

## A *DERMOCYSTIDIUM* INFECTION IN *TRICHOMYCTERUS* SP. (OSTEICHTHYES, TRICHOMYCTERIDAE)

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### Summary :

Two whitish elongate cysts in the left pectoral fin of *Trichomycterus* sp. (Osteichthyes, Trichomycteridae) were packed with *Dermocystidium* sp. spores. The spores were spherical and had a large PAS positive central refractile body, the cytoplasm being restricted to a narrow peripheral layer containing the nucleus. The cysts were surrounded by a thin homogeneous wall of parasite origin, and there was no encapsulation of the cysts by host tissue.

**KEY WORDS :** *Dermocystidium* sp., *Trichomycterus* sp., fish, protozoa, Brazil.

### Résumé : INFECTION DE *TRICHOMYCTERUS* SP. (OSTEICHTHYES, TRICHOMYCTERIDAE) PAR *DERMOCYSTIDIUM*

Deux kystes blanchâtres et allongés, observés dans la nageoire pectorale gauche de *Trichomycterus* sp. (Osteichthyes, Trichomycteridae) sont pleins de spores de *Dermocystidium* sp. Les spores sont sphériques et ont un gros corps central, opaque et PAS positif. Le cytoplasme des spores est réduit à une mince couche périphérique contenant le noyau. Les kystes sont enveloppés par une paroi mince et homogène, d'origine parasitaire. Il n'y a pas d'encapsulation des kystes par les tissus de l'hôte.

**MOTS CLÉS :** *Dermocystidium* sp., *Trichomycterus* sp., poissons, protozoaires, Brésil.

## INTRODUCTION

*Dermocystidium* is a genus of either protistan or fungal organisms of uncertain taxonomic affinities (Allen *et al.*, 1968; Pauley, 1967; Lom & Dyková, 1992). They have spherical stages (spores) with a large central refractile body. The cytoplasm, with the nucleus, is restricted to a narrow peripheral layer. There are a number of descriptions of the occurrence of *Dermocystidium* on several fish species, both farmed (Hedrick *et al.*, 1989; Wootten & McVicar, 1982; Nash *et al.*, 1989; Molnár & Sovényi, 1984; van de Moer *et al.*, 1987; Landsberg & Paperna, 1992; Ghittino *et al.*, 1981) and wild (Olson *et al.*, 1991; Pauley, 1967; Allen *et al.*, 1968; Arai & Mudry, 1983; Bell & Margolis, 1976). In some cases heavy mortalities were correlated to the infection (Hedrick *et al.*, 1989; Allen *et al.*, 1968; Pauley, 1967; Cervinka *et al.*, 1974; Bell & Margolis, 1976), while in others mortality was classified as moderate (Molnár & Sovényi, 1984) or was not observed (Wootten & McVicar, 1982). Most of the species are gill or skin invading forms usually causing grossly visible cysts of different sizes and shapes, and systemic infections were also

reported although less frequently. Reviews and or lists of species can be found in Bauer (1989), Hoffman (1999), Lom & Dyková (1992) and Cervinka *et al.*, (1974). In this paper we report a *Dermocystidium* infection on the pectoral left fin of *Trichomycterus* sp. from Brazil, the first reported occurrence of the parasite in fishes from South America.

## MATERIALS AND METHODS

The infected specimen (Zoological Collection of Londrina University, reference number CZUEL 1611) of *Trichomycterus* sp. (total length: 3.8 cm) was caught at River Preto, Mauá da Serra, Paraná State, Brazil. The affected fin was fixed in buffered formalin, routinely processed for histology, sectioned at 5 µm and stained with haemalumen and eosin (H&E), Masson's trichrome (MT) or by the periodic acid-Schiff's method (PAS). Part of the cyst content was observed in wet mounts (fixed material) and examined microscopically under Nomarski phase contrast.

## RESULTS

The left pectoral fin showed the presence of two whitish elongate cysts between the fin rays measuring 2.5 and 1.6 mm long, and 0.6 mm in the widest part (Fig. 1). The cysts were thinner at the base of the fin, enlarging up to the fin border. They were

