Helminths of the Red-knobbed Coot (Fulica cristata) from Barberspan, Republic of South Africa

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sin). Sporozoites were formed by globular bodies in sporocysts. Mature sporozoites were acid fast stained with a Ziehl-Neelsen acid fast procedure (Luna, 1960, Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology, McGraw-Hill Book Company, New York, p. 220); developing sporozoites were not acid fast. Representative sections are deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, USA (Accession No. 79046).

On transmission electron microscopy (Fig. 2) the oocyst wall fractured in numerous places. The sporocyst wall was bivalved (i.e., contained two sutures). When collapsed the sporocyst wall coiled upon itself (Fig. 2, lower sporocyst). Sporulating or mature sporozoites were present within most sporocysts. Nuclear material in the sporozoite had no nuclear membrane (Fig. 2).

In 1984 a new family, Calyptosporidae, was established for coccidians that possess sporulated oocysts within tissues of their poikilothermic hosts, have sporocysts which lack Stieda bodies, and require invertebrate intermediate hosts (Overstreet et al., 1984, J. Protozool. 31: 332–339). Two genera are presently in this family, i.e., *Calyptospora* and *Goussia*. Both genera possess oocysts with four sporocysts, but differ in the fact that (1) sporocysts of *Calyptospora* are covered with a thin veil supported by sporopodia and those of *Goussia* either lack a veil or if they have a veil lack supporting sporopodia and (2) sporocysts of *Calyptospora* have a membrane-covered apical opening with one associated suture while those of *Goussia* have no apical opening and have two sutures. The organism in this case report has features of *Goussia*. The lack of a veil places it in the subgenus *Goussia*. Although study of the life cycle of this organism is needed before exact taxonomic status can be determined, this preliminary report establishes the fact that *Goussia*-like organisms can be found in non-picine definitive hosts. Sporulated coccidian oocysts have been noted in crocodiles previously (Griner, 1983, Pathology of Zoo Animals, Zoological Society of San Diego, San Diego, California, p. 88), but no morphologic features were given. In addition oocysts similar to the ones reported in this case have been seen by one of us (CG) in internal organs of gavials (*Gavialis gangeticus* Gmelin, 1789).

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The red-knobbed or crested coot (*Fulica cristata*) is a sedentary species which is distributed widely throughout the Ethiopian region of Africa (Voous, 1960, Atlas of European Birds, Vol. 6, Thomas Nelson and Sons, London, p. 87). It is the most abundant waterbird at Barberspan in the western Transvaal (Milstein, 1975, Ostrich Suppl. 10: 1–74; Skead and Dean, 1977, Ostrich Suppl. 12: 3–42) where it is a regular breeder.

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In contrast to the North American and European species of coots, its helminth fauna is poorly known. Porter (1938, Pub. S. Afr. Inst. Med. Res. 8: 1–492) reported *Echinostoma fulicae* and *Bilharzia polonica* from this species in the Republic of South Africa and Solomon (1932, J. Helminthol. 10: 209–230) reported three species of cestodes from "coots" in Kenya. The cestodes recorded, however, were characteristic of grebes and were probably from *Podiceps* (Hudson, 1933, J. East Afr. Uganda Nat. Hist. Soc. 49–50: 205–217). *Polymorphus minutus* and *Fillicollis anatis* have been recorded also from *F. cristata* (see McDonald, 1969, Catalogue of helminths of waterfowl (Anatidae), U.S. Fish and Wildl. Serv. Spec. Sci. Rep. Wildl. No. 126, Washington, D.C., 692 pp.) but apparently neither infection was recorded from Africa.

Seven adult coots, injured during live-trapping operations for waterfowl at Barberspan during November and December of 1978, were examined. The birds were killed with chloroform and the digestive tracts removed. The esophagus, proventriculus, gizzard, intestine and caeca were separated, opened and both the lining and contents examined stereomicroscopically for helminths. The nasal sinuses, trachea, lungs and air sacs were searched also for helminths. Nematodes were fixed in hot 70% ethanol and stored in a mixture of 5% glycerine in 70% ethanol. Platyhelminths were fixed in 5% formalin and stored in 70% ethanol. Nematodes were cleared prior to examination by slow evaporation of alcohol and studied as temporary mounts in glycerine. Platyhelminths were stained in acetocarmine and examined as permanent mounts. Representative specimens have been deposited in the Canadian National Museum of Natural Science: *C. oculeum* NMCP 1986-0025, *D. brevis* NMCP 1986-0026 and *Notocotylus* sp. NMCP 1986-0024.

