

# THE HELMINTH FAUNA OF THE TERRESTRIAL VERTEBRATES FROM S. MIGUEL ISLAND (AZORES): AN ANNOTATED CHECKLIST OF KNOWN SPECIES

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## ARQUIPÉLAGO



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The helminth fauna in 1746 hosts, comprising 14 different species, which included almost all species of domestic and wild terrestrial vertebrates from S. Miguel Island, were studied. Of the classes NEMATODA, PLATYHELMINTHA and ACANTHOCEPHALA, 77 species were identified, most of them (65) were NEMATODA. PLATYHELMINTHA including CESTODA and DIGenea are represented by 8 and 2 species, respectively. ACANTHOCEPHALA includes 2 species only. Excluding *Fasciola hepatica* L., 1758 and *Strongylus vulgaris* (Looss, 1800), all the reported species are new records for the Azores Archipelago. The checklist is presented according to host and in alphabetical order. Frequency of occurrence and site within the host, as well as the localities where the host animal occurred, are presented.

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O presente trabalho refere-se aos resultados de pesquisas helmintológicas realizadas em 1746 hospedeiros, incluindo 14 espécies de vertebrados terrestres, envolvendo a quase totalidade das espécies domésticas e selvagens da Ilha de S. Miguel. Foram assinaladas 77 espécies respeitantes a NEMATODA, PLATYHELMINTHA e ACANTHOCEPHALA, a maioria das quais (65) pertencentes a NEMATODA. Nos PLATYHELMINTHA consideram-se as classes CESTODA e DIGenea representadas por 8 e 2 espécies respectivamente. Quanto a ACANTHOCEPHALA inclui apenas 2 espécies. Com excepção de *Fasciola hepatica* L., 1758 e *Strongylus vulgaris* (Looss, 1800), todas as espécies são pela primeira vez assinaladas na região. A lista anotada é apresentada por hospedeiro e segundo ordem alfabética, referindo-se ainda a prevalência e localização dos parasitas, assim como as localidades da ilha em que os hospedeiros foram analisados.

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## INTRODUCTION

Studies of helminth parasites in vertebrates in the Azores have been much neglected in the past. Only two species have been recorded previously,

*Fasciola hepatica* L., 1758, from S. Miguel island by MENDONÇA (1987, 1990) and BARATA (1990) and *Strongylus vulgaris* (Looss, 1800) by CRUZ E SILVA & RITA (1962). Considering this gap of knowledge, it was important to carry out the investigation presented here.

## MATERIAL AND METHODS

The study of parasites in vertebrates were carried out from January 1984 to November 1986. The list is for the most part based on a Doctoral thesis (AFONSO-ROQUE 1988, 1990), presented at the University of the Azores. The material from agricultural host species, used for human consumption, was obtained at the Municipal slaughterhouse in Ponta Delgada. In addition to material collected for this study, parasites from dogs and chicken were studied from specimens in the collection the Veterinary Service of the Regional Government of the Azores.

For classification of Nematoda, the system of CHABAUD (1974) was adopted and for Platyhelmintha and Acanthocephala, COX (1982). The parasites are listed in alphabetical order within these three groups. Nematoda are listed first, being the most important group.

Host species are also listed alphabetically within the classes Amphibia, Aves and Mammifera.

## LIST OF THE HELMINTH FAUNA OF TERRESTRIAL VERTEBRATES FROM S.MIGUEL, AZORES:

### AMPHIBIA

#### **Frog** (*Rana ridibunda* Pallas)

Number of hosts: 32.

#### **NEMATODA**

*Oxysomatium brevicaudatum* (Zeder, 1800)  
Railliet & Henry, 1916  
Frequency of occurrence: 100%.  
Site in host: alimentary tract.  
Locality: Achada das Furnas, Alagoinhas (Salto do Cavalo), Ribeira das Caldeiras, (Ribeira Grande), Ribeira do Guilherme (Nordeste), Ribeira da Lombada.

