fauna in general are scarce. So it would be of great significance to determine the fauna of the digestive system of amphibians in Turkey and then make comparisons with studies about the amphibian rectal fauna of various countries.

The ciliates living endocommensally in the digestive system of *Rana ridibunda* belong to the genus *Balantidium* (Trichostomatida) and the genus *Nyctotherus* (Heterotrichida). The result obtained concerning

Balantidium spp. are reported here; the species of the genus *Nyctotherus* in the digestive system of *Rana ridibunda* will be the subject of a subsequent paper.

Researchers have examined the various aspects of the species of the genus *Balantidium* living in frogs and toads (1-15). Some studied the morphological and cytological aspects of ciliates and attempted to define the species, while some attempted to identify the composition of species and others attempted to determine the affects of ecological factors on the population densities. In the light of different studies the protozoon fauna of European frogs and toads have been determined (16, 17). It is commonly accepted that there are 59 *Balantidium* species reported from various vertebrate and invertebrate hosts;

en estimated 18 species of *Balantidium* are found in amphibians (8). Recently many new species have been added to this list (11). In studies carried out in seven countries in Europe, only three *Balantidium* species (*B. duodeni*, *B. elongatum*, *B. entozoon*) were determined in the digestive systems of 14 different amphibian species (16, 17). Different *Balantidium* species were identified in addition to *B. elongatum* and *B. duodeni* in the research performed on Asiatic frogs (7, 11, 15). In Turkey there have been only a few studies of this kind. Consequently it is hard to draw up a fauna list for Turkey. The first study in Turkey was carried out by Öktem (18). Another study was conducted on *R. ridibunda* in Izmir by Şenler (19). In this study, the cytological and morphological aspects of *B. elongatum* and *B. duodeni* were examined at light microscopic levels. A similar study examining the ciliates in urinary bladders and intestines of *R. ridibunda* in generic levels was carried out in Sivas (20).

The records related to the species composition of ciliates in the digestive system of amphibians suggested that the ciliate fauna of amphibians from different countries are basically the same. Nevertheless, different species as well as the geographical variations of the same species can be found even among the species of the same host.

The aim of our study was to determine *Balantidium* species living endocommensally in the digestive system of *R. ridibunda* in Van and reveal the results obtained by making a comparison with those studies reported in various regions in terms of the similarities and differences.

Materials and Methods

The frogs used for the study were collected from Van-Edremit, Van Castle, YYÜ Campus entrance (the point where Morali stream flows into Lake Van) and three different swamps at the Campus between 1994 and 1997. The frogs were dissected within 24 hours. The duodenum, the intestinal part next to the duodenum and the rectum were placed into different glass cups containing Ringer solution. Ciliates were first examined in vivo (21). In order to determine the occurrence ratio of rectal *Balantidium* spp., the rectums taken from seven frogs were opened in the Ringer solution and kept in small bottles after fixation with formol saline.

In order to make permanent ciliate preparations, 2% of osmium tetroxide vapour, formol saline, Bouine and Champy solutions were used as fixatives. Following the fixation process, in order to see the details the samples were stained with Mayer's hematoxylin, Chatton-Lwoff's silver impregnation technique, Fernandez-Galiano's (22) pyridinated silver carbonate technique and Feulgen's nucleal reaction technique.

All of the cell measurements were made by an ocular micrometer calibrated with a Nikon objective micrometer. All measurements given in the study are in micrometers. The figures in this paper were drawn by camera lucida. The statistical analysis of measurements concerning various morphological characteristics were made using MINITAB software.

Table 1. Comparative data on specimens of *B. elongatum* in two different habitats. N. number of specimens; SD. standard deviation; SE. standard error.

	<i>B. elongatum</i> (in the intestine)					<i>B. elongatum</i> (in the rectum)				
	N	Range	Mean	SD	SE	N	Range	Mean	SD	SE
Body Length (L)	50	100.00-212.50	161.40	25.96	3.67	50	107.50-175.00	141.80	14.84	2.10
Body Width (W)	50	30.00-62.50	43.30	6.95	0.98	50	30.00-47.50	36.25	4.55	0.64
L/W	50	2.00-5.00	3.72	0.59	0.08	50	2.67-4.75	3.95	0.47	0.07
Macronucleus Length (ML)	50	25.00-50.00	31.01	4.92	0.70	50	17.50-30.00	24.40	3.05	0.43
Macronucleus Width (MW)	50	10.00-27.50	14.20	3.62	0.51	50	10.00-15.00	12.35	1.71	0.24
ML/MW	50	1.18-3.75	2.25	0.45	0.07	50	1.17-2.75	2.01	0.33	0.05
Vesicular Opening Length (VL)	50	25.00-57.50	40.95	6.81	1.00	50	22.50-42.50	37.10	3.79	0.54
L/VL	50	2.53-5.38	3.96	0.56	0.08	50	2.82-5.00	3.85	0.45	0.06
Dorsal	37	50-80	63.81	8.67	1.43	17	60-79	67.65	6.59	1.60
Number of ciliary rows										
Ventral	37	50-90	66.24	9.11	1.50	17	65-86	74.94	6.56	1.59

Results

Balantidium elongatum Stein, 1863

(Figure 1a, b; Table 1)

The body is thin, long and fusiform. Vestibulum resembles a short crack. Macronucleus conforms to the body shape. It is mostly in the mid parts of the cell. There are two contractile vacuoles; one of them is in the middle and the other in the posterior of the cell. The whole surface of the body is covered with uniform cilia, arranged in longitudinal lines. The left side of the vestibulum is lined with long adoral cilia specialized for feeding.

