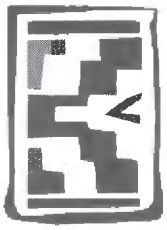

A checklist of helminths from the respiratory system and gastrointestinal tracts of African Anatidae

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ABSTRACT

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A literature survey revealed that 72 helminth species, including 14 known only to the generic level, had been reported from the digestive or respiratory tracts of 28 species of Anatidae in Africa. Most of the digeneans and nematodes reported, were cosmopolitan species that occur in a range of hosts. However, two groups of cestodes, one consisting of cosmopolitan or Eurasian species and the other consisting of species restricted mainly to sub-Saharan Africa, were apparent. A host-parasite list and a detailed parasite-host list provide the synyonomies related to African records, the host and geographical distribution of each species, and the authority and country of origin for each record.

Keywords: African, Anatidae, checklist, gastrointestinal tracts, helminths, respiratory system

INTRODUCTION

Members of the order Anseriformes are hosts to a diverse fauna of helminth parasites (Gohar 1934, 1935; Gower 1939; LaPage 1961; McDonald 1969). Although they are well studied in North American, European and Asian species, comparatively little is known of the helminth fauna of Anseriformes in other parts of the world. This is particularly true of Africa, where the helminth fauna of waterfowl have received little attention. With the exception of a study by Woodall (1977), all the records of helminth infections in waterfowl are based on small numbers of hosts included in more general surveys, on case reports, or on experimental infections in life-history studies. These reports are widely scattered throughout the literature and many are difficult to acquire. The need to consolidate the information on helminth infections in African waterfowl became apparent during a study of the intestinal helminths of Anatidae at Barberspan, South Africa.

Coverage in this checklist is restricted to helminths found in the respiratory and the gastrointestinal tracts. Appleton (1982) listed the schistosome species reported from African birds, including several species from waterfowl. Additional information on schistosome infections in anatid hosts can be found in Sakala (1979), Appleton & Eriksson (1983) and Appleton (1986). Bennett, Earle, Du Toit & Huchzermeyer (1992) provided extensive coverage of the haematozoa of African birds, including those in anatids.

The list is divided into two parts. The host-parasite list includes all helminth species found in a particular host and the country in Africa from which the record originated. Recent work has resulted in a number of changes in the taxonomy and nomenclature within the Anatidae. We have followed Sibley & Monroe (1990) throughout.

The parasite-host list includes the currently accepted scientific name, authority and site occupied within the host, if other than the intestine, and any recognized synonyms that may have been used in establishing the record. The list of synonyms, therefore, is not exhaustive. Additional information includes the host(s), localities pertinent to the particular record, and the

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author(s) responsible for each record. Where more than one record exists for a particular parasite, the authors responsible for each record are numbered, and the corresponding number is placed after each host name. Where records exist for more than one locality, the locality is designated after the appropriate author. The remarks section includes explanatory comments on the particular record or on the taxonomy of the parasite where appropriate.

The list of helminth species presented here, pertains only to records from Anseriformes. Records of helminth species normally occurring in waterfowl, but reported from other African hosts, have not been included.

In addition to the records listed here, several helminths have been reported from African species held in captivity elsewhere (Viana 1924; Canavan 1931; Kreis 1953; Venn 1955; Bezubik 1956; Avery 1966; Boughton 1966; Kotecki 1970) and from species with ranges that extend beyond the Ethiopian region (Jaiswal 1957; Ali 1971; Jairajpuri & Siddiqi 1971; Boero, Led & Brandetti 1972; Pandey 1973).

HOST-PARASITE LIST

FAMILY ANATIDAE

Subfamily Anatinae

TRIBE ANATINI

Anas [acuta] acuta L., northern pintail
Sobolevicanthus octacantha (Egypt)

Anas capensis Gmelin, Cape teal
Echinocotyle capensis (South Africa)
Fimbriasacculus africanensis (South Africa)
Sobolevicanthus transvaalensis (South Africa)

Anas clypeata L., northern shoveller
Hypoderaeum conoideum (Egypt)
Cloacotaenia megalops (Egypt)
Echinocotyle birmanica (Egypt)
Hymenolepis fructifera (Egypt)
H. fruticosa (Egypt)
Hymenolepis sp. (Egypt)
Microsomacanthus abortiva (Egypt)
M. collaris (Egypt)
M. floreata (Egypt)
M. pauciannulata (Egypt)

Anas [crecca] crecca L., common teal
Hypoderaeum conoideum (Egypt)
Diorchis longicirrosa (Egypt)
Amidostomum anseris (Egypt)
Epomidiostomum querquedulae (Egypt)

