

Occurrence of the Rumen Ciliate, *Elytroplastron bubali* (Dogiel, 1928) in Turkish Domestic Goats (*Capra hircus*)

Ahmet MERMER, Samiye RASTGELDİ, Gürsel ERGEN, Bayram GÖÇMEN

Ege Üniversitesi Fen Fakültesi Biyoloji Bölümü Zooloji Anabilim Dalı, Bornova, İzmir

SUMMARY: *Elytroplastron bubali*, previously not observed in any host animal species from Turkey, was first detected in the rumen contents of domestic goats (*Capra hircus*) in Adana with a frequency of 37.5%.

Key words: Rumen ciliates, *Capra hircus*, *Elytroplastron*, Entodiniomorpha, Turkey.

İşkembe Siliyatı *Elytroplastron bubali* (Dogiel, 1928)'nin Türkiye'deki Evcil Keçilerde (*Capra hircus*) Bulunuşu

ÖZET: Türkiye'deki herhangi bir konak hayvan türünden önceden gözlenmemiş olan *Elytroplastron bubali*, %37.5'lik bir görülme sıklığına sahip olacak şekilde Adana'daki evcil keçilerin (*Capra hircus*) işkembe içeriklerinden ilk kez belirlenmiştir.

Anahtar kelimeler: İşkembe siliyatları, *Capra hircus*, *Elytroplastron*, Entodiniomorpha, Türkiye

INTRODUCTION

Elytroplastron bubali is a single species of the genus, which was originally described as *Diplodinium (Polyplastron) bubali* by Dogiel (6) from the rumen contents of water buffalo in Georgia. When Kofoid & MacLennan (16) detected its presence in zebu cattle from India, based on several great morphological differences with the genus *Polyplastron*, i.e., the presence of the single long skeletal plate beneath the left surface instead of three short plate and also the presence of only four contractile vacuoles in a row near the dorsal midline of the body, they proposed a new genus, *Elytroplastron*, for this species.

Elytroplastron bubali is characterized by a dorsal ciliary zone (DCZ) at the anterior end of the body, two narrow skeletal plates beneath the right surface, and, unusually, a long narrow plate, beneath the left surface. There is also a small, inconspicuous, ventral plate at the anterior end of the body (6, 16, 17).

Additional hosts and localities (1-5, 12-15, 17, 18) have been determined since its descriptions by Dogiel (6) and Kofoid & MacLennan (16).

MATERIAL AND METHOD

Samples of rumen contents were obtained from 8 mature domestic goats (*Capra hircus* L.) at the slaughterhouses in Adana (Kadirli, Ceyhan) and Urfa at 10.02.1999, 28.03.1999 and 30.10.2000. The animals were allowed to graze on the

plateaus all day and fed 0.5-1 kg of wheat straw and barley fracture twice a day.

Collection, fixation, storage and counting of samples have been described in previous publications (7, 9, 10). Specimens were examined with a Jena "NF-binocular" microscope and photomicrography accessory. All measurements were made with a calibrated ocular micrometer. The terminology for orientation used in describing the structure of new ciliate species conforms to the conventional system of the ciliate kingdom proposed by Dogiel (6) and Grain (11).

Data of various morphological characteristics (i.e., the length of body [L], the width of body [W], the length to width ratio [L/W], the macronucleus length [MAL], the macronucleus width [MaW], macronucleus length to macronucleus width [MaL/MaW] and the length to macronucleus length ratio [L/MAL]) were organized using by the Excel (Microsoft Office XP) program. Identification of the genus *Elytroplastron* and the species *Elytroplastron bubali* was based mainly on the descriptions of Dogiel (6), Kofoid & MacLennan (16) and Ogimoto & Imai (17).

RESULTS AND DISCUSSION

During the course of a study on the rumen ciliate fauna of Turkish domestic goats, an unusual rumen protozoan for Turkish rumen ciliate fauna was observed and has subsequently been identified as *Elytroplastron bubali*. This species was detected only in the rumen contents of eight domestic goats sampled from two areas, Adana and Urfa, in southeast Anatolia, i.e., the frequency of appearance is 37.5%. Samples of rumen contents that observed the species are from the same area, Adana.

The percentage distributions of *Elytroplastron bubali* in the rumen contents of three goats were determined as 1.06%, 2.01% and 2.98%. Measurements of 103 specimens of *Elytroplastron bubali* are presented in Table 1.

Table 1. Dimensions of *Elytroplastron bubali* from rumen contents of goats in Adana, Turkey. L (length), W (width), L/W (length to width ratio), MaL (macronucleus length), MaW (macronucleus width), MaL/MaW (macronucleus length to macronucleus width) and L/MaL (length to macronucleus length ratio) [n= 103; SE= standard error; SD= standard deviation].