B. elongatum specimens were found in two different populations, one of them in the intestinal part next to the duodenum of *R. ridibunda* and the other in the rectum. It was found in the rectum together with the other species of *Balantidium* in most of the *R. ridibunda* specimens

examined. In a few of the specimens it constitutes a different population in the intestinal part next to the duodenum. The species appears to be fairly constant in morphological characters. However, the posterior part of the body in rectal samples is transparent. Comparative data on *B. elongatum* populations are summarised in table 1. Measurements of the specimens taken from the rectum are relatively smaller than those taken from the intestine. According to the one-way variance analysis, body measurements of two populations are significantly different ($P < 0.01$). As for the difference between the ratios, it was found to be insignificant ($P > 0.05$). It constitutes 7.6% on the average of total *Balantidium* spp. in the rectum.

Balantidium duodeni Stein, 1863

(Figure 1c, Table 2)

The body is round, the ventral side is markedly convex, the dorsal flat or slightly concave. Vestibulum is

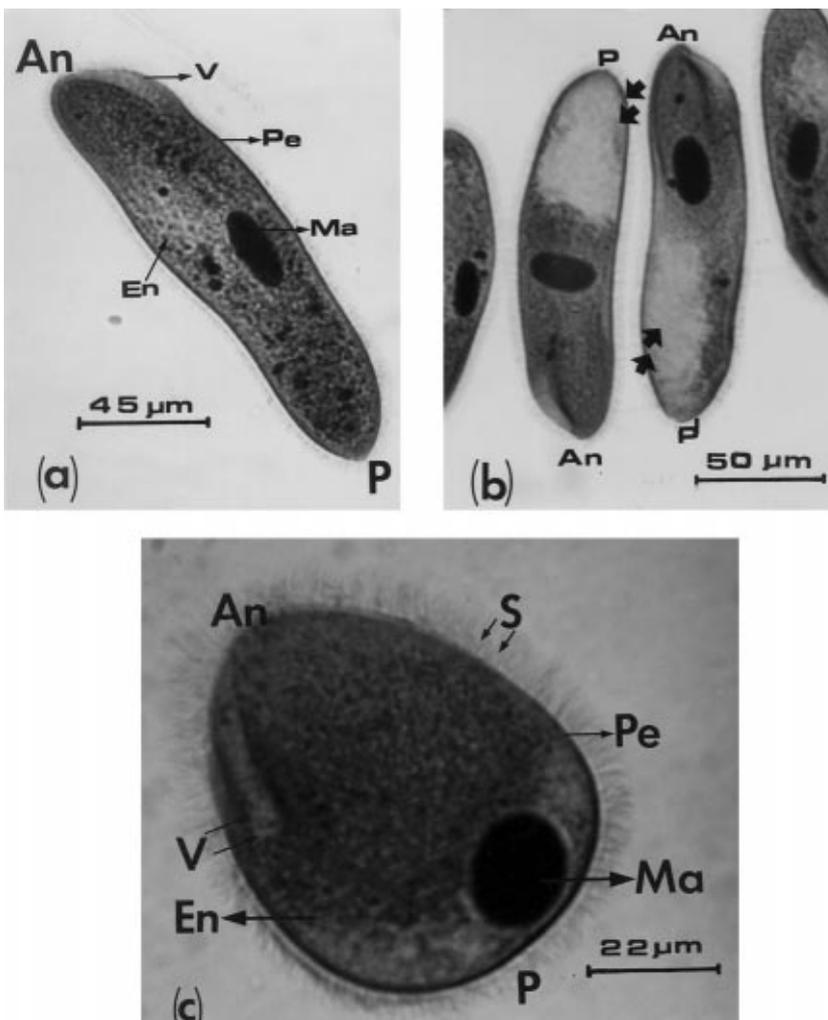


Figure 1. Light micrographs of *B. elongatum* (a. in intestine; b. in rectum) and *B. duodeni* (c). General morphology (Mayer's hematoxylin) An. anterior; P. posterior; V. vestibular opening; Pe. pellicle; En. endoplasm; Ma. macronucleus; Arrows. transparent zone.

long, narrow groove-shaped. Macronucleus is either ovoid or subspherical. There is only one contractile vacuole located near the macronucleus in the posterior part of the body.