Anas erythrorhyncha Gmelin, red-billed duck
Zygocotyle lunata (Madagascar)
Cloacotaenia megalops (Zimbabwe)
Diploposthe laevis (Zaire)
Fimbriasacculus africanensis (South Africa)
Microsomacanthus macrotesticulata (South Africa)

Anas [penelope] penelope L., Eurasian wigeon
Notocotylus attenuatus (Egypt)
Opisthorchis simulans (Egypt)
Epomidiostomum ncinatum (Algeria)
Echinuria uncinata (Algeria)

Anas [platyrhynchos] platyrhynchos L., mallard
Apatemon gracilis (Madagascar)
Stictodora sawakinensis (Tunisia)

Anas [platyrhynchos] platyrhynchos L. *dom.*, domestic mallard

We have included here all references to duck or duckling in which no other scientific or common name was supplied.

Echinoparyphium ralphaudyi (Egypt, Ethiopia)
E. recurvatum (Egypt)
Echinostoma fulicae (South Africa)
E. liei (Egypt)
E. revolutum (Egypt, Zaire, Zambia)
Notocotylus aegyptiacus (Egypt)
Paramonostomum aegyptiacum (Egypt)
Opisthorchis geminus (Egypt)
Pygidiopsis genata (Egypt)
Zygocotyle lunata (Madagascar, Zimbabwe)
Cloacotaenia megalops (Egypt)
Hymenolepis sp. (Egypt)
Microsomacanthus abortiva (Egypt, Nigeria)

Anas querquedula L., Garganey
Hypoderaeum conoideum (Ethiopia)
Microsomacanthus pauciannulata (Egypt)
Tetrabothrius sp. (Egypt)
Anas smithii (Hartert), Cape shoveller
Echinocotyle capensis (South Africa)

Anas sparsa Eyton, African black duck
Hymenolepis sp. (Ethiopia)
Porrocaecum crassum (Kenya)
Anas undulata DuBois, yellow-billed duck
Hypoderaeum conoideum (Ethiopia)
Diorchis longiovum (Ethiopia)
Fimbriasacculus africanensis (South Africa)
Lateriporus biuterinus (Ethiopia)
Microsomacanthus macrotesticulata (South Africa)
Retinometra longicirrosa (Ethiopia)

Anas sp.
Polymorphus minutus (Egypt)

"Wild duck" or "unidentified duck"
Mesostephanus sp. (Madagascar)
Contracaecum microcephalum (Zaire)
Zygocotyle lunata (Zaire)

TRIBE AYTHYINI

Aythya [fuligula] fuligula (L.), tufted duck
Opisthorchis simulans (Egypt)
Psilochasmus oxyurus (Egypt)

Diploposthe laevis (Egypt)
Fimbriaria fasciolaris (Egypt)

Aythya [*ferina*] *ferina* (L.), Common pochard
Capillaria obsignata (Egypt)
Netta erythrophthalma (Weid), southern pochard
Cloacotaenia megalops (Kenya)
Diploposthe laevis (Ethiopia, Kenya)
Fimbriaria fasciolaris (Kenya)
Microsomacanthus macrotesticulata (South Africa)

TRIBE CAIRININI

Cairina moschata (L.) *dom.*, Barbary domestic duck
Ascaridia galli (Zambia)
Gongylonema congolense (Zaire)
Heterakis gallinarum (Zambia)

Plectropterus gambensis (L.), spur-winged goose
Hypoderaeum conoideum (Zaire)
Opisthorchis geminus (Zambia)
Ophthalmophagus magahaesi (South Africa)
Typhlocoelum cucumerinum (South Africa)
Hymenolepis sp. (Sudan)
Hymenolepis sp. (South Africa)
Sobolevicanthus octacantha (Zaire)
Epomidiostomum uncinatum (Senegal)
Tetrameres plectropteri (Nigeria)

Sarkidiornis melanotos (Pennant), comb duck
Typhlocoelum cucumerinum (Madagascar, Zambia)
Contracaecum spiculigerum (Senegal)
Echinuria minor (Zaire)

Subfamily Tadorninae

TRIBE TADORNINI

Alopochen aegyptiacus (L.), Egyptian goose
Notocotylus aegyptiacus (Ethiopia)
Amphipetrovia biaculeata (Kenya)
Fimbriaria fasciolaris (Somalia)
Capillaria anatis (Senegal)
Polymorphus minutus (unknown)

Subfamily Dendrocygninae

TRIBE DENDROCYGNINI

Dendrocygna [*bicolor*] *bicolor* (Vieillot, 1896), fulvous whistling duck
Typhlocoelum cucumerinum (Zambia)
Diorchis sp. (Zaire)
Hymenolepis sp. A (Zaire)
Hymenolepis sp. B (Zaire)
Hymenolepis sp. (Ethiopia)

