

The eggs of some blood-flukes (Trematoda: Schistosomatidae) from South African birds

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The eggs of three species of avian schistosomes were recovered from indigenous South African birds.

Gigantobilharzia sp. was recorded from the kelp gull, *Larus dominicanus* and the gannet, *Morus capensis*; *Austrobilharzia* sp. from *L. dominicanus*, and *Trichobilharzia* sp. from the spurwing goose, *Plectropterus gambensis*, the Egyptian goose, *Alopochen aegyptiacus* and *L. dominicanus*. The morphology of these eggs is compared to that of described species of avian schistosomes.

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Die eiers van drie voëlschistosoomspesies is in inheemse Suid-Afrikaanse voëls gevind. *Gigantobilharzia*-sp. het in die swartrugmeeu, *Larus dominicanus* en die malgas, *Morus capensis*, voorgekom; *Austrobilharzia*-sp. in *L. dominicanus*, en *Trichobilharzia*-sp. in die wildemakou, *Plectropterus gambensis* en die kolgans, *Alopochen aegyptiacus* en in *L. dominicanus*. Die morfologie van hierdie eiers word vergelyk met dié van bekende voëlschistosoomspesies.

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The trematode family Schistosomatidae includes not only the blood-flukes causing bilharziasis in man, but a large number of species which parasitize other mammals and birds. These can also be of medical importance since their cercariae have been shown in many countries to be able to penetrate human skin and elicit a form of dermatitis. In order to gain information on the occurrence of schistosomes infecting South African birds therefore, a survey was begun in 1980 in which faecal samples from many species of indigenous birds were examined for the eggs of these parasites.

The size and shape of eggs voided in stool or urine samples are routinely used for the identification of the human bilharzia parasites. Avian schistosomes are normally identified on adult morphology. In a recent survey however, Guth, Blankespoor, Reimink & Johnson (1979) used egg morphology as well as other larval characteristics to make identifications to the generic level. This contribution records the eggs of three species of avian schistosome found during this survey to date.

Materials and Methods

Bird faeces, whole droppings where possible, were collected and preserved in 5% buffered formalin. These samples were filtered through a Helminth Filter designed for schistosome eggs (Visser & Pitchford 1972) viz. with an inner filter of 95 μm and an outer filter of 50 μm . The residue in the outer filter was then examined using a dissecting microscope. Several criteria were applied in identifying an egg as that of a schistosome. These were (i) that at least a proportion of the eggs in any sample should bear a spine, (ii) that the eggs should not possess an operculum, (iii) that the eggs should be embryonated (i.e. they should contain a fully-developed miracidium) and (iv) that they should be thin-shelled. Eggs were measured to the nearest 0,1 μm \pm standard deviation.

Results

Eggs of three species of schistosome belonging to three different genera (*Gigantobilharzia*, *Austrobilharzia* and *Trichobilharzia*) have so far been recovered from faecal samples of South African birds. Where more than one species of bird was encountered roosting together, it was usually not possible to accurately determine which species was associated with the samples.

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The egg of *Gigantobilharzia* sp. is illustrated in Figure 1. It is oval, rounded at either pole and has a short, straight, terminal spine. The mean dimensions of these eggs were $125,6 \pm 11,2 \times 81,9 \pm 9,1 \mu\text{m}$ ($n=33$) and the spine was $4-10 \mu\text{m}$ in length. The conspicuous dark spot in the centre of the egg is probably the neural mass of the miracidium inside. A hatched, ciliated miracidium is shown in Figure 2. *Gigantobilharzia* sp. eggs were found being voided in the faeces of kelp gulls, *Larus dominicanus* from the Little Manzimtoti lagoon south of Durban and either *L. dominicanus* or Hartlaub's gull, *Larus hartlaubii* from Hout Bay and Vishoek on the Cape Peninsula. They were also found in faeces of Cape gannets, *Morus capensis* stranded in the Durban area. Eggs from both *L. dominicanus* and *M. capensis* were included in measurements cited above.

