Short Communications

Dermocystidium koi found in skin lesions in koi carp (*Cyprinus carpio*)

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DERMOCYSTIDIUM koi is an uncommon infection that produces raised swellings up to 10 mm in diameter in the skin of koi (*Cyprinus carpio*). The condition was first reported by Hoshina and Sahara (1950). The genus of Dermocystidium has been used as a repository for protistan organisms of uncertain classification. Morphologically they feature spherical spores containing a large central vacuole or refractile body with the cytoplasm and nucleus restricted to the narrow periphery. A recent report has offered new evidence of the fungal nature of *D koi* and describes the histopathology of the lesions and suggests the process of growth of hyphae and spore development (Dyková and Lom 1992). Photographs of affected fish appear in texts (Butcher 1992, Lehmann and others 1994) but there is rarely any detailed description of the clinical lesion and no effective therapy has been recommended. Surgical excision has been suggested as a method of treatment (P. W. Scott, personal communication). This article reports five cases seen over a period of 18 months and describes the clinical lesions and methods of treatment.

All five cases came from three outdoor ponds in east London. The ponds contained between 11 and 30 fish and all affected fish had been owned for between one and four years. Some lesions had been present for up to nine months but most were noticed a few days prior to examination. Only one or two fish in the ponds developed lesions at any one time and they were clinically unaffected by the disease. All cases were seen in May and June when the water temperatures were 17 to 22°C although the significance of this finding is not yet known. One pond had several goldfish (*Carassius auratus*) present but only koi were affected with the disease.

Various methods were used to treat the five reported cases. Surgical excision in four cases which had up to four lesions each was followed by parenteral antibiotics given by injection. One lesion on the caudal fin (Fig 1) required repeated debridement of the area due to deep invasion around a cartilaginous ray. In these cases, sodium chloride salt was added to the pond water at 2 g/litre (0·2 per cent) to assist wound healing. The remaining fish had 10 separate lesions on the body, most of which had ruptured, and circumstances made it impossible to debride or excise these. Only superficial removal of the strong hyphal elements for identification was performed and this fish was given oral medicated food pellets containing 0·125 per cent oxolinic acid (King British) for 20 days. A commercial antifungal product containing malachite green was added to the pondwater to minimise the spread of infection. In all cases the wounds healed uneventfully during the following 10 to 50 days leaving no visible lesions.

FIG 1: Mature lesion on tail fin rupturing to expose hyphae

D koi causes a characteristic swelling in the upper layer of the dermis with a minimum of inflammation. Gross examination of the reported cases revealed swellings as small as 2 mm in diameter but most were noticed by owners when they had reached 5 to 8 mm in size. Small lesions were raised with a smooth intact epidermal surface and had a uniform pink colour. There was little local inflammation and occasionally some oedema was seen at the edge of the swelling. In larger lesions, the fungal elements could be seen through the epidermis which became progressively thinner to a point where the mass ruptured and exposed the fungal hyphae.

Small immature lesions (Fig 2) may require histopathological examination for identification of this disease. Stained sections revealed numerous intradermal cystic lesions comprising a thin-walled hyaline capsule filled with spores and with little inflammatory reaction in the surrounding tissue (Fig 3). When the white hyphae become visible through the epidermis, their characteristic appearance allows diagnostic identification. Confirmation is possible by microscopic examination of a fresh sample of the fungal elements which are typically strong white hyphae of varying thickness (Fig 4). These aseptate hyphae are filled with spores which are released in their hundreds from the broken ends and were about the size of an erythrocyte on a fresh wet preparation (Fig 5). A sample of the mature lesion in Fig 1 was fixed in 10 per cent formal saline and measurements of spores revealed the average diameter to be 11·45 µm (range 8·89 to 14·6 µm, sd = 1·15 µm) (n = 100). This agrees with the size given by Hoshina and Sahara (1950) (6·3 to 14·4 µm) and Dyková and Lom (1992) (11·08 µm, range 6·5 to 15 µm, sd = 2·01 µm).

The lesions conformed with published descriptions of *D koi* and differ from *D ershowi* in shape and size of the cyst which also affects the skin of carp (Garkavi and others 1980) and in the shape and location of *D cyprini* which is found on the gills of carp (Červinka and others 1974).