### AVES

#### **Chicken** (*Gallus gallus* L.)

Number of hosts: 15.

#### **NEMATODA**

*Ascaridia galli* (Schrank, 1780) Freeborn, 1923

Site in host: large intestine

Locality: Lagoa and others not specified.

*Heterakis gallinarum* (Schrank, 1788)

Site in host: large intestine

Locality: Lagoa and others not specified

#### **Quail** (*Coturnix coturnix* L.)

Number of hosts: 26

#### **NEMATODA**

*Choanotaenia* sp

Frequency of occurrence: 3.8%.

Site in host: intestine.

Locality: Santana (Ribeira Grande).

*Rhabdometra* sp.

Frequency of occurrence: 3.8%.

Site in host: intestine.

Locality: Santana (Ribeira Grande).

### MAMMIFERA

#### **Black rat** (*Rattus rattus* (L.))

Number of hosts: 81.

#### **NEMATODA**

*Capillaria annulosa* (Duj., 1845) Travassos, 1915

Frequency of occurrence: 7.2%.

Site in host: small intestine.

Locality: Cabouco, Mata Rego d'Água, Vila Franca.

*Capillaria gastrica* (Baylis, 1926)

Frequency of occurrence: 3.6%.

Site in host: esophagus.

Locality: Ribeira Quente.

*Capillaria hepatica* (Bancroft, 1893) López Neyra, 1947

Frequency of occurrence: 60.2%.

Site in host: liver.

Locality: general.

*Heterakis spumosa* Schneider, 1866

Frequency of occurrence: 8.4%.

Site in host: large intestine.

Locality: Água d'Alto, Cabouco, Lagoa do Fogo, Ponta Garça (Castelo Branco), Pico do Cascalho, Sete Cidades.

*Mastophorus muris* (Gmelin, 1790)  
Frequency of occurrence: 50.6%.  
Site in host: esophagus, stomach and intestine.  
Locality: general.

*Nippostrongylus brasiliensis* (Travassos, 1914)  
Frequency of occurrence: 24.1%.  
Site in host: small intestine.  
Locality: general.

*Syphacia muris* (Yamaguti, 1935), Yamaguti, 1941  
Frequency of occurrence: 2.4%.  
Site in host: cecum.  
Locality: Vila Franca e Água de Alto.

#### CESTODA

*Cysticercus pisiformis* (Block, 1780)  
Frequency of occurrence: 2.4%.  
Site in host: peritoneal cavity.  
Locality: Cabouco e Lagoa do Fogo.

*Hymenolepis diminuta* (Rud., 1819) Blanchard, 1891  
Frequency of occurrence: 4.8%.  
Site in host: small intestine.  
Locality: general.

*Hymenolepis nana* (Siebold, 1852) Blanchard, 1891  
Frequency of occurrence: 4.8%.  
Site in host: small intestine.  
Locality: Sete Cidades.

#### DIGenea

*Brachylaema recurva* (Duj., 1845)  
Frequency of occurrence: 1.2%.  
Site in host: small intestine.  
Locality: Chã de Macela.

#### ACANTHOCEPHALA

*Moniliformis* (*moniliformis*) *moniliformis* Petrotschenko, 1958  
Frequency of occurrence: 1.2%.  
Site in host: large intestine.  
Locality: Sete Cidades.

#### Dog (*Canis familiaris* L.)

Number of hosts: 5

#### NEMATODA

*Ancylostoma caninum* (Ercolani, 1859)  
Site in host: small intestine.  
Locality: Lagoa and others not specified.

*Toxocara canis* (Werner, 1782)  
Site in host: large intestine.  
Locality: Lagoa and others not specified.

*Trichuris vulpis* (Froelich, 1789)

*Uncinaria stenocephala* (Railliet, 1884)  
Site in host: small intestine.  
Locality: Lagoa and others not specified.

