

New Rumen Ciliates From Turkish Domestic Cattle (*Bos taurus* L.): IV. *Eudiplodinium dehorityi* n.sp.

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SUMMARY: In a survey of rumen contents from 30 adult Turkish domestic cattle (*Bos taurus* L.), an unusual new form of *Eudiplodinium* was observed. This form was established as a new species, *Eudiplodinium dehorityi* n.sp., and constituted 13.31, 15.41, 0.20 and 0.34% of the total ciliates in four animals. Several morphological characteristics of this species are unique to the genus *Eudiplodinium*, showing definite evolutionary trends to the genera *Elytroplastron* and *Polyplastron*.

Key words: *Eudiplodinium dehorityi* n.sp., new rumen ciliates, *Bos taurus* L., Turkey.

Türkiye Evcil Sığırlarından (*Bos taurus* L.) Yeni İşkembe Siliyatları: IV. *Eudiplodinium dehorityi* n.sp.

ÖZET: İzmir (Türkiye) civarındaki toplam 30 ergin evcil sığır (*Bos taurus* L.)'dan elde edilen işkembe içeriklerinin incelenmesi sırasında, yeni ve oldukça farklı bir *Eudiplodinium* formu gözlenmiştir. Bu form, yapılan incelemeler sonucunda yeni bir tür *Eudiplodinium dehorityi* n.sp. olarak tanımlanmıştır. İncelenen sığır işkembe içeriklerinin dördünde, sırasıyla %13.31, %15.41, %0.20 ve %0.34'lük bulunma oranlarıyla gözlenmiş olan bu tür, ayrıntılı bir şekilde tanımlanmış ve benzerleri ile tartışılarak ilişkileri ortaya konmuştur. Bu türün bazı morfolojik karakterleri *Elytroplastron* ve *Polyplastron* cinslerine bariz evrimsel eğilimler gösterecek şekilde ve *Eudiplodinium* cinsi içerisinde sadece bu türe özgüdür.

Anahtar kelimeler: *Eudiplodinium dehorityi* n.sp., Yeni İşkembe Siliyatları, *Bos taurus* L., Türkiye

INTRODUCTION

This is a continuation of three previous studies reporting on the rumen ciliate fauna of Turkish domesticated cattle (3-5).

MATERIALS AND METHODS

Samples and methods used in this study were the same as those described in the preceding papers (3-5).

RESULTS

Eudiplodinium dehorityi n.sp. (Figure 1-8, Table 1)

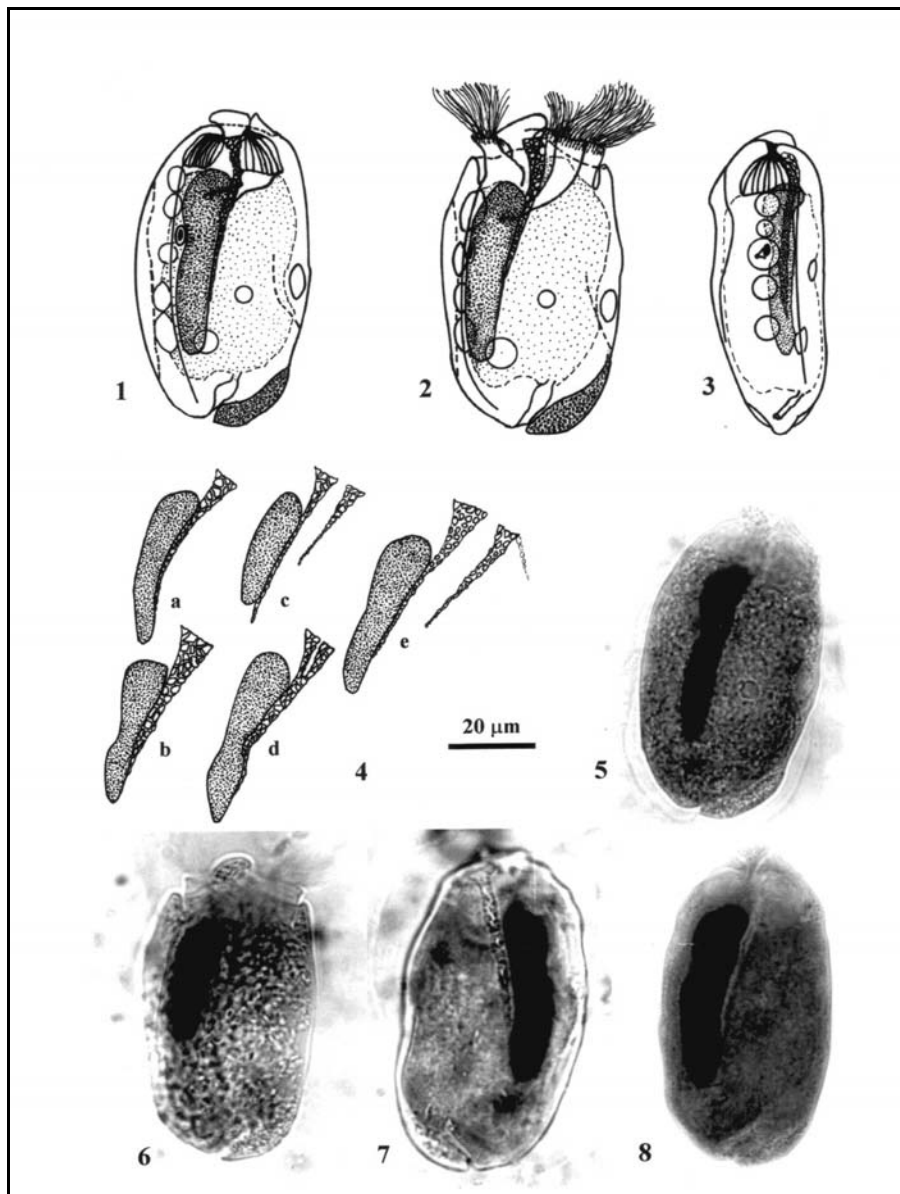
Diagnosis: The body is ellipsoidal in shape (side view) but appears with distinct rounded anterior and posterior ends. Dorsal and ventral sides are roughly convex. There is a central periplasm and a small caudal lobe, full of carbohydrate particles, is located on the posterior ventral end of the body. The operculum is medium in size. Oral region is slightly curved towards the ventral side.