Culture of three samples did not prove successful despite trans-

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FIG 2: An immature lesion on operculum with hyphae barely visible (scale in mm)

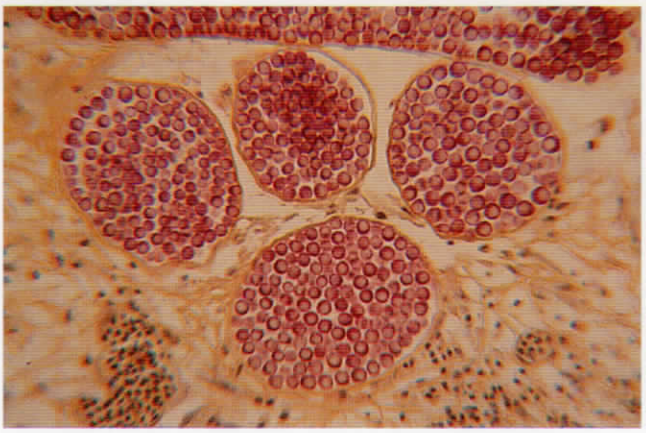

FIG 3: Histopathological section through hyphae (PAS x 400)

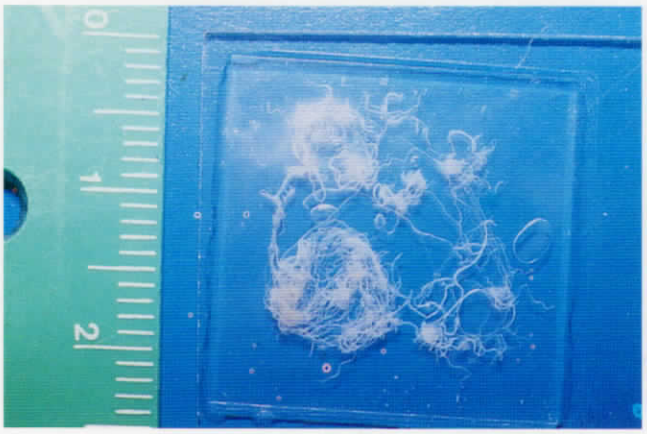

FIG 4: Strong thick white hyphae plucked from a lesion (scale in mm)

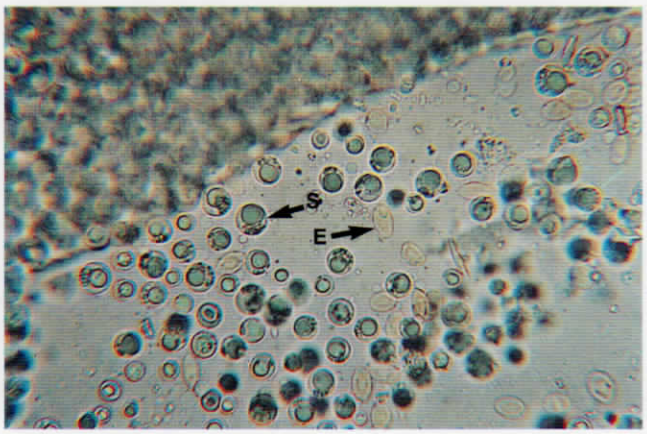

FIG 5: Spores released from hyphae in fresh specimen (E arrow = erythrocyte, S arrow = spore, x 400)

porting the fungus on Sabouraud's agar and a modified Sabouraud's agar (Dermafyt Test plates; Kruuse).

Little is known about the epidemiology or the life cycle of the fungus involved but, of the four surgical cases, one was excised as an immature lesion and no further cases developed in the pond. Another case was debrided after it had ruptured but was followed the next year by two new cases. The non-surgical case with ruptured lesions and antifungal pond treatment resolved without further cases. This suggests that excision alone of immature lesions may be effective in limiting further cases, whereas ruptured lesions releasing spores require some environmental treatment with an antifungal agent to control the disease.

From the limited number of cases seen it would appear that *D koi* is not fatal nor does it significantly affect the health of fish although the release of large numbers of spores may have some, as yet unobserved effect. Treatment may not be essential although surgical excision and debridement of the lesions was also seen to improve the rate of recovery. Antibiotic treatment is advised to reduce the risk of secondary bacterial infection of the open lesions.

It is hoped that the information presented here will assist visual identification of *D koi* and will help further studies of this disease.

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Abstracts

Treatment of limb skin defects in dogs and cats with distant skin flaps

THE treatment of large skin defects on the distal limbs of dogs and cats can be difficult, owing to the lack of local skin either for primary wound closure or for the formation of skin flaps. Ten dogs and four cats were treated by the use of pedicle skin flaps from the thorax or abdomen which closed the wounds with full thickness skin and gave a satisfactory cosmetic result. The technique allowed 100 per cent of the wound to be covered in 10 of the animals, and more than 95 per cent of the skin flap survived in 12 of them. The most common complications were infection and partial dehiscence of the suture line, but they did not detract from the final outcome. The flaps were released in either one or two stages, and both procedures were equally satisfactory.

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