Dendrocynga viduata (L.), white-faced whistling duck
Echinostoma revolutum (Zambia)
Opisthorchis geminus (Zambia)
Hymenolepis sp. (Guinea)
Hymenolepis sp. (Senegal)
Paracamallanus sp. (Senegal)
Sublura brumpti (Senegal)

TRIBE OXYURINI

Thalassornis leuconotus Eyton, white-backed duck
Apatemon congolensis (Rwanda)

Subfamily Anserinae

TRIBE ANSERINI

Anser cinereus Meyer, domestic goose
Cercarioides baylisi (Egypt)
Hymenolepis sp. (Kenya)

Anser albifrons (Scolopi), greater white-fronted goose
Amidostomum acutum (Egypt)

Anser anser (Linnaeus), greylag goose
Amidostomum anseris (Algeria)
Epomidiostomum orispinum (Algeria)

Cygnus olor (Gmelin), mute swan
Amidostomum anseris (Sudan)

PARASITE-HOST LIST

Class Trematoda, subclass Digenea

FAMILY CYATHOCOTYLIDAE

Mesostephanus sp.

HOST: Wild duck
DISTRIBUTION: Madagascar
RECORD: Richard 1964

FAMILY STRIGEIDAE

Apatemon gracilis (Rudolphi, 1819)

HOST: *Anas platyrhynchos*
DISTRIBUTION: Madagascar
RECORD: Richard 1964

Apatemon congolensis Dubois & Fain, 1956

SYNONYM: *Apatemon gracilis congolensis* Dubois & Fain, 1956
HOST: *Thalassornis leuconotus*
DISTRIBUTION: Rwanda
RECORD: Dubois & Fain 1956

FAMILY CYCLOCOELIDAE

Ophthalmophagus magalhaesi Travassos, 1921

SYNONYM: *Ophthalmophagus plectropteri* Dubois, 1930
HOST: *Plectropterus gambensis*
DISTRIBUTION: South Africa
RECORD: Dubois 1930

Typhlocoelum cucumerinum (Rudolphi, 1809)

SYNONYM: *Monostomum sarcidiornicola* Mégnin, 1890

Typhlocoelum gambense Dubois, 1930

SITE: Trachea
HOSTS: *Plectropterus gambensis* (2)
Sarkidiornis melanotos (1, 3)
Dendrocygna bicolor (3)
DISTRIBUTION: Madagascar, South Africa, Zambia
RECORDS: 1. Mégnin 1890 (MAD)
2. Dubois 1930 (S.A.)
3. Bisseru 1957a (ZAM)
REMARKS: Dubois (1930) reported that the specimens he examined had oroginally been obtained by Theiler from the intes tine of *P. gambensis*.

FAMILY ECHINOSTOMATIDAE

Echinoparyphium ralphaudyi Lie, Heyneman, Jeyarasasingam, Mansour, Lee, Lee & Kostanian, 1975

HOST: *Anas platyrhynchos* dom.
DISTRIBUTION: Egypt, Ethiopia
RECORD: Lie, Heyneman, Jeyarasasingam, Mansour, Lee, Lee & Kostanian 1975
REMARKS: Lie *et al.* established experimental infections in a range of avian and mammalian hosts from metacercariae obtained from snails from these localities. Mouahid & Moné (1988) consider *E. ralphaudyi* a synonym of *E. elegans*.

Echinoparyphium recurvatum (Linstow, 1873)

SYNONYM: *Echinostoma recurvatum* of Azim (1930) *nec* (Von Linstow, 1873)
HOST: *Anas platyrhynchos* dom.
DISTRIBUTION: Egypt
RECORDS: 1. Sonsino 1892
2. Rysavy, Ergens, Groschaft, Moravec, Yousif & El-Has 1973
3. Moravec, Barus, Rysavy & Yousif 1974
REMARKS: Worms grown experimentally in ducks from metacercariae obtained near Cairo. Azim (1930) & Bisseru (1967) also reported *E. recurvatum* from mammals experimentally exposed to metacercariae from Egypt and Zaire, respectively. Rysavy *et al.* (1973) reported this parasite as *Echinoparyphium bioccalerouxi* Dollfus, 1953, but stated that it appeared to be the same as *E. recurvatum*. Moravec *et al.* (1974) suggested that *E. bioccalerouxi* was a synonym of *E. recurvatum*; Mouahid & Moné (1988) consider *E. bioccalerouxi* a synomym of *E. elegans*. As the record for *E. bioccalerouxi* and its taxonomic status are both questionable, we have refrained from including this species as a separate entry in this work.