In most cells (88%), a single skeletal plate begins from the right-dorsal side of the ACZ and right ventral side of the operculum, terminating at approximately $\frac{3}{4}$ the length of the macronucleus, also narrowing posteriorly.

The peripheral periplasm occupies very large place in the body. The cytoproctal tube is long and extends from the posterior end of the periplasmic sac to the posterior end of the cell, at the angle of ca. 45° to the main body axis. The cytoproct is seen at the dorsal median of the ventral caudal

lobe. The macronucleus is rod shaped, narrowing towards the posterior end. An ellipsoidal micronucleus is located within a dorsal groove of the macronucleus, occupying 1/3 of its frontal side (anterior). Four-five contractile vacuoles (CV), out of a total 7-8, are situated in between the macronucleus and the dorsal side of the body. One additional CV lies near the right posterior tip of the macronucleus. There are two additional CV at the level of the half of the body: one of these is near the right surface and the other is located on the ventral side of the body. The central periplasm on the posterior of the body is thickened and the cytoproctal tube extends within this part.

Description: In side view, the body appears almost ellipsoidal in shape with its rounded anterior and posterior ends. The dorsal and ventral surfaces are slightly convex. The apical spine (the operculum) is medium in size and does not stretch out prominently from the anterior pole of the body in contracted samples. Body length and width are 7.41 (59.00-85.00) μ m, 38.61 (28.00-47.00) μ m respectively and L/W ratio is 1.86 (1.40-2.15). The oral region (ACZ) is slightly inclined to the ventral. Dorsal ciliary zone (DCZ) is at the same level with ACZ. Both dorsal and ventral edges are convex and smooth. In addition, some superficial depressions are seen inwardly on the left dorsal side. There is a small caudal lobe on the posterior ventral side, containing numerous carbohydrate particles.



Figures 1-8. Drawings [1-4] and some photographs [5-8] of *Eudiplodinium dehorityi* n.sp. from Turkish Domestic Cattle showing the variations in the general body shape, macronuclear shape and the number and shape of the skeletal plates. 1,2,4-6 and 8, the right side views; 7, the left side view and 3, the dorsal view.

Near the dorsal edge of the macronucleus a lengthwise pelicular folding begins at the DCZ and extends down to the cytoproct level. In approximately 88% of the cells, a single narrow skeletal plate exist next to the right of the nasse (oesophagus). It starts from the right dorsal edge of the ACZ and right ventral of operculum, and often (84% of the cells) extends $\frac{3}{4}$ of the length of the macronucleus, gradually tapering towards the posterior end. Occassionally the plate is shorter (8.00%) or longer (8.00%). The skeletal plate lies adjacent to the macronucleus on the right ventral side. The cytoproctal tube is relatively long and broad, lies at an angle of ca. 45° to main body axis and terminates with the cytoproct which opens on the dorsal of the caudal lobe.