#### Goat (*Capra hircus* L.)

Number of hosts: 40

#### NEMATODA

*Bunostomum trigonocephalum* (Rud., 1808)  
Frequency of occurrence: 52.0%.  
Site in host: large intestine.

*Chabertia ovina* (Fabricius, 1794) Railliet & Henry, 1909  
Frequency of occurrence: 0.4%.  
Site in host: large intestine.

*Haemonchus contortus* (Rud., 1803)  
Frequency of occurrence: 80.0%.  
Site in host: abomasum and small intestine.

*Oesophagostomum (Hysteracrum) venulosum* (Rud., 1809)  
Frequency of occurrence: 54.5%.  
Site in host: large intestine.

*Ostertagia ostertagi* (Stiles, 1992) Ransom, 1907  
Frequency of occurrence: 37.5%.  
Site in host: abomasum and small intestine.

*Teladorsagia circumcincta* (Stadelman, 1894)  
Frequency of occurrence: 56.0%.  
Site in host: abomasum and small intestine.

*Teladorsagia trifurcata* (Ransom, 1907)  
Frequency of occurrence: 37.5%.  
Site in host: abomasum.

*Trichostrongylus axei* (Cobbold, 1879)  
Frequency of occurrence: 80.0%.  
Site in host: abomasum and small intestine.

*Trichostrongylus capricola* Ransom, 1907  
Frequency of occurrence: 80.0%.  
Site in host: abomasum and small intestine.

*Trichostrongylus colubriformis* (Giles, 1892)  
Frequency of occurrence: 80%.

Site in host: abomasum and small intestine.

*Trichostrongylus retortaeformis* (Zeder, 1800)

Frequency of occurrence: 0.4%.

Site in host: small intestine.

*Trichuris globulosa* (Linstow, 1901)

Frequency of occurrence: 22.6%.

Site in host: large intestine.

*Trichuris ovis* (Abildgaard, 1795)

Frequency of occurrence: 14.4%.

Site in host: large intestine.

#### CESTODA

*Cysticercus tenuicollis* Railliet, 1885

Site in host: liver and peritoneal cavity.

#### DIGENEA

*Fasciola hepatica* L., 1758

Site in host: bile ducts.

#### Hedgehog (*Erinaceus europaeus* L.)

Number of hosts: 12.

#### NEMATODA

*Capillaria erinacei* (Rudolphi, 1819)

Travassos, 1915

Frequency of occurrence: 30.0%.

Site in host: small intestine.

Locality: Lagoa e Fenais da Ajuda.

*Crenosoma striatum* (Zeder, 1800)

Frequency of occurrence: 75.0%.

Site in host: bronchiae.

Locality: Região da Salga, Lagoa do Fogo, Livramento, S. Vicente Ferreira, Lagoa, Fenais da Ajuda, Serra Gorda.

#### ACANTHOCEPHALA

*Prosthynchus* sp.

Frequency of occurrence: 8.3%.

Site in host: large intestine.

Locality: S. Vicente Ferreira.

#### Horse (*Equus caballus* L.)

#### NEMATODA

*Cylicocyclus elongatus* (Looss, 1900)

Site in host: large intestine.

*Onchocerca reticulata* Diesing, 1841

Site in host: suspensory ligament.

*Parascaris equorum* (Goeze, 1878)

Site in host: intestine.

*Strongylus edentatus* (Looss, 1900)

Site in host: large intestine.

*Strongylus vulgaris* (Looss, 1900)

Site in host: large intestine.

*Thelazia lacrymalis* Bosc., 1819

Site in host: lacrymal gland ducts.

#### House mouse (*Mus musculus* L.)

Number of hosts: 5

#### NEMATODA

*Capillaria hepatica* (Bancroft, 1893) Lopez Neyra, 1947

Frequency of occurrence: 100%.

Site in host: liver.

Locality: Ponta Delgada

*Syphacia obvelata* (Rud., 1802)

Frequency of occurrence: 20.0%.