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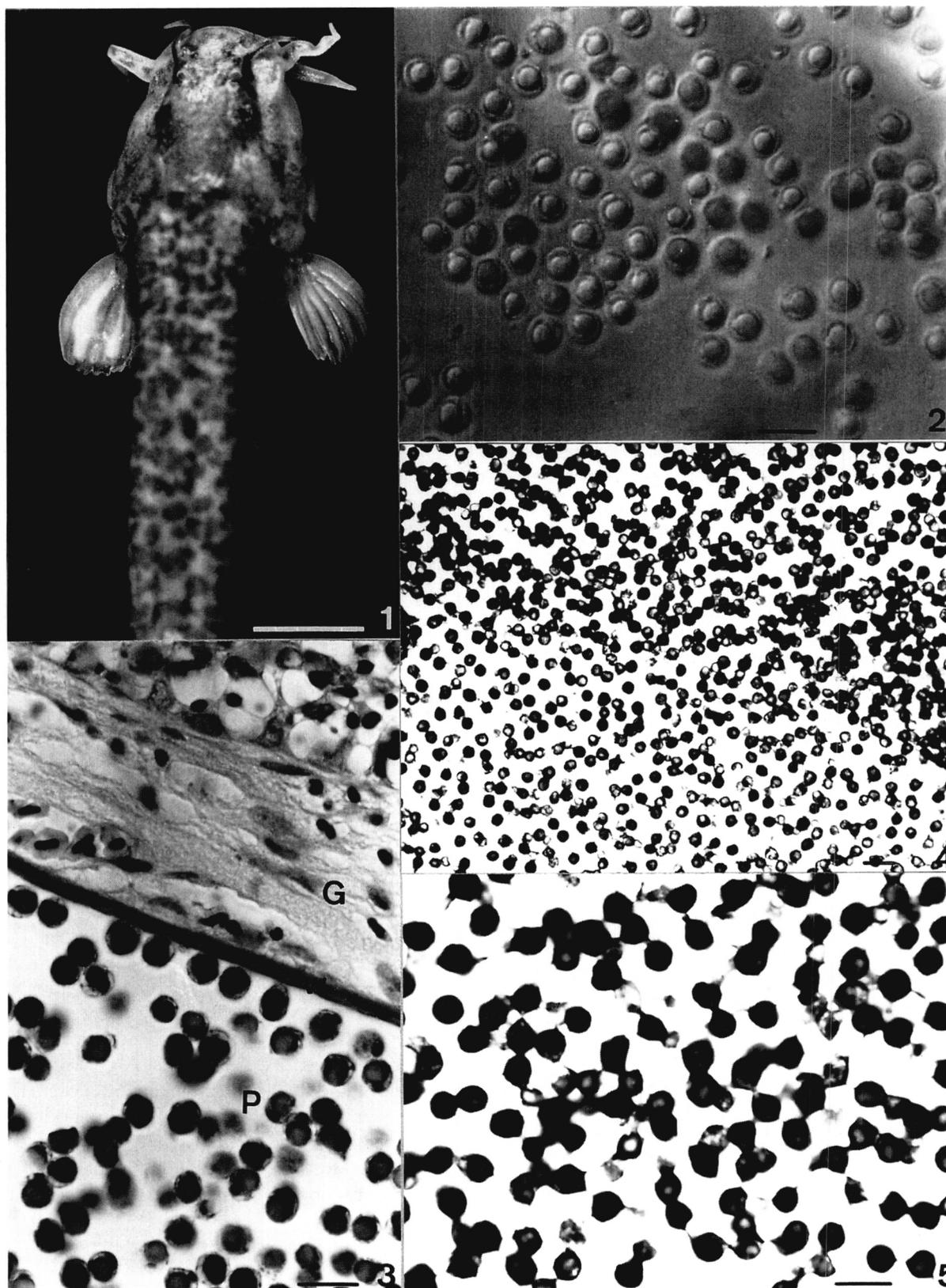


Fig. 1-5. – Infection of *Trichomycterus* sp. by *Dermocystidium* sp. 1 - *Trichomycterus* sp. Note the two whitish, elongate cysts in the left pectoral fin (bar = 3 mm); 2 - *Dermocystidium* sp. spores (fixed material). Nomarski phase contrast (bar = 10  $\mu$ m); 3 - Details of the cyst. Note the cyst wall (w) and the fine granular material in the dermis (g). The parasitic cells (p) show a large central body (H & E, bar = 10  $\mu$ m); 4 - Section of the cyst showing two types of spores, smaller (s) and larger (l) (H & E, bar = 10  $\mu$ m); 5 - Formations apparently composed by the condensation of fine granular material (PAS, bar = 10  $\mu$ m).