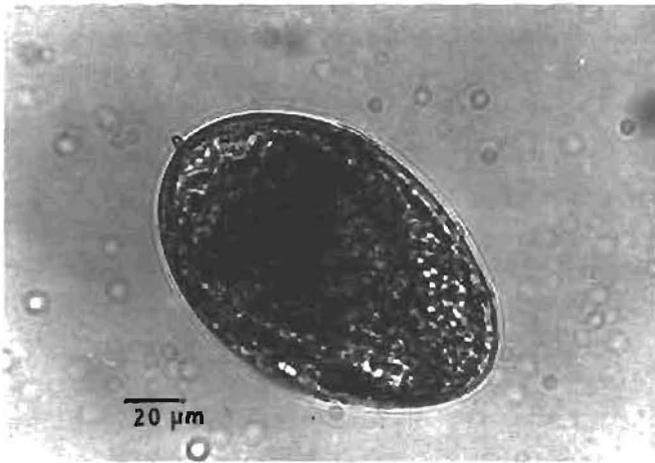


Figure 1 The egg of *Gigantobilharzia* sp. from *Larus dominicanus* from the Little Manzimtoti lagoon.

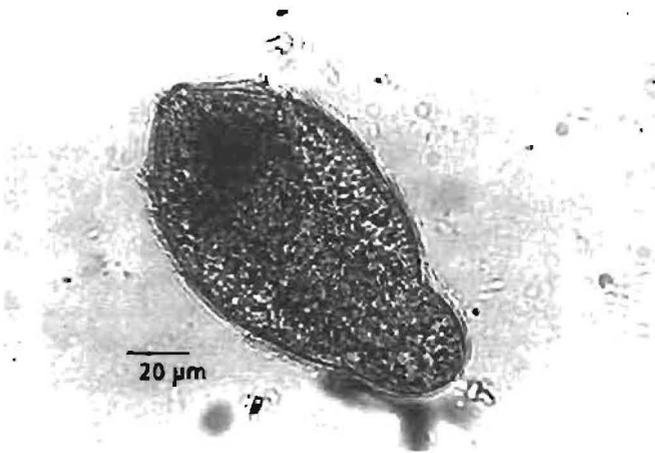


Figure 2 The hatched, ciliated miracidium of *Gigantobilharzia* sp. from *Larus dominicanus*.

The egg of *Austrobilharzia* sp. is almost spherical with a spine which is $5-15 \mu\text{m}$ long and sometimes hooked (Figure 3). This egg measured approximately $80,0 \pm 8,9 \times 74,2 \pm 8,6 \mu\text{m}$ ($n=12$) and closely resembles that of *Austrobilharzia terrigalensis* Johnston, 1917, from Australia. They were found in the faeces of *L. dominicanus*

from the Umgeni estuary and Little Manzimtoti lagoon on the Natal coast and also from Port Elizabeth.

The egg of *Trichobilharzia* sp. is elliptical to lanceolate with a prominent terminal spine which was usually hooked (Figure 4). The mean dimensions of these eggs were $122,2 \pm 11,1 \times 61,9 \pm 7,9 \mu\text{m}$ ($n=27$) and the spine measured $5-15 \mu\text{m}$. *Trichobilharzia* sp. eggs have been found in the faeces of spurwing geese, *Plectropterus gambensis* from Barberspan (Western Transvaal) and Durban, also Egyptian geese, *Alopochen aegyptiacus* from Barberspan and *L. dominicanus* from Port Elizabeth.

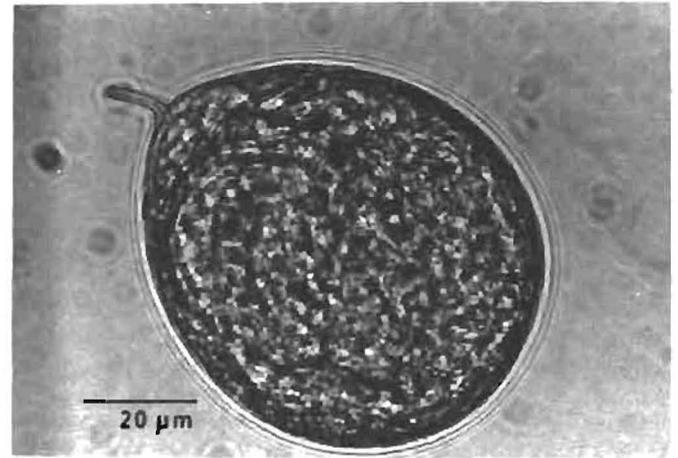


Figure 3 The egg of *Austrobilharzia* sp. from *Larus dominicanus* from the Umgeni estuary.