Echinostoma fulicae Porter, 1921

HOST: *Anas platyrhynchos* dom.
DISTRIBUTION: South Africa
RECORD: Porter 1938
REMARKS: Experimental infection; the natural host is the red-knobbed coot, *Fulica cristata* Gmelin.

Echinostoma liei Jeyarasasingham, Heyneman, Lim & Mansour, 1972

HOST: *Anas platyrhynchos* dom.
DISTRIBUTION: Egypt
RECORD: Jeyarasasingham *et al.* 1972
REMARKS: Experimental infections derived from metacercariae obtained near Cairo. Jeyarasasingham *et al.* (1972) listed ducklings as natural and experimental hosts. However, the source of this information is not clear from their paper. Moravec *et al.* (1974) consider *E. liei* a synonym of *E. revolutum*.

Echinostoma revolutum (Froelich, 1802)

HOSTS: *Anas platyrhynchos* dom. (1, 2, 3, 4)*
Dendrocygna viduata (1)
DISTRIBUTION: Egypt, Zaire, Zambia
RECORDS: 1. Bisseru 1967 (ZAI, ZAM)
2. Haiba, Rahman & Kawasmeh 1977 (EGT)
3. Rysavy *et al.* 1973 (EGT)
4. Moravec *et al.* 1974 (EGT)
REMARKS: * Experimental infections derived from metacercariae obtained from snails in the respective localities. Bisseru (1967) established infections experimentally in a duck from metacercariae from Zaire.

Hypoderaeum conoideum (Bloch, 1782)

HOSTS: *Anas clypeata* (3)
Anas crecca crecca (3)
Anas querquedula (2)
Anas undulata (2)
Plectropterus gambensis (1)
DISTRIBUTION: Egypt, Ethiopia, Zaire
RECORDS: 1. Dollfus 1950 (ZAI)
2. Graber, Blanc & Delavenay 1980 (ETH)
3. Sakla 1985 (EGT)

FAMILY PSILOSTOMATIDAE

Psilochasmus oxyurus (Creplin, 1825)

HOST: *Aythya fuligula*
DISTRIBUTION: Egypt
RECORD: Gohar 1934
REMARKS: Original record not found; possibly attributable to Gohar who did not differentiate between personal records and those of others in the lists coled.

FAMILY PARAMPHISTOMATIDAE

Zygocotyle lunata (Diesing, 1836)

SITE: Colon, cloaca
HOSTS: *Anas platyrhynchos* dom. (1)
Anas erythrorhyncha (3)
Unidentified duck (2)
DISTRIBUTION: Madagascar, Zaire, Zimbabwe
RECORDS: 1. Mettrick 1959 (ZIM)
2. Dollfus 1963 (ZAI)
3. Richard & Daynès 1966 (MAD)

FAMILY HETEROPHYIDAE

Cercarioides baylisi Nazmi, 1930

HOST: *Anser cinereus* dom.
DISTRIBUTION: Egypt
RECORDS: Nazmi 1930

Pygidiopsis genata Looss, 1907

HOST: *Anas platyrhynchos* dom.
DISTRIBUTION: Egypt
RECORD: Kuntz & Chandler 1956

Stictodora sawakinensis Looss, 1899

HOST: *Anas platyrhynchos*
DISTRIBUTION: Tunisia
RECORD: Balozet & Callot 1938, 1939
REMARKS: Balozet & Callot (1939) provided a description of the specimens reported in their 1938 paper, but stated that they came from a wild duck. We assume that this is the same material from the same host reported in 1938.

FAMILY OPISTHORCHIIDAE

Opisthorchis geminus (Looss, 1896)

SITE: Bile ducts
HOSTS: *Anas platyrhynchos* dom. (1)
Plectropterus gambensis (2)
Dendrocygna viduata (2)
DISTRIBUTION: Egypt, Zambia
RECORDS: 1. Looss 1899 (EGT)
2. Bisseru 1957b (ZAM)

Opisthorchis simulans (Looss, 1896)

SITE: Bile ducts
HOST: *Anas penelope penelope*

Aythya fuligula

DISTRIBUTION: Egypt
RECORD: Looss 1899

FAMILY NOTOCOTYLIDAE

Notocotylus aegyptiacus (Odhner, 1905)

SYNONYM: *Monostomum verrucosum* Looss, 1896 *nec* Froelich, 1789 (in part)
Notocotyle aegyptiaca Odhner, 1905
SITE: Caecum
HOSTS: *Anas platyrhynchos* dom. (1)
Alopochen aegyptiacus (2)
DISTRIBUTION: Egypt, Ethiopia
RECORDS: 1. Odhner 1905 (EGT)
2. Dubois 1951 (ETH)
REMARKS: One of two species of *Notocotylus* recognized by Odhner (1905) in material described as *Monostomum verrucosum* Froelich, 1789 by Looss (1896).