The macronucleus is a bent rod-shaped structure, rounder on the anterior end and thinner towards the other end. The ellipsoidal micronucleus is situated $\frac{1}{3}$ of the distance from the anterior end of the macronucleus on the dorsal side. A total of 7-8 contractile vacuoles are usually observed, 4-5 of which lie between the macronucleus and the dorsal edge of the body. One sits near right posterior end and the last two on the mid region of the body. One of the latter situated near to right surface and the other is on the ventral side.

The central periplasm (ectoplasm) is thicker on the ventral side where the cytoproctal tube lies. The measurements and the calculated ratios of 25 samples of *Eudiplodinium dehorityi* n.sp. from animal no1, are given in Table 1.

Table 1. Measurements of *Eudiplodinium dehorityi* n.sp. from Turkish Domestic Cattle No. 1 (n=25).

Characteristics	Mean	Range	SE	SD
L	71.41	59.00-85.00	1.59	7.94
W	38.61	28.00-47.00	0.92	4.58
L/W	1.86	1.40-2.15	0.04	0.17
MAL	38.23	30.00-52.00	1.21	6.04
MAW	10.00	7.50-12.50	0.27	1.36
L/MAL	1.88	1.56-2.27	0.04	0.19
MAL/MAW	3.88	2.70-5.78	0.14	0.72
W/MAW	1.03	0.82-1.38	0.03	0.15

L=Length, W=Width (dorso-ventral diameter), L/W=Length to Width Ratio, MAL=Macronucleus Length, MAW=Macronucleus Width, L/MAL=Length to Macronucleus Length Ratio, MAL/MAW=Macronucleus Length to Macronucleus Width Ratio, W/MAW=Width to Macronucleus Width Ratio, SE=Standart Error, SD=Standart Deviation.

Variations: The size and shape of the body of this species is fairly constant. However, the number of contractile vacuoles varies between 7 and 8. The main difference occurs with those on the dorsal side of the macronucleus, being either 4 or 5. The shape of the macronucleus is generally uniform as seen in Figure 1 (80.00 %), but some modifications could be seen as shown in Figure 4.

The skeletal plate is mostly narrow in shape and single in number (88.00 % of cells), but occasionally is branched either on the anterior end (4.00 %) or totally (8.00 %). A third very small plate, sometimes occurs at the anterior tip of the left ventral side of the secondary forming plate, however, this form is rare. In a few specimens (12.00 %), the skeletal plate is considerably wider (Figure 4b).

Type Host and Locality: Domestic cattle, *Bos taurus*, in Izmir, Turkey.

Habitat: Rumen.

Occurrence: *Eudiplodinium dehorityi* n.sp. constituted 13.31, 15.41, 0.20 and 0.34 % of the total ciliates in samples from four Turkish domestic cattle, nos. 1, 2, 5, 9, respectively, giving a frequency of occurrence at 13.33 %. Total ciliate protozoa numbers per ml. Rumen contents in these cattle were 45.3×10^4 , 53.0×10^4 , 63.5×10^4 and 50.5×10^4 , respectively.

Etymology: *Eudiplodinium dehorityi* n.sp. is named after Prof. Dr. Burk A. Dehority (Ohio State University) a colleague known for research on rumen and gastrointestinal protozoa in different regions of the World.

Type material: Holotype and paratypes are preserved on the permanent slides numbered ZSBEU-RCC.1/PN 1-28, dating 21-28 March 1990, in the collection of RCC (Rumen ciliate of Cattle) in the Zoology Section, Department of Biology, Faculty of Science, Ege University (ZSBEU) (3), Bornova, Izmir, Turkey.

DISCUSSION

Eudiplodinium dehorityi n.sp. was placed into the genus *Eudiplodinium* based on its general body size and shape and the existence of only a single skeletal. However, this species shows an evolutionary trend to the genera of *Elytroplastron* and *Polyplastron*, as evidenced by the variation in the number of contractile vacuoles, the shape of macronucleus, as well with the variations of the skeletal complex.

Eudiplodinium dehorityi n.sp. has a much smaller body size than those measurements given previously for *Elytroplastron* (100-130 μm x 76-100 μm) and *Polyplastron* (122-210 μm x 97-130 μm) and has a less developed skeletal complex (6, 7). Thus, *Eudiplodinium dehorityi* n.sp. would have to be considered as a primitive form in comparison with the other members of those two genera.

Eudiplodinium dehorityi n.sp. resembles *Eudiplodinium bovis* Dogiel (2) and *Eudiplodinium bubalus* Dehority (1) with its main morphological characteristics and by having only a single narrow skeletal plate. It is distinguished from these species by the number of contractile vacuoles (7-8 instead of 2), the posteroventral lobe is filled with carbohydrate particles and variations are seen in the skeletal complex.

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