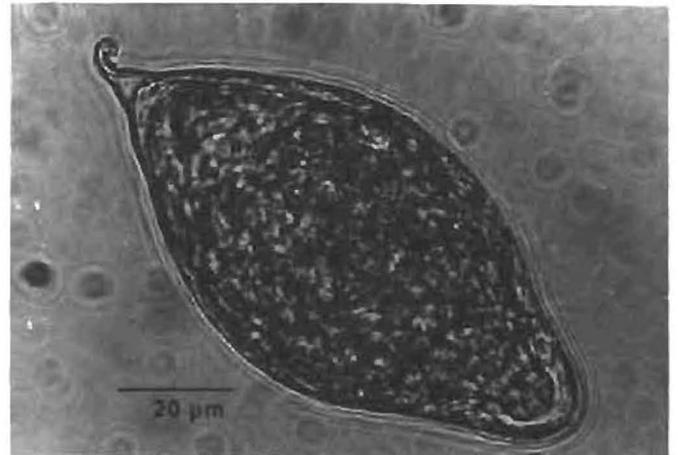


Figure 4 The egg of *Trichobilharzia* sp. from *Plectropterus gambensis* from Durban.

Discussion

Little is known of the avian schistosomes of Africa. The 17 named species so far reported from this continent are listed in Table 1. The descriptions given by Fain (1955, 1956) were, however, often incomplete and based on small numbers of specimens, sometimes of one sex only and with no knowledge of the rest of the life-cycle.

The *Gigantobilharzia* eggs found in the faeces of *Larus dominicanus* and *Morus capensis* during the present study differ in size and shape from those of three species

Table 1 Avian schistosomes recorded from Africa

Species	Definitive host	Locality	Source	
<i>Macrobilharzia baeri</i>	Reed cormorant	<i>Phalacrocorax africanus</i>	Rwanda	Fain 1955
<i>Ornithobilharzia canaliculata</i>	Sooty gull	<i>Larus hemprichii</i>	Red Sea	Witenberg & Lengy 1967
	Kelp gull	<i>Larus dominicanus</i>		
<i>Trichobilharzia anatina</i>	Yellowbill duck	<i>Anas undulata</i>	Rwanda	Fain 1955
<i>T. aureliani</i>	Great crested grebe	<i>Podiceps cristatus</i>	Rwanda	Fain 1956
	Dabchick	<i>Podiceps ruficollis</i>	Rwanda	Fain 1956
<i>T. berghei</i>	Yellowbill duck	<i>Anas undulata</i>	Rwanda	Fain 1955
<i>T. duboisi</i> ^a	Dwarf goose	<i>Nettapus auritus</i>	Rwanda	Fain 1959
<i>T. nasicola</i> ^a	Yellowbill duck	<i>Anas undulata</i>	Rwanda	Fain 1955
<i>T. rodhaini</i> ^a	Hadedah	<i>Hagedashia hagedash</i>	Rwanda	Fain 1955
<i>T. schoutendeni</i>	White backed duck	<i>Thalassornis leuconotus</i>	Rwanda	Fain 1955
<i>T. spinulata</i> ^a	Spurwing goose	<i>Plectropterus gambensis</i>	Rwanda	Fain 1955
	Egyptian goose	<i>Altopochen aegyptiacus</i>		
<i>Bilharziella polonica</i>	Coot	<i>Fulica cristata</i>	Transvaal	Porter 1938
<i>Gigantobilharzia ardeolae</i>	Squacco heron	<i>Ardeola rolloides</i>	Madagascar	Fain 1960
<i>G. nettapi</i>	Dwarf goose	<i>Nettapus auritus</i>	Rwanda	Fain 1960
<i>G. plectropteri</i>	Spurwing goose	<i>Plectropterus gambensis</i>	Rwanda	Fain 1960
<i>G. tantali</i>	Wood stork	<i>Ibis ibis</i>	Rwanda	Fain 1960

^aFrom nasal veins

previously recorded from gulls; *Gigantobilharzia huttoni* (Leigh 1953) from the USA (egg described by Leigh 1955), *Gigantobilharzia lawayi* Brackett, 1942 (redescribed by Farley, 1963) from Canada and *Gigantobilharzia monocotylea* Szidat, 1930, from Germany. They compare well, however, in both shape and size, with those of an unidentified species of *Gigantobilharzia* recovered from the silver gull, *Larus novaehollandiae* on the Great Barrier Reef in Australia by Rohde (1978).

As noted earlier, the spherical eggs attributed to *Austrobilharzia* from *Larus dominicanus* are similar to those of *A. terrigalensis* described from *L. novaehollandiae* from Australia by Bearup (1956) but now believed to have a more cosmopolitan distribution (Farley 1971). Another schistosome of marine birds that has spherical or near spherical eggs and which might occur in South Africa is *Ornithobilharzia canaliculata* (Rudolphi, 1819). This is a very widely distributed parasite, but is known from Africa only in the sooty gull, *Larus hemprichii* and *L. dominicanus* from the Red Sea (Witenberg & Lengy 1967).