Notocotylus attenuatus (Rudolphi, 1809)

SYNONYM: *Monostomum verrucosum* of Looss (1896) *nec* Froelich, 1789 (in part)

Notocotylus triserialis (Diesing, 1839)

SITE: Caecum
HOST: *Anas penelope*
DISTRIBUTION: Egypt
RECORD: Odhner 1905
REMARKS: One of two species of *Notocotylus* recognized by Odhner (1905) in material described as *Monostomum verrucosum* Froelich, 1789 by Looss (1896). Odhner (1905) identified these specimens as *N. triserialis* (Diesing, 1839), which is a synonym of *N. attenuatus* (Rudolphi, 1809).

Paramonostomum aegyptiacum Khalifa & El-Naffar, 1978

HOST: *Anas platyrhynchos* dom.
SITE: Caecum
DISTRIBUTION: Egypt
RECORD: Khalifa & El-Naffar 1978
REMARKS: Experimental infection. The limited success in establishing infections in ducklings led Khalifa & El-Naffar (1978) to suggest that ducks may not be the natural host of this species.

Class Cestoda

FAMILY HYMENOLEPIDIDAE

Fimbriaria fasciolaris (Pallas, 1781)

HOSTS: *Alopochen aegyptiacus* (3)
Aythya fuligula (1)
Netta erythrophthalma (2)
DISTRIBUTION: Egypt, Kenya, Somalia
RECORDS: 1. Meggit 1927 (EGT)
2. Hudson 1933 (KEN)
3. Joyeux, Baer & Martin 1936 (SOM)

Fimbriasacculus africanensis Alexander & McLaughlin (in press)

HOSTS: *Anas capensis*

Anas erythrorhyncha
Anas undulata
DISTRIBUTION: South Africa
RECORD: Alexander & McLaughlin (in press)

Amphipetrovia biaculeata (Fuhrmann, 1909)

SYNONYM: *Hymenolepis biaculeata* Fuhrmann, 1909
HOST: *Alopochen aegyptiacus*
DISTRIBUTION: Kenya
RECORD: Fuhrmann 1909
REMARKS: Czaplinski & Vaucher (1994) list *Amphipetrovia* as a synonym of *Hymenolepis* Weinland, 1858

Cloacotaenia megalops (Nitzch in Creplin, 1829)

SYNONYM: *Hymenolepis megalops* (Nitzch in Creplin, 1829)
SITE: Cloaca
HOSTS: *Anas clypeata* (1)
Anas erythrorhyncha (3)
Anas platyrhynchos dom. (1)
Netta erythrophthalma (2)
DISTRIBUTION: Egypt, Kenya, Zimbabwe
RECORDS: 1. Meggit 1927 (EGY)
2. Hudson 1933 (KEN)
3. Woodall 1977 (ZIM)

Diorchis longicirrosa Meggit, 1927

HOST: *Anas crecca crecca*
DISTRIBUTION: Egypt
RECORDS: 1. Meggit 1927
2. Mahon 1958

Diorchis longiovum Schiller, 1953

SYNONYM: *Schillerius (Diorchis) longiovum* var. *aethiopicus* Graber, Blanc & Delavenay, 1980
HOST: *Anas undulata*
DISTRIBUTION: Ethiopia
RECORD: Graber, Blanc & Delavenay 1980

Diorchis sp.

HOST: *Dendrocygna bicolor*
DISTRIBUTION: Zaire
RECORD: Baer & Fain 1955

Echinocotyle birmanica (Meggit, 1927)

SYNONYM: *Hymenolepis birmanica* Meggit, 192
HOST: *Anas clypeata*
DISTRIBUTION: Egypt
RECORD: Meggit 1927

Echinocotyle capensis McLaughlin, 1989

HOSTS: *Anas capensis*
Anas smithii
DISTRIBUTION: South Africa
RECORD: McLaughlin 1989

Hymenolepis fructifera Meggit, 1927

HOST: *Anas clypeata*
DISTRIBUTION: Egypt
RECORD: Meggit 1927

Hymenolepis fruticosa Meggit, 1927

HOST: *Anas clypeata*
DISTRIBUTION: Egypt
RECORD: Meggit 1927

Hymenolepis spp.

