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A New Finding of *Dermocystidium* - like Spores in the Gut of Cultured *Oreochromis niloticus*

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Abstract: The present study describes a new species of the genus *Dermocystidium* that isolated from the intestine of cultured *Oreochromis niloticus* inhabiting some aquatic resources particularly Lake Burullus, Egypt. This species lacks a typical nucleus and has a large central vacuole with a diameter 11.4±0.9×11.6±3.3 µm and vacuolated peripheral bodies embedded within tipped cytoplasmic area with dimensions 1.7±0.7×1.0±0.8 µm. They are surrounded by double and single membrane respectively. The reported spores are investigated microscopically, photographed, sketched, measured and compared with previous related ones.

Key words: *Dermocystidium* · Spores · Intestine · *Oreochromis niloticus*

INTRODUCTION

The composition of genus *Dermocystidium* Pérez, 1908 have long been unclear [1]. It belongs to order Haplosporidia as reported by [2]. The adult stage consists of a polynuclear plasmodium that encysts and produces spores by division into many parts. Different species of this order such as *D. branchialae* Léger infected the gills of brook trout (*Salmo fario*), *D. gasterostei* Elkan parasitized on the caudal fin, cysts also occur in the cornea of the eye, some of them being deeply embedded between the skull bones, close to the brain capsule. *D. percae* Reichenbach Klinke produces globular spores in the cutis of perch *Perca fluviatilis*, especially at the fins, the head and the belly at the border of the operculum. *D. vedovikyi* Jirovec, spores produced white globular knots at the gills of pike *Esox lucius* [2]. [3] isolated *D. pusula* Pérez, 1908; *D. cyprinid* [5] from the gills of common carp in Europe, *D. branchiale* [6] occurring in the gills of *Salmo trutta* Fario in Europe.

Species reported by [3] were divided according to their morphology and types of infection. *D. branchiale* [6] multinuclear cysts found usually in the skin or gills of fish. *D. salmonis* Davis, 1947 cysts on gills of *Oncorhynus tshawytscha*. This is a first report on this parasite from the intestine of cultured *Oreochromis niloticus* in Egypt.

MATERIALS AND METHODS

Oreochromis niloticus collected from some aquatic sites (Lake Burullus and fish farms in Kafr El-Shiekh governorate). The specimens were dissected and the length and body weight were measured. The individuals were measured about 5 - 22.5 cm in total length and weighed 10-153g. Fresh preparations of intestine were examined. Squashed portions and content of the intestine of the fish, were placed in 70 % ethyl alcohol and freshly examined by light microscopy. The detected spores were photographed, illustrated, measured and compared with previous reported and related species.

RESULTS

Typical spores of genus *Dermocystidium* were isolated from the intestine of *Oreochromis niloticus*. The following is a detailed description of the obtained spores.

Description (Figs. 1-4, A-D): Typical spores are globular with circular body of a mean diameter about 15.9-16.3 (16.1±0.2) µm in length and width 7.0-17.6 (14.1±8.0) µm (Table 1). They have cytoplasmic area appeared as thick narrow peripheral layer with a thickness about 4.3±0.9 µm. Spores lack a nucleus and have double internal-envelope

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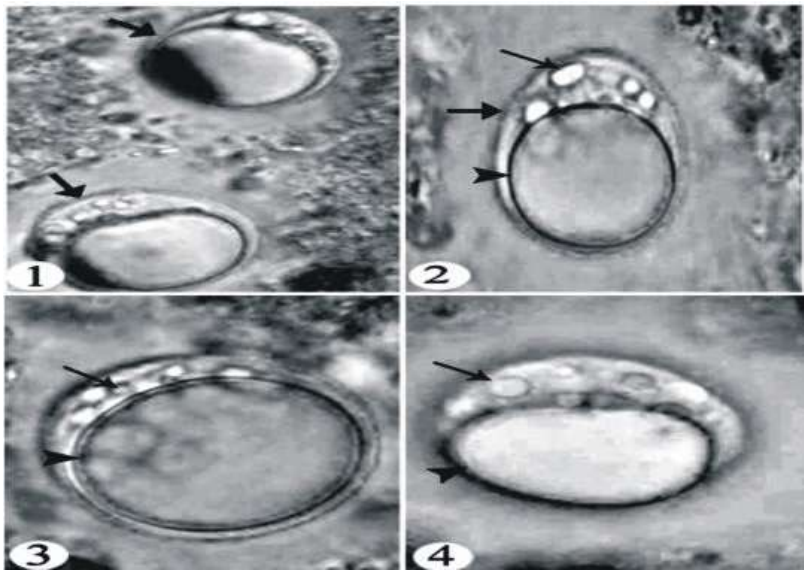
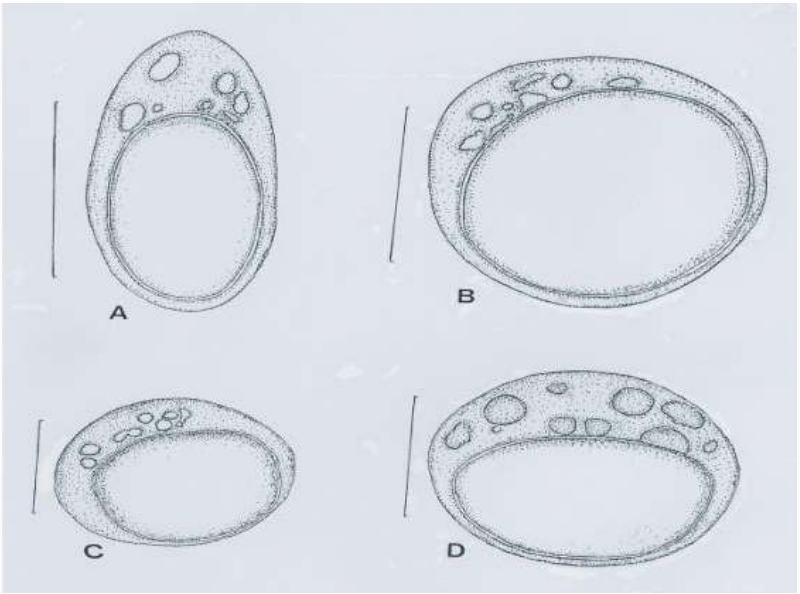
Table 1: Mmeasurements (in µm) of spores of *D. aegyptiacus* from the intestine of Nile tilapia *Oreochromis niloticus*. Size range (mean±standard deviation)