B. duodeni was observed in the duodenum in a few of specimens of *R. ridibunda* examined.

***Balantidium helenae* Bezenberger, 1904**

(Figure 2a, b, c; Table 3)

The body is an elongated ovoid. The length of the body is twice as big as its width. The anterior part of the body which gradually narrows is conical and the posterior is domed projecting like a knob. Vestibule is V-shaped.

	N	Range	Mean	SD	SE	
Body Length (L)	45	55.0-150.00	82.33	16.19	2.40	
Body Width (W)	45	50.0-87.50	62.94	8.96	1.33	
L/W	45	1.07-2.00	1.33	0.17	0.02	
Macronucleus Length (ML)	45	10.00-27.50	19.67	4.15	0.62	
Macronucleus Width (MW)	45	10.00-25.00	15.61	3.85	0.57	
ML/MW	45	1.00-2.00	1.29	0.25	0.04	
Vesicular Opening Length (WL)	45	25.00-50.00	32.22	6.68	0.97	
L/WL	45	2.00-3.20	2.58	0.32	0.05	
Number of Ciliary Rows	Dorsal	10	92-170	128.60	26.28	8.31
	Ventral	10	130-190	153.00	16.56	5.24

Table 2. Data of various morphological characteristics of *B. duodeni*. N. number of specimens; SD. standard deviation; SE. standard error.

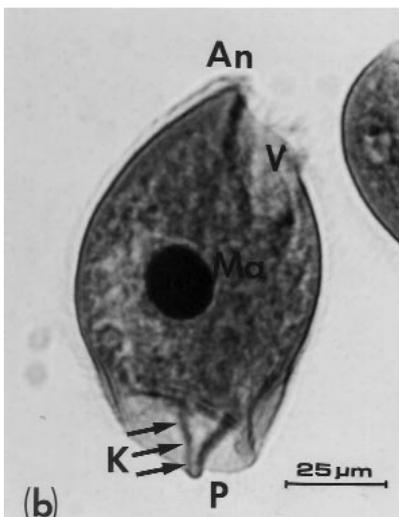
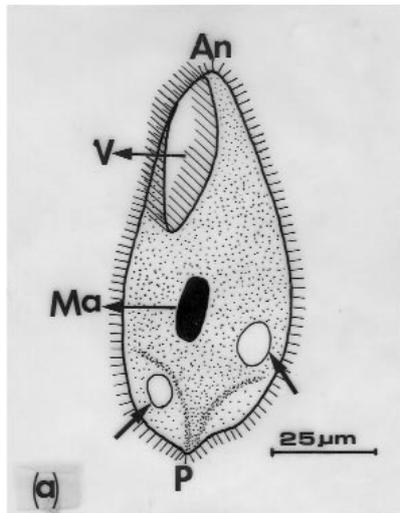


Figure 2. Light micrographs and drawing of *B. helenae*. a, b. General morphology (Mayer's hematoxylin) c. somatic ciliature (silver impregnation) An. anterior P. posterior; V. vestibular opening; Ma. macronucleus; K. knob in the posterior end; Arrows. contractile vacuoles.

Vestibule opening begins at the anterior and extends approximately to one-third of the body. Macronucleus differs in shape from ovoid to cylindrical; its length is twice as big its width on average and is placed in the mid parts of the cell. However in some of the specimens it is closer to the posterior and in some others it is closer to the anterior. Micronucleus, observed only in few of the specimens, is spherical. It is placed in the mid parts of the macronucleus and is quite close to it. It has two contractile vacuoles. They are located near the lateral sides in the posterior half of the body. Irregular bodies are found in the cytoplasm and these can be observed even in living specimens. These bodies give positive reactions when treated with Feulgen just like the nucleus. Cytopyge, which is at the posterior end is clearly visible. The whole surface of the body is covered with uniform cilia and each ciliary row is lined parallel to the long axis of the body. Ciliary rows terminate at the edge of vestibulum in anteroventral, and at anterior end in anterodorsal. As for the posterior, these ciliary rows, which cover the body, terminate around the cytopyge. The adoral cilia covering the interior of vestibulum are long.

B. helenae was observed in the rectum in all specimens of *R. ridibunda* examined. The measurements and ratios of the body, and the number of ciliary rows are

	N	Range	Mean	SD	SE	
Body Length (L)	50	62.50-112.50	88.85	12.51	1.77	
Body Width (W)	50	30.00-77.50	45.00	8.38	1.18	
L/W	50	1.19-2.50	2.00	0.30	0.04	
Macronucleus Length (ML)	50	15.00-32.50	23.30	32.25	0.46	
Macronucleus Width (MW)	50	7.50-20.00	11.65	2.18	0.31	
ML/MW	50	1.38-2.75	2.00	0.25	0.04	
Vesibular Opening Length (WL)	50	25.00-50.00	33.15	5.53	0.78	
L/WL	50	1.92-3.50	2.71	0.37	0.05	
L/ML	50	2.54-6.17	3.85	0.53	0.08	
Number of Ciliary Rows	Dorsal	25	48-64	54	4.96	0.99
	Ventral	25	50-75	57	6.09	1.22

summarised in Table 3. It constitutes 50.21% on the average of total *Bolantidium* spp. in the rectum.

