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Preliminary Investigation on Buxtonella sulcata (Jameson, 1926) (Ciliphora: Trichostomatidae) in Egyptian Ruminants

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***Buxtonella sulcata* (Jameson, 1926) is an intestinal protozoan of large ruminants, with scanty information and contradictious reports about its pathogenesity. This work aimed to investigate the prevalence rate of *B. sulcata* in Egypt. Forty eight cases collected from cattle (n= 29) and buffaloes (n= 19) from El-Mahalla El-Kubra area, Al-Gharbiya province. Samples were examined for the presence *B. sulcata.* The overall infection rate was 41.6% (20/48), in cattle 48.2% (14/29) and in buffalo 31.5% (6/19). This is the first study on *B. sulcata* in Egyptian ruminants also highlights the situation of intestinal ciliates of ruminant animals and provides basic information for the future work of intestinal ciliates of animals and man.**

Buxtonella sulcata (Jameson, 1926) is a ciliate protozoon inhabiting the large intestines of cattle and buffaloes. The presence of *B.sulcata* in cattle and buffaloes feces have been reported from many countries (Tomoczuk *et al.,* 2005; Al-Saffar *et al.,* 2010; Jiménez *et al.,* 2010).

Controversy views about the pathogencity of *B. sulcata* are still present. Becker (1932); Lapage (1956) assumed its commensal nature, but other reports (e.g. Tomczuk *et al.,* 2005; Gőz *et al.,* 2006; Al-Saffar *et al.,* 2010) claimed the association of high incidence and intensity of *B. sulcata* with diarrhea in cattle.

Buxtonella sulcata is usually misdiagnosed with *Balantidium coli* (Malmsten, 1857) another intestinal ciliate which according to our knowledge is the only known pathogenic ciliate for animals and man. *B. coli* main host is swine (Wenyon, 1926; Levine, 1985), but it could infect other animal species (Headley *et al.,* 2008).

Due to all following causes; this work aimed to determine the prevalence of *B. sulcata* in cattle and buffaloes in Egypt; (1) the morphological similarity in-between *B. sulcata* and *B. coli* trphozoites and cysts as shown earlier (Rees, 1931; Lynn, 2008); (2) the difficulty of staining and cultivation of *B. coli* and other ciliates; the routine diagnosis of intestinal ciliates infection is by coprological examination which has doubtful results and require experience (Schuster and Ramirez-Avila, 2008; Ndao, 2009); (3) consequently the possibility of misidentification of the intestinal ciliate which could found in different animal's feces as *B. coli* even if it is the first cite in the host species is present (Ponce-Gordo *et al.,* 2008).

Material and methods

Study Area and samples. During spring, 2012; fecal samples were collected from a total of 48, cattle (n=29) and buffaloes (n=19) in El-Mahalla El-Kubra area, Al-Gharbiya province. Each sample labeled individually; preserved immediately after collection in separate plastic containers with neutral formalin 10% and transferred to the lab for further examination.

Laboratory examination. Samples were processed for morphological examination by formalin-ethyl ether concentration method (Garcia, 1999); wet mounts from sediments were stained with Lugol's iodine 5% and examined under light microscope at high magnification. Identification and classification of *B.sulcata* was done according to Rees (1930); Lapage (1956); Lynn (2008).

Results

Out of 48 examined fecal samples, 20 (41.6%) were positive, of which 14 cattle out of 29 (48.2%) and 6 buffaloes out of 19 (31.5%) found to be infected with *Buxtonella sulcata*.

Buxtonella sulcata observed cysts were round in diameter ranging between 68 - 120 µm (with a mean of 84 µm), with obviously seen large nucleus (macronucleus) and in front of a smaller clearly seen round one (micronucleus) (Figs. 1 and 3 A), clear cyst wall of encysted trophozoites could be seen even without staining (Fig. 1 A). While, *B. sulcata* vegetative forms were few, oval in shape, sized 84-120µm in length x 60-90µm in width (with an average of 120 x 84 µm). The whole body covered by clear long cilia (Figs. 2 and 3 B). Kidney shape macronucleus and a smaller micronucleus were also observed. The characteristic grooves (Fig.3 B), cytopyge and cytostome located at the

posterioventral position (Figs. 2 B and 3 B) were also noticed.