Characteristics	Range	Mean	SD	SE
[L]	95.50-170.10	132.66	17.67	1.74
[W]	40.30-116.50	88.11	12.54	1.23
[MaL]	46.60-114.20	81.39	17.98	2.54
[MaW]	9.30-21.00	14.10	3.11	0.44
[L/W]	1.20-1.80	1.51	0.11	0.01
[MaL/MaW]	3.33-9.50	5.90	1.31	0.19
[L/MaL]	1.33-2.40	1.66	0.23	0.03

The average size of the cells in this study was just slightly shorter than that observed by Dogiel (6) and Kofoid & MacLennan (16), but the length to with ratio was similar to that of Dogiel's (6) and Kofoid & MacLennan's (16) specimens.

Elytroplastron bubali closely resembles *Polyplastron multivesiculatum* that is also determined in this study. *E. bubali* is smaller than *P. multivesiculatum* (95-170 µm long compared with 114-180 µm), but it is most easily identified from this by the arrangement of the three main skeletal plates. The single, long plate beneath the left surface of *Elytroplastron bubali* is replaced in *Polyplastron multivesiculatum* by three short plates. The skeletal complex of these species are similar only in the viewpoint of the right side plates. There is a row of four contractile vacuoles near the dorsal midline and near the macronucleus in *E. bubali*. This situation resembles the dorsal row of vacuoles in *P. multivesiculatum*. However, there are additional vacuoles in *P. multivesiculatum*.

Elytroplastron bubali is found Japanese cattle but not in Japanese sheep or goats (14), and in cattle but not water buffalo from Indonesia (12), Thailand (13), and Philippines (18). However, it is found in Indian cows, sheep, goats and buffalo (1, 2, 6), an in Brazilian cattle and water buffalo (3, 4). This species is also determined in Japanese serow (15) and the hindgut of the capybara (5). Although the rumen ciliate fauna of the domestic sheep and cattle was studied in detail (8-10), the species was firstly observed from any host species living in Turkey.

The presence of *Elytroplastron bubali* in only domestic goats in Turkey is difficult to explain, since the domestic sheep and cattle are shared the same geographical area. However, one important conclusion that can be drawn from this study is that the species *E. bubali* is host-specific for goats in Turkey.

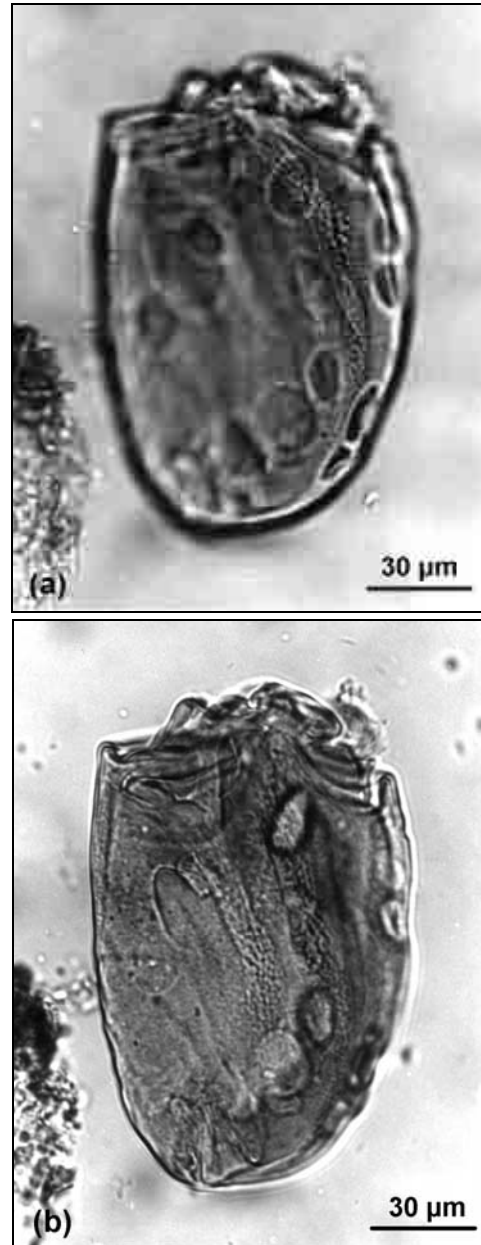


Figure 1. Photomicrographs of : *Elytroplastron bubali* (a, b). Cells stained and fixed with methyl geen-formalin-saline (MFS) solution (Both photomicrographs taken from the left side). (a): Cell focused left surface, (b): Cell focused right surface.