***Bolantidium claperedei* Mahoon and Khan, 1986**

(Figure 3a, b; Table 4)

The body is an extended ovoid. Its length is slightly bigger than its width. Just like the species mentioned above, the posterior end is projecting like a knob. Vestibular opening nearly extends to the equatorial region of the cell. Macronucleus shifts from spherical to ovoid. It is relatively smaller according to the body size. It is mostly located in the mid parts of the cell. There is only one contractile vacuole. The arrangement of ciliary rows and adoral cilia look like the former species.

This species was observed in all of the *R. ridibunda* specimens examined throughout the course of study in the rectum. Body measurements and ratios, and the number of ciliary rows are given in Table 4. It constitutes 28.41% on the average of total *Bolantidium* spp. in the rectum.

***Bolantidium giganteum* Bezenberger, 1904**

(Figure 4a, b)

The body is somewhat egg-shaped, slightly narrowed at the anterior end, and posterior part is evenly rounded. It length is 100.0-112.5 µm and its width 37.5-52.5µm.

Table 3. Data of various morphological characteristics of *B. helenae*. N. number of specimens; SD. standard deviation; SE. standard error.

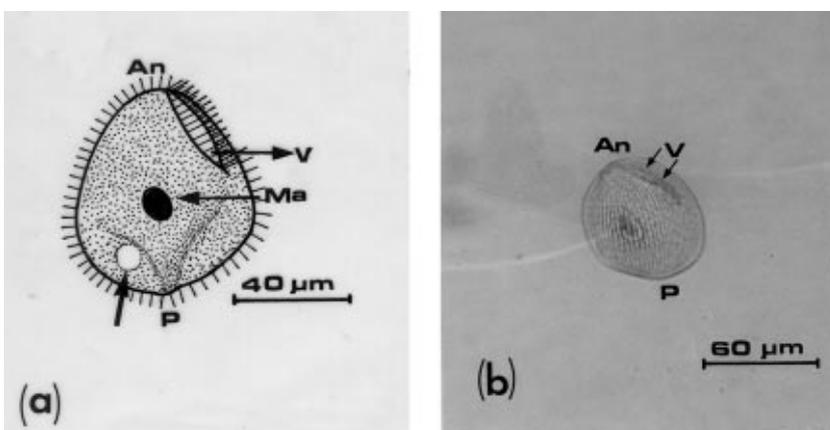


Figure 3. Light micrograph and drawing of *B. claperedei*. a. General morphology b. Somatic ciliature (silver impregnation) An. anterior; P. posterior; V. vestibular opening; Arrow. contractile vacuole.

The length of the body is approximately twice as big as its width (length to width ratio: 1.94-2.50). Vestibulum is short (Vestibulum length: 25.0-32.5µm) and located in the anterior of the body which is almost one fourth of it (length to vestibulum length ratio: 3.08-4.20). Macronucleus length is 25.0-37.5µm and its width is 10-20µm. It is cylindrical or kidney-shaped. There are four contractile vacuoles more or less symmetrically placed. Since little of it can be obtained in the permanent preparations no detailed statistical study could be made.

B. giganteum constitutes 4.98% of the average rectal *Balantidium* spp.

***Balantidium vanensis* n.sp.**

(Figure 5a, b, c, d, 6a, b, c; Table 5)

Diagnosis. The largest ciliate in the rectum of *R. Ridibunda*; the body is an extended ovoid. The anterior part gradually gets narrower. Its posterior part is rounded; the oral apparatus is large. Vestibular opening is close to the terminal. Vestibulum is funnel-shaped and

extends backward; cytopharynx is long; the right and the left sides of vestibular opening are surrounded with marked lips. The left lip covers the posterior part of the right lip like a collar. There is a differentiation in the somatic ciliature in the right side of the vestibular opening. Macronucleus shows a polymorphism. In living specimens the macronucleus was observed to have changed in a number of different forms. Endoplasm is densely granular: so it is darker than the other species of the genus *Balantidium*. There are a large number of contractile vacuoles.