Spore body Length x Width	A large central vacuole diameter	Vacuolated peripheral bodies	Cytoplasmic area thickness
15.9-16.3 (16.1±0.2) x 7.0-17.6 (14.1±8.0)	10.3-12.4 (11.4±0.9) x 5.9-14.6 (11.6±3.3)	0.5-2.4 (1.7±0.7) x 0.2-0.9 (1.0±0.8)	3.1-5.5 (4.3±0.9)



Figs. 1-4: Fresh preparations of intestine of *Oreochromis niloticus* show spores of *Dermocystidium aegyptiacus* at different microscopically views. Note the spherical spore (thick arrow) with a large central vacuole (arrowhead), x1500. (1) arrows refer to thick-wall of typical spores. (3, 4) show peripheral vacuolated bodies with different sizes in cytoplasmic area (arrows) and internal wall of the central vacuole is surrounded by thick membranous like-shape (arrowheads).



Figs. A-D: *D. aegyptiacus* of a typical stage found in the intestine of *O. niloticus*. Scale bar-10 µm.

membrane. Cytoplasm contains small vacuoles of different shape, number and size are round and embedded within the preferable cytoplasmic area. The small vacuoles measured about 1.0±0.8 µm in size. It seems that, the spore distinguished by a peripheral outer small layer and thick inner membranous like shape. A thick compact membrane surrounds the large central vacuole appeared as empty space characteristic this stage of the spore with a diameter (11.4±0.9×11.6±3.3) µm in size.

Taxonomic Summary:

Type host: Nile tilapia *Oreochromis niloticus* Linnaeus, 1757

Type locality: Fish farms particularly at Lake Burullus

Site of infection: Intestine

Intensity of Infection: Rare

Photosyntype: In the collection of the author

Etymology: Specific name refers to Egypt

DISCUSSION

The present spores were described from the intestinal contents of Nile tilapia *(Oreochromis niloticus)*. Obviously, they do not affect the host tissue. However, other species *D. koi* [4] destroyed the skin and sub-dermal tissue of koi carp and goldfish [3].

Morphologically, the spores have two main layers. The outer is cytoplasmic area contained vacuoles-like shape. Their plasmodia disrupted and probable released out into intestinal lumen with its content. The plasmodia stages of *Dermocystidium* species have a most usual behavior of nucleus and early stages have an ordinary nucleus. *Dermocystidium* represents a unique case when a stage of the life cycle of eukaryote lacks a typical nucleus. Therefore, it may be postulated that the typical spores of this parasite be suitable to describe at this stage [1].

Lom and Dyková [3] reported that *Dermocystidium* is depositary for protistan organisms of uncertain taxonomic affinities often relegated to unspecified groups of lower fungi with spherical stages and similar to present spores and *D. koi* designated as spores having common large central vacuole. It concludes that the present spores may also of uncertain taxonomic state although their morphology is seemly *Dermocystidium*.

The present species has a globular form measured 16.1×14.1 µm in size compared with available previous species (Table 1). These spores are relatively similar in shape with *D. koi*, *D. branchiae* and *D. percae* [3], however, they have larger size. In conclusion, size and shape of large vacuole, type host and infection site are necessary as basic taxonomic characteristics of the present species. Finally, the present parasite is different from previous species therefore, it can be considered as a new species under name *Dermocystidium aegyptiacus*.

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