REFERENCES

1. Banerjee AK, 1955. Studies on Parasitic Ciliates from Indian Ruminants. *Proc Zool Soc Bengal*, 8(2): 87-101.
2. Das Gupta M, 1935. Preliminary Observations on the Protozoan Fauna of the Rumen of Indian Goat, *Capra hircus* Linn. *Arch Protistenkd*, 85: 153-172.
3. Dehority BA, 1979. Ciliate Protozoa in the Rumen of Brazilian Water Buffalo, *Bubalus bubalis* L.. *J Protozool*, 26: 536-544.
4. Dehority BA, 1986. Rumen Ciliate Fauna of Some Brazilian Cattle: Occurrence of Several Ciliates New to the Rumen Including the Cycloposthid *Parentodinium africanum*. *J Protozool*, 33: 416-421.

5. **Dehority BA**, 1987. Rumen Ophryoscolecid Protozoa in the Hindgut of the Capybara (*Hydrochoerus hydrochoeris*). *J Protozool*, 34 (2): 143-145.
6. **Dogiel VA**, 1928. La Faune d'infusoires Habitant l'estomac du Buffle et du Dromadaire. *Ann Parasitol Hum Comp*, 6: 323-338.
7. **Göçmen B**, 1999. *Ophryoscolex* Stein, 1858 (Protozoa: Ciliophora: Entodiniomorphida) Cinsi Hakkında Morfolojik ve Taksonomik Araştırmalar. *Doğa-Tr. J. of Zoology*, 23 (Ek sayı 2): 397-427.
8. **Göçmen B, Torun S, Öktem N**, 1999. Türkiye Evcil Koyun (*Ovis ammon aries*)'larının İşkembe Siliyat (Protozoa:Ciliophora) Faunası Hakkında Bir Ön Çalışma: II-Familya Ophryoscolecidae (Entodiniomorphida). *Doğa-Tr. J of Zoology*, 23 (Ek sayı 2): 473-490.
9. **Göçmen B, Dehority BA, Talu GH, Rastgeldi S**, 2001. The Rumen Ciliate Ophryoscolecid (Entodiniomorphida) and Isotrichid (Trichostomatida) Fauna of Domestic Sheep (*Ovis ammon aries*) from the Turkish Republic of Northern Cyprus. *J Eukaryot Microbiol*, 48 (4), 455-459.
10. **Göçmen B, Dehority BA, Rastgeldi S**, 2003. Ciliated Protozoa in the Rumen of Turkish Domestic Cattle (*Bos taurus L.*). *J Eukaryot Microbiol*, 50(2): 104-108.
11. **Grain J**, 1994. Infusoires Ciliés (Ordre des Entodiniomorphida). *Traité de Zoologie*, Grasse, P. (Ed.), 2 (2): 327-364.
12. **Imai S**, 1985, Rumen Ciliate Protozoal Fauna of Bali Cattle (*Bos Javanicus domesticus*) and Water Buffalo (*Bubalus bubalis*) in Indonesia, with the Description of a New Species, *Entodinium javanicum* sp. n. *Zool Sci*, 2 (4): 591-600.
13. **Imai S, Ogimoto K**, 1984, Rumen Ciliate Protozoal Fauna and Bacterial Flora of Zebu Cattle (*Bos indicus*) and the Water Buffalo (*Bubalus bubalis*) in Thailand. *Jpn J Zootech Sci*, 55 (8): 576-583.
14. **Imai S, Katsuno M, Ogimoto K**, 1979. Type of the Pattern of the Rumen Ciliate Composition of the Domestic Ruminants and the Predator-Prey Interaction of Ciliates. *Jpn J Zootech Sci*, 50 (2): 79-87.
15. **Imai S, Abe M, Ogimoto K**, 1981. Ciliate Protozoa from the rumen of Japanese Serow, *Capricornis crispus* (Temminck). *Jpn. J Vet Sci*, 43(3): 359-367.
16. **Kofoed CA, MacLennan RF**, 1932, Ciliates from *Bos Indicus* Linn. II. A Revision of *Diplodinium* Schuberg, *Univ. Calif. (Berkeley) Publ Zool*, 37: 53-153.
17. **Ogimoto K, Imai S**, 1981. Atlas of Rumen Microbiology. Japan Scientific Societies Press, Tokyo, p.231.
18. **Shimizu M, Kinoshita M, Fujita K, Imai S**, 1983. Rumen Ciliate Protozoal Fauna and Composition of the Zebu Cattle, *Bos indicus* and Water Buffalo, *Bubalus bubalis*, in Philippines. *Bull Nip Vet Zootech Col*, 32:83-88.