Description. The body is roughly ovoid; its posterior is quite extended. There is a knob exit in the posterior; its length is 166.10 (107.50-210.00) µm and its width 108.75(75.00-150.00) µm. The ratio of the length to the width is 1.55 (1.18-1.89). The vestibular opening is V-shaped. Its length is 76.90 (50.00-107.50) µm; it extends along nearly half its body. Macronucleus with various shapes like ovoid, kidney or lobes is usually located in the mid parts of the body. Micronucleus is

	N	Range	Mean	SD	SE	
Body Length (L)	52	45.00-82.50	62.21	8.23	1.14	
Body Width (W)	52	32.50-62.50	43.03	6.03	0.84	
L/W	52	1.09-1.80	1.45	0.15	0.02	
Macronucleus Length (ML)	52	12.50-27.50	17.26	3.40	0.47	
Macronucleus Width (MW)	52	10.00-17.50	12.16	1.72	0.24	
ML/MW	52	0.86-2.20	1.44	0.31	0.04	
Vesicular Opening Length (WL)	52	20.00-45.00	29.66	4.43	0.61	
L/WL	52	1.50-3.25	2.13	0.35	0.05	
L/ML	52	2.09-5.60	3.72	0.80	0.11	
Number of Ciliary Rows	Dorsal	25	35-44	39.72	2.44	0.49
	Ventral	25	34-46	39.08	3.38	0.68

Table 4. Data of various morphological characteristics of *B. claperedei* N. number of specimens; SD. standard deviation; SE. standard error.

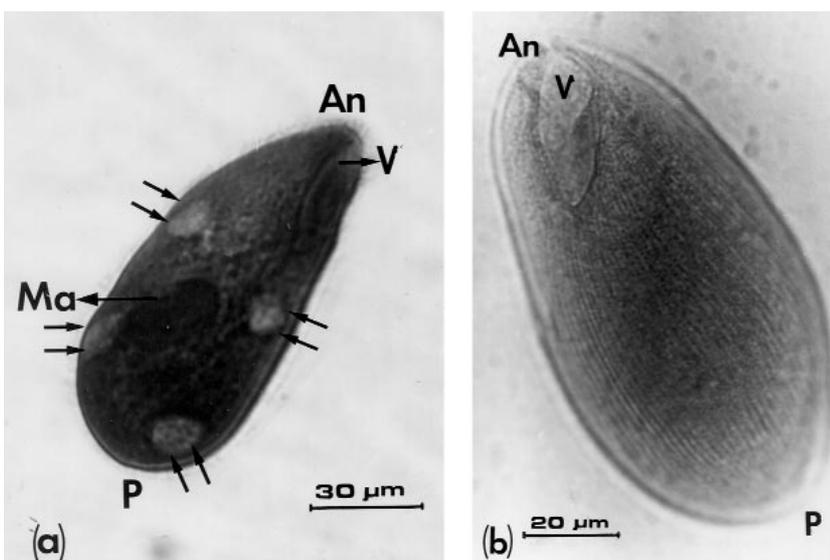


Figure 4. Light micrographs of *B. giganteum*. a. General morphology (Mayer's hematoxylin) b. Somatic ciliature (silver impregnation) An. anterior; P. posterior; V. vestibular opening; Ma. macronucleus; Arrows. contractile vacuoles.

spherical, sometimes situated in a cavity and sometimes in a site close to the macronucleus. There are lots of contractile vacuoles localized in various parts of the body, mostly in the posterior parts. Cytophyge is clearly localized in its posterior end.

Somatic ciliature is composed of ciliary rows which are parallel to the long body axis. The arrangement of ciliary rows in the dorsal side is typical to the genus *Balantidium*. Ciliary rows end up around vestibulum in the anterior and around the cytophyge in the posterior. As in the dorsal, the ciliary rows of the ventral side proceed towards the anterior starting around the cytophyge at the posterior. The ciliary rows in the left side end up around the vestibular opening. The somatic ciliary rows in the right side, extending to the vestibular opening, show a disorder at this point. Most of the ciliary rows originating at the posterior terminate here. At this point new bunch-like ciliary rows are formed. New ciliary rows accompanied by somatic ciliary rows coming from the posterior in small numbers constitute a specialized field of ciliary rows in the right side of the vestibular opening. The newly composed ciliary rows and the somatic ciliary coming from the posterior end up at the right side of the vestibular opening.

Data for measurements and ratios related to various morphometric characteristics are given in Table 5.

Type host. *Rana ridibunda* Pallas, 1771

Type locality. Van, Turkey

Habitat. Rectum

Occurrence. It was observed in all the *R. ridibunda* specimens examined. It constitutes 9.06% on average of the species of the genus *Balantidium* in the rectum.

Type material. Permanent preparations of this species together with the fixed material in formol saline are kept

in the Department of Biology, Faculty of Science and Literature, Yüzüncü Yıl University, Van, Turkey.

Derivatio nominis. The new species was named after the place, Van (Turkey) where it was found.

Remarks. This species resembles *B. sinensis* (3) and *B. megastomae* (11), which have previously been described. *Balantidium vanensis* should be regarded as a new species because of the following characteristics.

(a) The macronucleus has a polymorphic structure

(b) It has a specialized field of ciliary rows due to the exceeding multiplication of ciliary rows on the right side of the vestibular opening

(c) It has marked lips surrounding the vestibular opening; the left lip covers the right lip in the posterior

(d) the length and largeness of the vestibular opening

(e) the presence of a long cytopharynx

Discussion

Body measurements of *B. elongatum* and *B. duodeni* were different from those reported by Şenler (19). However, the proportional values were found to be the same as those reported in the study above. Since the general morphology of these two species is not very different from the original descriptions, a further examination seems unnecessary.