HOSTS: *Anas platyrhynchos* dom. (2)
Anser cinereus (4)
Anas clypeata (2)
Anas sparsa (7)
Dendrocygna bicolor (5, 6)
Dendrogygna viduata (1, 8)
Plectropterus gambensis (1, 3)
DISTRIBUTION: Egypt, Ethiopia, Kenya, Guinea, Senegal, Sudan, South Africa, Zaire
RECORDS: 1. Joyeux, Gendre & Baer 1928 (1a GUI; 1b SUD)
2. Meggitt 1930 (EGY)
3. Dubois 1930 (S.A.)
4. Hudson 1933 (KEN)
5. Fuhrmann & Baer 1943 (ETH)
6. Baer & Fain 1955 (ZAI)
7. Graber, Blanc & Delavenay 1980 (ETH)
8. Vassiliadès 1980 (SEN)
REMARKS: Meggitt (1930) considered the specimens from *A. boschas* (= *Anas platyrhynchos* dom.) and *A. clypeata* to be the same species; Joyeux *et al.* (1928), and Baer & Fain (1955) reported two species in each of their studies.

Microsomacanthus abortiva (Von Linstow, 1904)

SYNONYM: *Hymenolepis abortiva* Von Linstow, 1904
Taenia (Hymenolepis) voluta Von Linstow, 1904
SITE: Small intestine, caeca
HOSTS: *Anas platyrhynchos* (2)
Anas platyrhynchos dom. (1, 2)
Anas clypeata (2)
DISTRIBUTION: Egypt, Nigeria
RECORDS: 1. Von Linstow 1904 (NIG)
2. Meggit 1927 (EGY)

Microsomacanthus collaris (Batsch, 1786)

SYNONYM: *Hymenolepis collaris* (Batsch, 1786)
HOST: *Anas clypeata*
DISTRIBUTION: Egypt
RECORD: Meggit 1927

Microsomacanthus floreata (Meggit, 1930)

SYNONYM: *Hymenolepis pauciovata* Meggit, 1927 *nec* Fuhrmann, 1906
Hymenolepis floreata Meggit, 1930

HOST: *Anas clypeata*
DISTRIBUTION: Egypt
RECORD: Meggit 1927

Microsomacanthus macrotesticulata Alexander & McLaughlin, 1993

HOSTS: *Anas undulata*
Anas erythtrorhyncha
Netta erythrophthalma
DISTRIBUTION: South Africa
RECORD: Alexander & McLaughlin 1993

Microsomacanthus pauciannulata (Meggit, 1927)

SYNONYM: *Hymenolepis pauciannulata* Meggit, 1927
HOSTS: *Anas clypeata* (1)
Anas querquedula (2)
DISTRIBUTION: Egypt
RECORDS: 1. Meggit 1927
2. Mahon 1958

Retinometra longicirrosa (Fuhrmann, 1906)

SYNONYM: *Hymenolepis (Hymenosphenacanthus) longicirrosa* (Fuhrmann, 1906)
HOST: *Anas undulata*
DISTRIBUTION: Ethiopia
RECORD: Graber, Blanc & Delavenay 1980
REMARKS: The species *longicirrosa* Fuhrmann, 1906 was listed in the genus *Retinometra* Spassky (1955) by Schmidt (1986). Czaplinski & Vaucher (1994) consider *Retinometra* a synonym of *Cladogynia* Baer, 1938. Specimens described by Graber *et al.* have accessory sacs characteristic of the genus *Sobolevicanthus* Spassky & Spasskaya, 1954, not *Retinometra*. The rostellar hooks on the scolex fragments are cheliforme, differing from those in both *Retinometra* and *Sobolevicanthus*. Evidently the material described consists of fragments of two species, neither of which are *longicirrosa*.

Sobolevicanthus octacantha (Krabbe, 1869)

SYNONYM: *Hymenolepis octacantha* (Krabbe, 1869)
HOSTS: *Anas acuta* (1)
Plectropterus gambensis (2)
DISTRIBUTION: Egypt, Zaire
RECORDS: 1. Meggit 1927 (EGT)
2. Baer & Fain 1955 (ZAI)

Sobolevicanthus tranvaalensis McLaughlin, 1984

HOST: *Anas capensis*
DISTRIBUTION: South Africa
RECORD: McLaughlin 1984

FAMILY ACOLEIDAE

Diploposthe laevis (Bloch, 1782)

HOSTS: *Anas erythrorhyncha* (3)
Netta erythrophthalma (2, 4)
Aythya fuligula (1)
DISTRIBUTION: Egypt, Ethiopia, Kenya, Zaire
RECORDS: 1. Meggit 1927 (EGT)
2. Hudson 1933 (KEN)
3. Baer & Fain 1955 (ZAI)
4. Graber *et al.* 1980 (ETH)
REMARKS: Schmidt (1986) placed *Diploposthe* in the Acoelidae; Czaplinski & Vaucher (1994) believe that it belongs in the Hymenolepididae

FAMILY DILEPIDIDAE

Lateriporus biuterinus Fuhrmann, 1908

HOST: *Anas undulata*
DISTRIBUTION: Ethiopia
RECORD: Graber *et al.* 1980
REMARKS: Czaplinski & Vaucher (1986) believe that these specimens were misidentified and represent a hymenolepedid belonging to the genus *Hamatolepis* Spasskii, 1962.