It is noteworthy that the eggs of *Trichobilharzia*, a freshwater genus recorded here from spurwing and Egyptian geese and from kelp gulls, were voided in the faeces. This indicates that the adult worms inhabit the veins of the birds' mesentery and thus excludes the possibility of their representing one of the four species of *Trichobilharzia* described from the veins of the nasal fossae of birds in Central Africa by Fain (1955, 1959). These eggs also differ from those of *Trichobilharzia* spp. which inhabit the mesenteric vein of birds and whose eggs were described by Fain (1955, 1956). The present material may represent a new species.

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References

- BEARUP, A.J. 1956. The life-cycle of *Austrobilharzia terrigalensis* Johnston, 1917. *Parasitology* 46: 470–479.
- BRACKETT, S. 1942. Five new species of avian schistosomes from Wisconsin and Michigan with the life-cycle of *Gigantobilharzia gyrauli* (Brackett, 1940). *J. Parasit.* 28: 25–42.
- FAIN, A. 1955. Recherches sur les schistosomes d'oiseaux au Ruanda-Urundi (Congo belge). *Rev. Zool. Bot. Afr.* 51: 373–387.
- FAIN, A. 1956. Les schistosomes d'oiseaux du genre *Trichobilharzia* Skrjabin et Zakharow, 1920, au Ruanda Urundi. *Rev. Zool. Bot. Afr.* 54: 147–178.
- FAIN, A. 1959. Un nouveau schistosome du genre *Trichobilharzia* dans les fosses nasales du canard nain. *Rev. Zool. Bot. Afr.* 55: 227–232.
- FAIN, A. 1960. Nouveaux schistosomes d'oiseaux du genre *Gigantobilharzia* Odhner. *Ann. parasit. hum. comp.* 35: 292–304.
- FARLEY, J. 1963. A redescription of *Gigantobilharzia lawayi* Brackett, 1942. *J. Parasit.* 49: 465–467.
- FARLEY, J. 1971. A review of the family Schistosomatidae: excluding the genus *Schistosoma* from mammals. *J. Helminthol.* 45: 289–320.
- GUTH, B.D., BLANKESPOOR, H.D., REIMINK, R.L. & JOHNSON, W.C. 1979. Prevalence of dermatitis-producing schistosomes in natural bird populations of lower Michigan. *Proc. helminthol. Soc. Wash.* 46: 58–63.
- JOHNSTON, S.J. 1917. On trematodes of Australian birds. *J. Proc. R. Soc. N.S.W.* 50: 187–261.
- LEIGH, W.M. 1953. *Cercaria huttoni*, sp. nov., a dermatitis-producing schistosome larva from the marine snail, *Haminoea antillarum guadalupensis*. *J. Parasit.* 39: 625–629.
- LEIGH, W.M. 1955. The morphology of *Gigantobilharzia huttoni* (Leigh 1953) an avian schistosome with marine dermatitis-producing larvae. *J. Parasit.* 41: 262–269.

- PORTER, A. 1938. The larval trematoda found in certain South African Mollusca with special reference to schistosomiasis (bilharziasis). *Publ. S. Afr. Inst. med. Res.* 8: 1–492.
- ROHDE, K. 1978. The bird schistosome *Gigantobilharzia* sp. in the silver gull, *Larus novaehollandiae*, a potential agent of schistosome dermatitis in Australia. *Search* 9: 40–42.
- RUDOLPHI, C.A. 1819. Entozoorum synopsis cui accedunt mantissa duplex et indices locupletissimi X+ 811 pp.
- SZIDAT, L. 1930. *Gigantobilharzia monocotylea* n. sp., ein neuer Blutparasit aus Ostpreussischen Wasservögeln. *Z. Parasitenk.* 2: 583–588.
- VISSER, P.S. & PITCHFORD, R.J. 1972. A simple apparatus for rapid recovery of helminth eggs from excreta with special reference to *Schistosoma mansoni*. *S. Afr. med. J.* 46: 1344–1346.
- WITENBERG, G. & LENGY, J. 1967. Redescription of *Ornithobilharzia canaliculata* (Rud.) Odhner, with notes on classification of the genus *Ornithobilharzia* and the sub-family Schistosomatinae (Trematoda). *Israel J. Zool.* 16: 193–204.