B. helenae was first described by Bezenberger in the rectum of *Rana tigrina*; in later studies it was obtained in the rectum of various Asiatic frogs (1, 2, 4, 7). In this study it was first reported in the rectum of *R. ridibunda*. Bhatia and Gulati (1), Nie (2), and Uttangi (4) reported quite different data from each other. Our study was also different in terms of body dimensions and ratios compared with the above reports. In our study body dimensions were found to be relatively smaller than those

	N	Range	Mean	SD	SE	
Body Length (L)	52	107.50-210.00	166.10	22.63	3.20	
Body Width (W)	52	75.00-150.00	108.75	17.43	2.47	
L/W	52	1.18-1.89	1.55	0.17	0.02	
Macronucleus Length (ML)	52	37.50-100.00	54.95	13.05	1.85	
Macronucleus Width (MW)	52	12.50-37.50	21.30	6.00	0.85	
ML/MW	52	1.42-5.20	3.15	0.73	0.10	
Vesibular Opening Length (WL)	52	50.00-107.50	76.90	15.50	2.19	
L/WL	52	1.67-3.64	2.21	0.38	0.05	
L/ML	52	1.88-5.25	3.15	0.73	0.10	
Number of Ciliary Rows	Dorsal	25	105-185	140.76	21.38	4.28
	Ventral	25	90-175	140.26	20.23	4.05

Table 5. Data of various morphological characteristics of *B. vanensis* n.sp. N. number of specimens; SD. standard deviation; SE. standard error.