FAMILY TETRABOTHRIIDAE

Tetrabothrius sp.

HOST: *Anas querquedula*
DISTRIBUTION: Egypt
RECORD: Mahon 1958

Phylum Nematoda

FAMILY AMIDOSTOMATIDAE

Amidostomum acutum (Lundahl, 1848)

SYNONYM: *Amidostomum skrjabini* Boulenger, 1926
SITE: Gizzard—under lining
HOST: *Anser albifrons*
DISTRIBUTION: Egypt
RECORD: Boulenger 1926

Amidostomum anseris (Zeder, 1800)

SYNONYM: *Amidostomum nodulosum* (Rudolphi, 1803)
SITE: Gizzard—under lining
HOSTS: *Anas crecca* (2)
Anser anser (1)
Cygnus olor (3)*
DISTRIBUTION: Algeria, Egypt, Sudan
RECORDS: 1. Seurat 1918 (ALG)
2. Selim, Hosney & El-Kassaby 1970 (EGT)

3. Saad, Eisa & Abdel Rasoul 1981 (SUD)

REMARKS: * Specimens from captive birds

Epomidiostomum querquedulae Boulenger, 1926

SITE: Gizzard—under lining
HOST: *Anas crecca*
DISTRIBUTION: Egypt
RECORD: Boulenger 1926

Epomidiostomum orispinum (Molin, 1861)

SITE: Gizzard—under lining
HOST: *Anser anser*
DISTRIBUTION: Algeria
RECORD: Seurat 1918

Epomidiostomum uncinatum (Lundahl, 1848)

SITE: Gizzard—under lining
HOST: *Anas penelope* (1)
Plectropterus gambensis (2)
DISTRIBUTION: Algeria, Senegal
RECORDS: 1. Seurat 1918 (ALG)
2. Vassiliadès 1980 (SEN)

FAMILY HETERAKIDAE

Heterakis gallinarum (Schrank, 1788)

SYNONYM: *Hetarakis gallinae* (Gmelin, 1790)
SITE: Caeca
HOST: *Cairina moschata* dom.
DISTRIBUTION: Zambia
RECORD: Le Roux 1934

FAMILY ASCARIDIIDAE

Ascaridia galli (Schrank, 1788)

SYNONYM: *Ascaris lineata* (Schneider, 1866)
HOST: *Cairina moschata* dom.
DISTRIBUTION: Zambia
RECORD: Le Roux 1934

FAMILY ASCARIDIDAE

Porrocaecum crassum (Deslongchamps, 1824)

HOST: *Anas sparsa*
DISTRIBUTION: Kenya
RECORD: Schmidt & Canaris 1968

FAMILY ANISAKIDAE

Contracaecum microcephalum (Rudolphi, 1809)

HOST: Wild duck
DISTRIBUTION: Zaire
RECORD: Baylis 1940

Contracaecum spiculigerum (Rudolphi, 1809)

HOST: *Sarkidiornis melanotos*
DISTRIBUTION: Senegal
RECORD: Vassiliadès 1980

FAMILY SUBULURIDAE

Subulura brumpti (Lopez-Neyra, 1942)

SYNONYM: *Allodapa suctoria* (Molin, 1860)
SITE: Caeca, small intestine
HOST: *Dendrocygna viduata*
DISTRIBUTION: Senegal
RECORD: Vassiliadès 1980

FAMILY CAMALLANIDAE

Paracamallanus sp.

HOST: *Dendrocygna viduata*
DISTRIBUTION: Senegal
RECORD: Vassiliadès 1980

FAMILY GONGYLONEMATIDAE

Gongylonema congolense Fain, 1955

SITE: Crop, oesophagus
HOST: *Cairina moschata* dom.
DISTRIBUTION: Zaire
RECORD: Fain 1955

FAMILY TETRAMERIDAE

Tetrameres plectropteri (Thwaite, 1926)

SYNONYM: *Echinurioides plectropteri* Thwaite, 1926
SITE: Not given; probably proventriculus
HOST: *Plectropterus gambensis*
DISTRIBUTION: Nigeria
RECORD: Thwaite 1926

FAMILY ACUARIIDAE

Echinuria minor Sandground, 1937

SITE: Proventriculus
HOST: *Sarkidiornis melanotos*
DISTRIBUTION: Zaire
RECORD: Sandground 1937

Echinuria uncinata (Rudolphi, 1819)

SITE: Proventriculus
HOST: *Anas penelope*
DISTRIBUTION: Algeria
RECORD: Seurat 1919