Six of the seven coots harbored specimens of at least one species of helminth. Of the five different helminths found only two, *Cyclocoelum oculeum* and *Diorchis brevis*, could be identified to species. Specimens of *Notocotylus* sp. were immature and specimens of both *Tetrameres* and *Capillaria* consisted only of females and hence specific identification was not possible. Species of these three genera are common parasites of coots elsewhere. The intensity of infection ranged from one to 11 helminths per coot.

Diorchis brevis was found in four coots and the intensity ranged from one to eight cestodes per bird. Two specimens from one coot were gravid and had fully formed eggs in the uterus. The rest were immature and ranged from specimens with a scolex and a few proglottids to nearly gravid forms still bearing the sterile terminal proglottid. The prepatent period of *D. brevis* is not known, but it ranges from 10 to 15 days in other diorchid species (Dobrokhotova, 1971, Trudy Inst. Zool. Alma-Ata 31: 67–73; Egizbaeva and Erbolatov, 1973, *In* Zhiznennye Tsikly Gel'mintov Zhivotnykh Kazakhstana (Sbornik), Alma-Ata, Akad. Nauk Kazakh. SSR: 101–108; Stradowski, 1973, Acta Parasitol. Pol. 21: 349–357) which suggests that the immature specimens had been acquired recently under local conditions.

Three coots had digenean infections. One coot harbored four ovigerous specimens of *C. oculeum* in the nasal sinus. Two other coots had one and two immature specimens of *Notocotylus* in the caeca. According to Roode (1967) (quoted in Milstein, 1975, op. cit.) no live molluscs occur in Barberspan, however these are present in the surrounding river systems. Hence, transmission of digeneans in the pan itself apparently is not possible although local foci may occur nearby. Movement between Barberspan and other local waterbodies apparently is an important factor in the acquisition of digeneans.

One coot harbored two ovigerous specimens of *Tetrameres*. As these were mature, there was no way to determine whether they may have been acquired locally. However, a number of ducks harboring immature specimens of *Tetrameres* were found also suggesting that local transmission may be possible (McLaughlin, unpubl. data). A single ovigerous specimen of *Capillaria* was found in the caecum of one coot and, as this genus has a direct life cycle, local transmission is clearly possible.

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Helminth Fauna of Beaver from Central Texas

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The beaver, *Castor canadensis*, is distributed throughout most of North America, ranging from Canada and Alaska to northern Mexico (Hill, 1982, *In* Wild Mammals of North America, J. A. Chapman and G. A. Feldhamer (eds.), Johns Hopkins University Press, Baltimore, Maryland, pp. 256–281). While the helminth fauna of beaver is well documented in the northern latitudes by at least 16 studies from Canada, the northern United States (reviewed by Bush and Samuel, 1981, *In* Proc. First Worldwide Furbearer Conf., J. A. Chapman and D. Pursley (eds.), R. Donnelley and Sons Co., Falls Church, Virginia, pp. 678–689), and Alaska (Babero, 1953, J. Parasitol. 39: 674–675), there is little information on the helminth fauna of this host from the more southern regions of its range. The present study was initiated to examine the helminth community of a beaver population from central Texas.

Thirty-six beaver were collected with Conibear traps from five counties (Bell, Bosque, Freestone, Limestone, and Navarro) representing a 12,721-km^2 area in central Texas within a 120-km radius of Waco, Texas during 1981–1982. The area is characterized by hilly and broken topography interspersed with large numbers of small permanent to intermittent streams many of which have been modified to form small impoundments. The streams are the lesser tributaries of two major and nonconfluent drainage systems in the area, the Brazos River and Trinity River. These impoundments have created suitable habitat for beaver and the area now supports a sizable population derived from original endemic stock. This area is considered to have the highest density of beavers in the state of Texas and landowners often complain of damage to their reservoirs and adjacent croplands. Beaver examined in this study were collected from impoundments on both drainage systems and in response to damage complaints by landowners to the Texas Rodent and Predatory Animal Control Service.

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