Discussion

The total percentage of infection among all examined samples was 41.6%, being higher than recorded before from calves in Turkey (Gőz *et al.,* 2006); cattle from Iraq (Ala-Saffar *et al.,* 2010), %) and cattle in Korea (Hong and Youn, 1995), but much lower than findings of Hayashi *et al.,* 1971 in Japan (64 %).

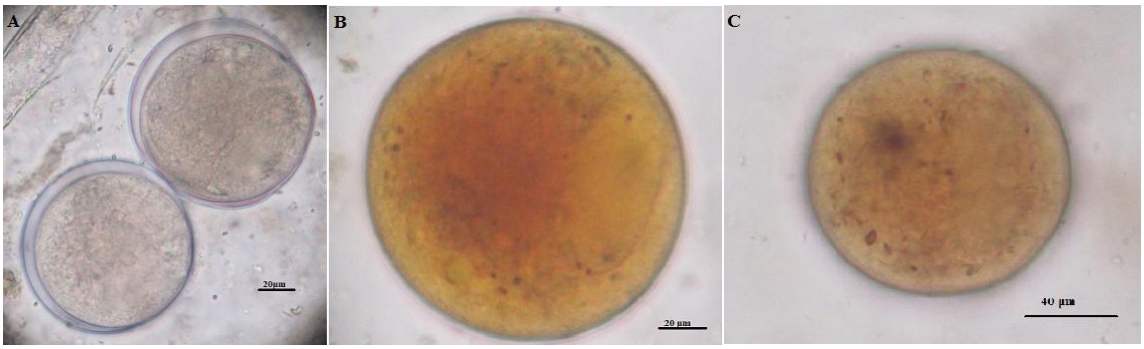

Fig. (1): *Buxtonella sulcata* cyst.
A: Unstained. Note the clear cyst wall, and the macronucleus which appears in the upper cyst.
B: Stained, note the kidney shape macronucelus.
C: Stained, note the round clear micronuclus in front of the macronucleus.

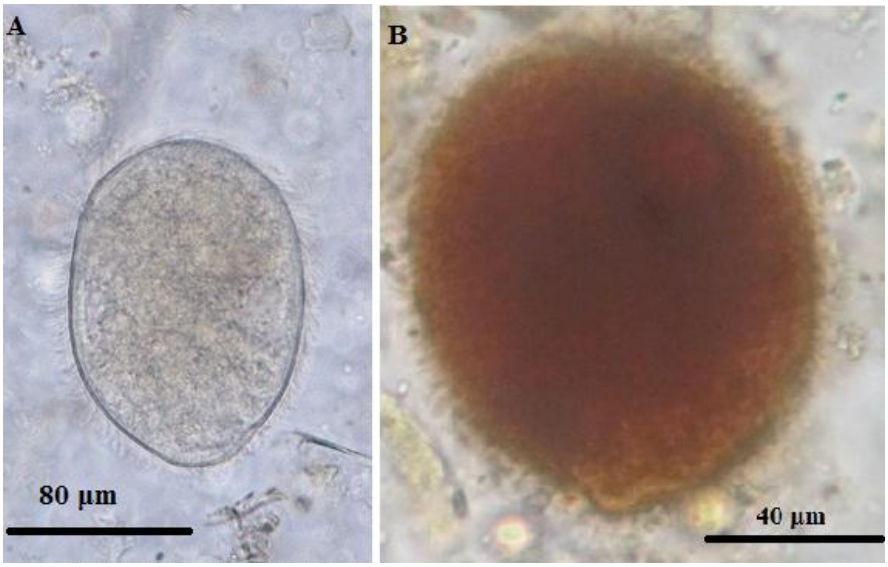

Fig. (2): *Buxtonella sulcata* trophozoites. **A:** Unstained, note the cilia.
B: Stained, note the cilia, two openings in the posterior end.