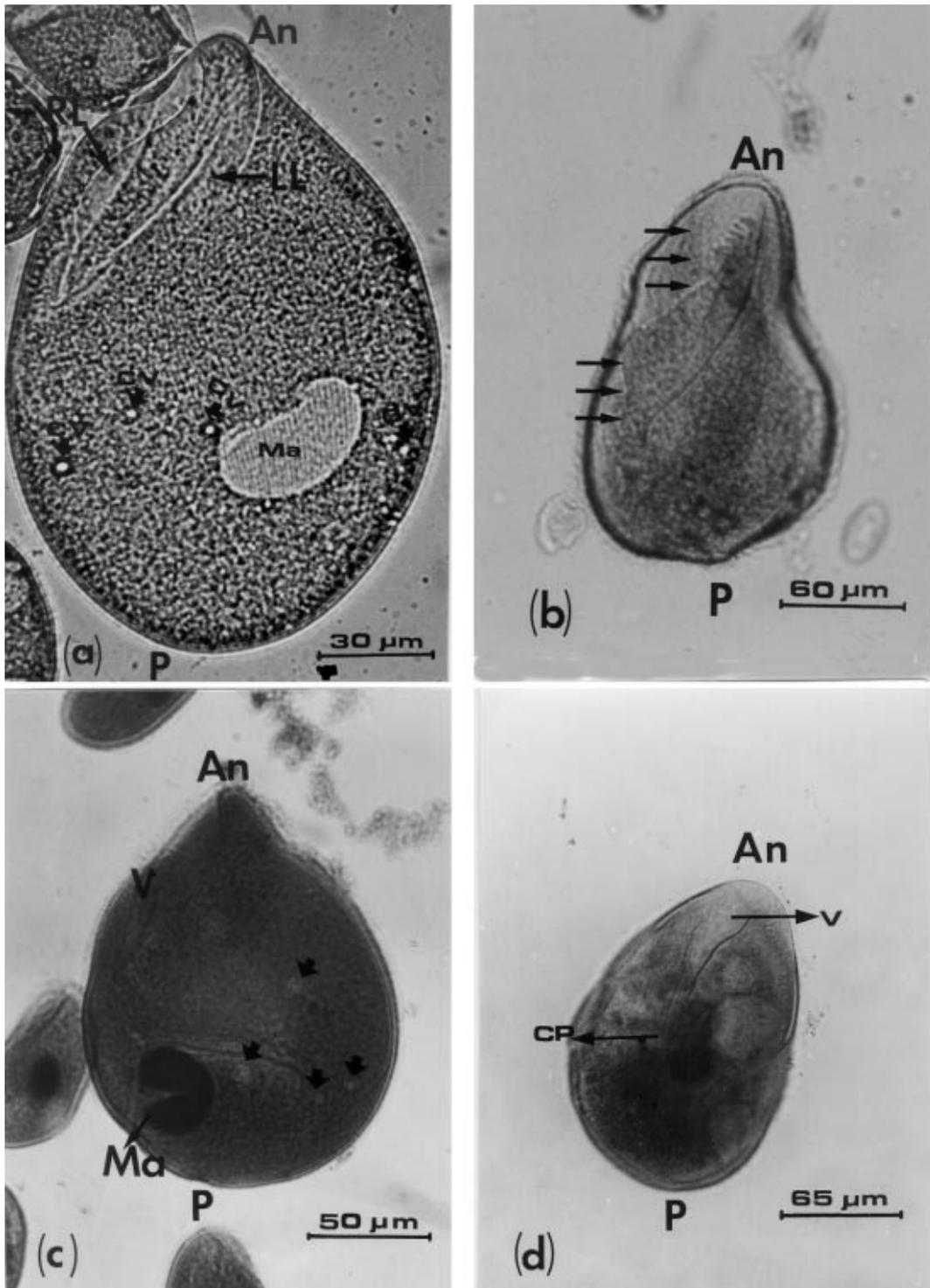


Figure 5. Light micrographs of *B. vanensis* n. sp.
 a. Light micrograph of ventral side focused. Left lip and right lip are clearly seen (in vivo) b. Large oral aperture is clearly seen (in vivo) c. General morphology (Mayer's hematoxylin) d. Long cytopharynx is clearly seen (silver impregnation) An. anterior; P. posterior; Ma. macronucleus; V. vestibular opening; RL. right lip; LL. left lip; CV. contractile vacuoles; Arrows. oral aperture.

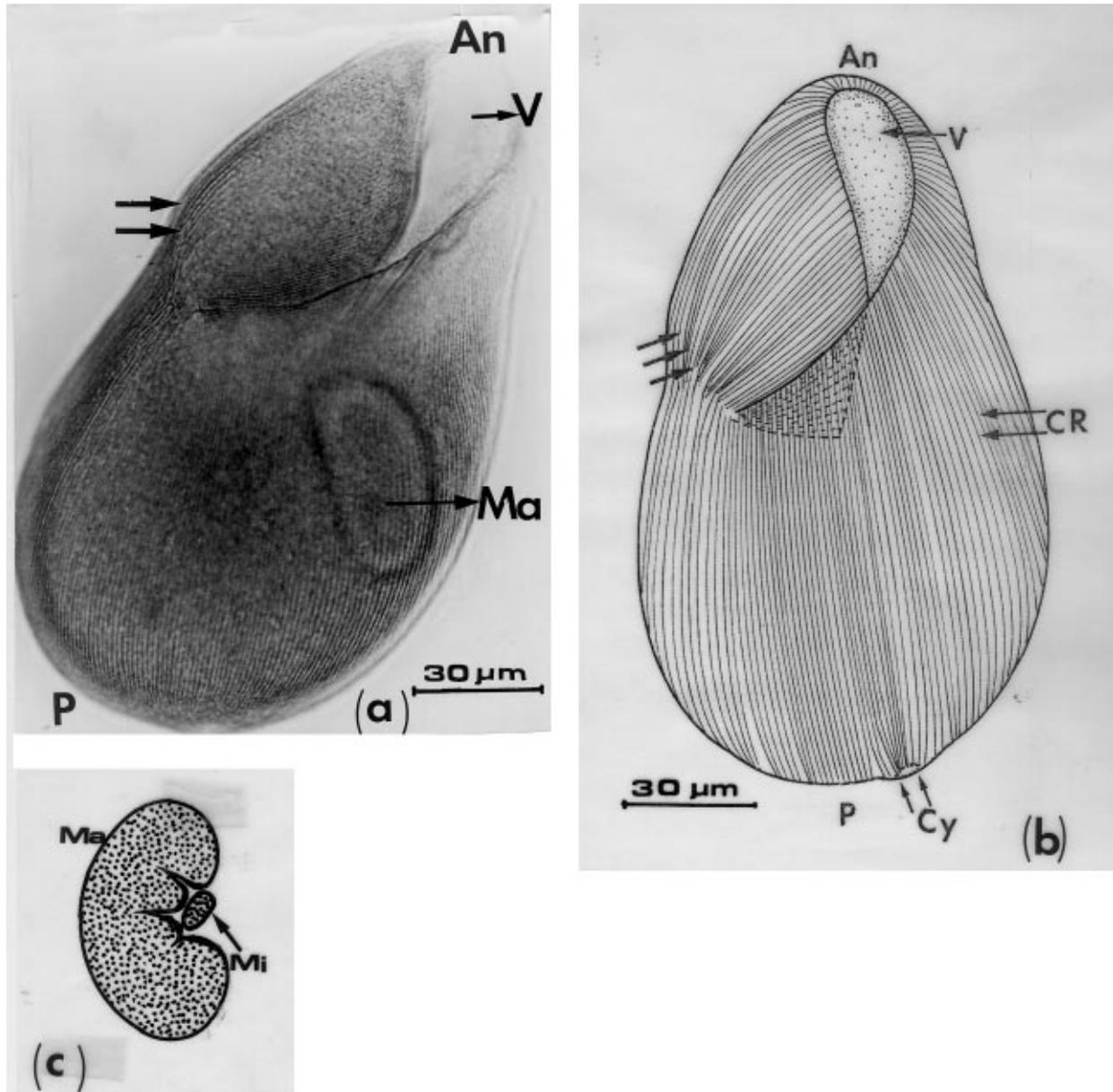


Figure 6. Light micrograph and drawings of *B. vanensis* n. sp.
 a, b. Somatic and oral ciliature (silver impregnation) c. One of the macronucleus forms. An. anterior; P. posterior; Ma. macronucleus; Mi. micronucleus; V. vestibular opening; CR. ciliary rows; Cy. cytophyge; Arrows. specialized field of ciliary rows.