FAMILY TRICHURIDAE

Capillaria obsignata Madsen, 1945

HOST: *Aythya ferina*
DISTRIBUTION: Egypt
RECORDS: 1. Selim & El-Kassaby 1965
2. Selim *et al.* 1970

Capillaria anatis (Schrank,1790)

SYNONYM: *Capillaria retusa* (Raillet, 1893)
SITE: Caeca, small intestine
HOST: *Alopochen aegyptiacus*
DISTRIBUTION: Senegal
RECORD: Vassiliadès 1980
REMARKS: Madsen (1951) lists *C. retrusa* as a synonym of *Capillaria anatis* (Schrank, 1790)

Phyllum Acanthocephala

FAMILY POLYMORPHIDAE

Polymorphus minutus (Goeze, 1782)

HOSTS: *Anas* sp. (1)
Alopochen aegyptiacus (2)
DISTRIBUTION: Egypt
RECORDS: 1. Southwell & MacFie 1925
2. Original citation not found. The record was obtained from McDonald (1969) who did not list Africa in the distribution of this species. We assume that the infection was in a captive bird(s).

DISCUSSION

The lack of detailed studies on the helminths of African anatids and the temporal and spatial discontinuity in the work that has been done, preclude any in-depth analysis of the existing records. Nevertheless, some observations are possible and, for convenience, the records have been divided into three arbitrary groups; those of species recorded only from North Africa, those reported from North Africa and sub-Saharan Africa and those reported only from sub-Saharan regions. Seventy-two species of helminths (58 fully identified species and 14 identified only to the generic level) have been reported from the gastrointestinal or respiratory systems of 28 species of waterfowl in Africa (13 indigenous species, 12 Eurasian species, three domestic species/strains, two unidentified "wild ducks" and an unidentified *Anas* species). Digeneans (21 species), cestodes (32 species; 12 known only to the generic level), and nematodes (18 species) were well represented, but records of acanthocephalan infections were rare. Twenty-two species have been reported from North Africa (Egypt, Algeria and Tunisia), 12 species from North Africa and from sub-Saharan Africa and 24 species, along with 12 of the 14 unidentified species, from sub-Saharan Africa. Forty-two of the 58 species have Eurasian, equatorial or cosmopolitan distributions (McDonald 1969), the other 16 are restricted to Africa. While many of the digeneans and nematodes reported are common parasites of anatids, the degree of host specificity is comparatively low and most are capable of infecting birds belonging to different host orders. Virtually all of the digeneans infect other orders of aquatic birds (McDonald 1969), and several of the nematodes typically parasitize birds other than anatids. *Ascaridia*, *Heterakis*, *Subulura* and *Gongylonema* are primarily parasites of Galliformes, and most of the records from anatids are from domestic ducks, presumably infected through contact with poultry. *Contacaecum* species typically infect piscivorous birds (Pelicaniformes and Ciconiiformes) and, although anatids are susceptable, they are only occasionally infected with them (McDonald 1969). The cestodes, in contrast, are highly host specific and typically infect a single order of birds. The cestode species are maintained by the anatid community, whereas a range of avian hosts, including species belonging to other orders, may contribute in varying degrees towards maintaining particular digenean and nematode species. Few of the digenean and nematode species reported from anatids in Africa are restricted to the continent. Among those that are, only *Apatemon congolensis*, *Echinuria minor* and *Tetrameres plectropteri* appear to be natural parasites of anatids. *Echinostoma liei* and *E. ralphaudyi* are of doubtful validity and are probably synonyms of more widely distributed species. *Echinostoma fulicae*, *Paramonostomum aegyptiacum* and *Gongylonema congolense* are not normally parasitic in anatids.

The situation among the cestodes differs somewhat. The eight species known only from Africa, belong to the Hymenolepididae as do 11 of the 14 unidentified species. Fourteen species (including four new species [McLaughlin 1984, 1989; Alexander & McLaughlin 1993, (in press) and ten *Hymenolepis* spp.] were recorded from sub-Saharan Africa. Six other undescribed species are present in the material collected at Barberspan [Alexander, S. & McLaughlin, J.D. Helminth fauna of *Anas undulata*, *Anas erythrorhyncha*, *Anas capensis* and *Anas smithii* at Barberspan, Republic of South Africa. (In preparation)]. This suggests that extensive speciation has occurred among the hymenolepidids of anatids in sub-Saharan Africa. There is only limited contact between the African and Eurasian anatids, and the cestode fauna of anatids in sub-Saharan Africa appear to have evolved in isolation from those of Eurasian species. With virtually no contact between host groups, there exists little opportunity for exchange between one group in the helminth fauna and the other, and/or the establishment of the cestodes in either. It appears that where this has happened, the successful are typically common parasites of Eurasian anatids.

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