full of spherical spores, 5.0 to 9.5  $\mu\text{m}$  in diameter (fixed material) having a large central refractile body which occupied up to about 90 % of the spore volume. The cytoplasm was restricted to a narrow peripheral, lightly staining layer containing a small, compact nucleus (Fig. 2). The portion of cytoplasm containing the nucleus was thicker than the opposite one. Apparently all the spores were in the same developmental stage. Histologically the cyst, which was located under the dermis, was enveloped by a thin homogeneous eosinophilic one layer hyaline wall, 2-3  $\mu\text{m}$  thick, apparently of parasite origin (Fig. 3). Small amounts of homogeneous eosinophilic staining material were observed in some places of the wall inner surface but not forming a continuous layer. There was not a noticeable reaction of the host tissue to the cyst, and encapsulation by connective tissue was not observed. Between the dermal fibers there was some fine granular material which was more abundant near the cyst apex. The structure of the epidermis was normal.

The cyst was full of loosely packed spores. Two categories of spores could be distinguished (Fig. 4). In the central part of the cyst the spores were smaller (3.0-5.5  $\mu\text{m}$  diameter), had a central body sometimes poorly defined, and the cytoplasm, nucleus and central body were weakly stained by Haemalumen and Eosin. The other spores, filling most of the cyst, were bigger (5.0-8.0  $\mu\text{m}$ ). Their central body was more evident and deeply stained, and the nuclei and cytoplasm were more clearly seen. Both types were PAS positive but the smaller spores were not so deeply stained as the bigger ones. The two different sized spores were observed only in the median sections of the cysts, the superficial ones showing only big spores. Lightly staining granular material was present between the spores. In several places some poorly defined formations, composed apparently by the condensation of fine granular material, were observed. The arrangement of these formations suggests that they constituted partitions disposed in an irregular network (Fig. 5).

After the present description was completed eight specimens out of 23 (34.7 %) were found infected in the fins. The cysts were smaller and thinner than the described one. They were elongate and, in one case, ring-like shaped. The number of cysts per fin varied between one and three, and they were more common in ventral and pectoral fins. Location of the cysts in dorsal and tail fins was observed only in two specimens.

## DISCUSSION

Taking into account the shape of the cysts (thinner at the base of the fin and enlarging towards the fin border), it is assumed that the cyst formation initiated in the base of the fin. The spores

within the cysts conform to the characteristics of *Dermocystidium* spp. as described for different fish species by several authors (Elkan, 1962; Pauley, 1967; Cervinká *et al.*, 1974; Wootten & McVicar, 1982; Molnár & Sovényi, 1984; Ghittino *et al.*, 1981), e.g., spores with a large central body and peripheral cytoplasm containing the nucleus. Spores with these characteristics were interpreted as infective mature spores, being the final product of a developmental sequence involving the formation and subsequent breakdown of a plasmodium (Elkan, 1962; Cervinká *et al.*, 1974). In our material a plasmodium was not observed but the substance lining the interior side of the cyst wall may constitute the remnants of the plasmodium. The formations composed by the condensation of fine granular material observed in some places may correspond to the residue of interstitial matrix coagulating on the surface of the spores. However, their disposition is strongly similar to the septa-like structures described and depicted by Cervinká *et al.* (1962). Therefore it has to be considered also they may represent the remnants of partitions forming a network of chambers enclosing the individual plasmodia, as described by those authors for *D. cyprini* infecting *Cyprinus carpio*.

The two types of spores observed correspond presumably to different stages of maturity. The different intensity of the PAS positive reaction of the spores supports this conclusion and was also interpreted by Elkan (1962) as resulting from different maturity stages of the spores. In spite of the two different, but similar maturity stages observed, and taking into account that no other cell types or developmental stages were observed in the cysts, it can be assumed that the parasite development was almost accomplished and the observed cyst structure represents the late stage of infection.

The thin hyaline wall surrounding the spores is similar to the ones described for other species in thickening and staining properties. However, the present cyst wall has only one discernible layer and not two as described for *Dermocystidium* sp. infecting the eel (Wootten & McVicar, 1982). Furthermore, great differences exist between our observations and previous descriptions of skin and gill *Dermocystidium* species, because a host tissue reaction is not observed in the present material. A well defined connective tissue capsule around the cysts is a common feature of dermocystidiosis (Molnár & Sovényi, 1984) and was described, as well as hypertrophy of the gill epithelium, for several species in different hosts (Wootten & McVicar, 1982; Molnár & Sovényi, 1984; Pauley, 1967; Ghittino *et al.*, 1981; Allen *et al.*, 1968.). In our material that does not happen, in spite of the late stage of infection represented by the cyst, and the only host tissue modifica-

tion was the presence of fine granular material between the connective fibers of the dermis.

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