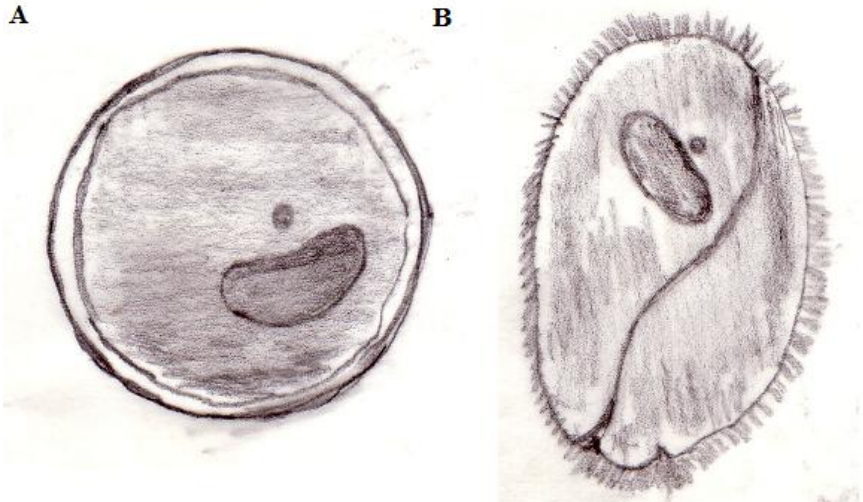

Fig. (3): Hand drawing of *Buxtonella sulcata*. **A:** Cyst. **B:** Trophozoite.

This variation in the percentage of infection with *B. sulcata* in-between these studies and the current work could be attributed to many factors including environmental, mangemental and immunological factors of the examined animals, in accordance to Al-Saffar *et al.,* (2010). Also, a seasonal variation of the percentage of infection with *B.sulcata* was observed before (Hong and Youn, 1995). The higher incidence of *B. sulcata* in examined cattle than in buffaloes found in this study disagrees with the results of Lubinsky, (1957); Mamatha and Placid, (2006).

The morpho-metrical results of the trphozoites and cysts of *B.sulcata* in this study are in agreement with other previous studies (Rees, 1931; Hayashi *et al.,* 1971; Al-Saffar *et al.,* 2010). The most obvious morphological character of the trophozoites is the presence of a curved groove (Fig. 3 B) which runs from the anterior end to the posterior end (Rees, 1930; Kudo, 1931).

Buxtonella sulcata is frequently found during the fecal examination of animals to reveal infection with gastrointestinal parasites (Jiménez *et al.,* 2010). The intestinal ciliates found in ruminant commonly identified as *B. coli* (Cooper and Gulati, 1926; Bilal, *et al.,* 2009); or *B. sulcata* (Rees, 1931; Becker, 1932; Lapage, 1956; Tomczuk *et al.,* 2005; Gőz *et al.,* 2006; Al-Saffar *et al.,* 2010). While in camels the taxonomy and identification of ciliate species in the intestinal tract is not clear, as some authors identify the intestinal species as *B. coli* (Abubaker *et al.,* 2000), others identified it as *Infindubilorum cameli* (Levine, 1985).

Levine (1985) suggested that the species present in ruminants (i.e. cattle, buffaloes, camels) is actually *B. sulcata*; this view is supported by our results and other works done on cattle and buffaloes (Lubinsky, 1957;Tomczuk *et al.,* 2005; Gőz *et al.,* 2006; Al-Saffar *et al.,* 2010), and the view of (Ponce-Gordo *et al.,* 2008) who stated that"it is a common mistake on identifying any ciliates in feces of animals as *B. coli"*.

Concerning the pathogencity of *B. sulcata,* it is controversial either it is a commensal or pathogeneic as it was noticed that high intensity of *B. sulcata* was associated with diarrhoea in ruminants (Yaşar Gőz *et al.,* 2006; Al-Saffar *et al.,* 2010), but it is not clear if it is a real cause of dirrhoea or not.

Urman and Kelly (1964) reported a case of dead cow with ulcerative colitis, histological examination showed presence of blood cells and debris within the food vacuole of *B. sulcata* invaded the epithelium and sub-epithelial layers of colon, but they did not accuse *B. sulcata* as a cause of death or colitis. Later, Tomczuk *et al.,* (2005) claimed that *B. sulcata* has similar behavior to *B .coli* as a cause of diarrhoea in cattle. *Balantidium* spp. could produce balantidial dysentery in man and diarrhoea in animals (Wenyon, 1926; Levine, 1985; Ponce-Gordo *et al.,* 2008), meanwhile, the pathogenesis of balantidial dysentery is not fully understood (Schuster and Ramirez-Avila, 2008).

The differentiation between the cyst stages of *B. sulcata* and *B. coli* is difficult due to overlapping in size and the absence of characteristic feature especially in aged cysts, the most frequently stage found is cyst, which complicates the differentiation.

In conclusion, this preliminary repot highlights the situation of *B. sulcata* in Egypt. Further and excessive study to identify the exact species of intestinal ciliates in different ruminant animals and clarify its nature are required and encouraged.

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