found by Bhatia and Gulati (1) and Nie (2). When the L/W ratio is considered, it can be said that *B. helenae* specimens examined in those studies have a more spherical shape. In the specimens of Bhatia and Gulati (1) and Nie (2) it was reported that the macronucleus was kidney-shaped (which conforms to the original description) and one contractile vacuole was present in the posterior part of the body. Although Mahoon and Ghauri (7) reported larger individuals of this species, the

L/W ratio is close to the values found in this study. The form of the body and the macronucleus, in terms of the number of contractile vacuoles and the length of the vestibular opening, are similar to those specimens examined by Mahoon and Ghauri (7). As observed in these specimens, the body is an extended ovoid and the macronucleus is also ovoid. There are two contractile vacuoles. Vestibular opening is one third of the cell. The differences among specimens are due to different hosts.

B. claperedei was described by Mahoon and Khan, 1986 in *Rana cyanophlyctis* (15). This was a new record for *R. ridibunda*. It has similarities with those specimens identified in *Rana tigrina* in terms of general morphology and body measurements (15). Vestibular opening was found to be much longer compared with the specimens of Kazmi et al. (15). Vestibular opening is reported as being almost one third of the body length, in the article above. This value was found to be almost half of the body in our study. Kazmi et al.'s (15) specimens are in the shape of a macronucleus which resembles beans. However, in the specimens we found the shape varied from ovoid to sphere.

B. giganteum was described by Bezenberger in 1904 in the rectum of *Rana temporaria chinensis*. This species was first reported in *R. Ridibunda* in this study. In our study we found specimens similar to those identified in the rectum of *Rana nigromaculata* and *Rana plancyi* by Nie (3). In spite of the difference in body length and especially width in these two different studies, they have similarities in terms of their general morphology. Our specimens are smaller than the original specimens of Bezenberger (3). It resembles *Balantidium entozoon* (5), having four contractile vacuoles symmetrically located; but the vestibular opening is shorter in this species.

Balantidium vanensis n. sp., in terms of size is distinguished from the other *Balantidium* species in the rectum of *R. Ridibunda*. As explained before, this species is similar to *B. sinensis* described from the rectum of *Rana nigromaculata* and *Rana plancyi* in China (3) and *B. megastomae* (11) described from the rectum of *Rana cyanophlyctis* in India in terms of some basic characteristics. *B. vanensis* bears differences from the figures and definitions of Nie (3) and the descriptions made by Shete and Krishnamurthy (11) in the following respects:

(1) *B. sinensis* in terms of its macronucleus is kidney-shaped or ovoid, while the macronucleus in *B. megastomae* is in the form of lobes. Macronucleus in *Balantidium vanensis* is characteristically polymorphic.

(2) The oral and somatic ciliature of *B. sinensis* and *B. megastomae* have not been reported to bear any of the differences to constitute any diagnostic character in regard to its structure. In *Balantidium vanensis*, there is a specialized field of ciliary rows as a consequence of excessive multiplication of cilium on the right of the vestibular opening.

(3) The marked lips surrounding the vestibular opening in *Balantidium vanensis* do not exist in *B. sinensis* or *B. megastomae*.

(4) There is a long cytopharynx in *Balantidium vanensis*; but there is no mention of a cytopharynx in *B. sinensis* and *B. megastomae*.

(5) Vestibular opening is one third of the body length in *B. megastomae* while in *B. sinensis* it is one fourth of it. In *Balantidium vanensis* this value was found to be half of it on average.

(6) Our specimens, with respect to body measurements, are smaller than *B. sinensis* and *B. megastomae*.

B. sinensis (3), *B. megastomae* (11) and *Balantidium vanensis* n. sp. are similar to each other in terms of being the largest ciliates in the rectum of the frogs described and the number of contractile vacuoles.

In this study our aim was to determine and introduce the *Balantidium* fauna found in the digestive system of Turkey's frogs. In our study, the ciliate species we determined were compared with similar species described in previous studies and we thought it would be appropriate to record it as a new species.

The other *Balantidium* species, apart from *B. elongatum* and *B. duodeni*, are new records for *R. ridibunda* and Turkey. *Balantidium* fauna of *R. ridibunda* in Van were compared with European and Asiatic frogs studied by various researchers (1-4, 7, 8, 11, 16, 17). Our result showed that the *Balantidium* fauna of *Rana ridibunda* in Van, Turkey are similar to that of Asiatic frogs.

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