Site in host: cecum.

Locality: Ponta Delgada.

#### CESTODA

*Cysticercus pisiformis* (Bloch, 1780)

Frequency of occurrence: 20.0%.

Site in host: peritoneal cavity.

#### Norwegian rat (*Rattus norvegicus* (Berkenhaut))

Number of hosts: 29.

#### NEMATODA

*Capillaria hepatica* (Bancroft, 1893) López Neyra, 1947

Frequency of occurrence: 60.7%.

Site in host: liver.

Locality: general.

*Heterakis spumosa* Schneider, 1866

Frequency of occurrence: 8.7%.

Site in host: large intestine.

Locality: Livramento, Sete Cidades, Monte do Morro.

*Mastophorus muris* (Gmelin, 1780)

Frequency of occurrence: 34.8%.

Site in host: esophagus, stomach and intestine.

Locality: general.

*Nippostrongylus brasiliensis* (Travassos, 1914)

Frequency of occurrence: 8.7%.  
 Site in host: small intestine.  
 Locality: general.  
*Trichosomoides crassicauda* (Bellingham, 1840)  
 Frequency of occurrence: 4.3%.  
 Site in host: bladder.  
 Locality: Rabo de Peixe, Livramento.  
*Hymenolepis diminuta* (Rud., 1819)  
 Blanchard, 1895  
 Frequency of occurrence: 26.1%.  
 Location: small intestine.  
 Locality: Ginetes, Furnas, Santa Iria, S. Vicente Ferreira.  
*Himenolepis nana* (Siebold, 1852) Blanchard, 1891  
 Frequency of occurrence: 4.3%.  
 Site in host: small intestine.  
 Locality: Sete Cidades.

#### **Ox** (*Bos taurus* L.)

Number of hosts: 600.

#### **NEMATODA**

*Bunostomum* sp.  
 Frequency of occurrence: 30.8%  
 Locality: general  
*Cooperia* sp.  
 Frequency of occurrence: 43.6%  
 Locality: general  
*Haemonchus* sp.  
 Frequency of occurrence: 43.6%  
 Locality: general  
*Nematodirus* sp.  
 Frequency of occurrence: 5.1%  
 Locality: central region of island  
*Oesophagostomum* (*Bosicola*) *radiatum* (Rud., 1803)  
 Site in host: large intestine  
*Ostertagia* sp.  
 Frequency of occurrence: 56.4%  
 Locality: general  
*Strongyloides* sp.  
 Locality: Lagoa do Congro  
*Trichostrongylus* sp.  
 Frequency of occurrence: 38.5%  
 Locality: general

#### **CESTODA**

*Cysticercus tenuicollis* Railliet, 1885  
 Site in host: liver  
*Moniezia benedeni* (Moniez, 1878)  
 Site in host: small intestine

#### **DIGENEA**

*Fasciola hepatica* L., 1758  
 Frequency of occurrence: 4.65%-8.10% (MENDONÇA 1987).  
 Site in host: bile ducts.  
 Locality: eastern part of island (MENDONÇA 1987).

#### **Pig** (*Sus scrofa* L.)

Number of hosts: 600.

#### **NEMATODA**

*Ascaris suum* Goeze, 1782  
 Site in host: intestine.  
*Metastrongylus apri* (Gmelin, 1780)  
 Site in host: bronchiae.  
*Metastrongylus pudendotectus* Vostokov, 1905  
 Site in host: bronchiae.  
*Metastrongylus salmi* Geddoelst, 1923  
 Site in host: bronchiae.  
*Oesophagostomum* *dentatum* (Rud., 1803)  
 Site in host: large intestine.  
*Trichuris suis* (Schränk, 1788)  
 Site in host: large intestine.

#### **CESTODA**

*Cysticercus tenuicollis* Railliet, 1885  
 Locality: peritoneal cavity.

#### **DIGENEA**

*Fasciola hepatica* L., 1758  
 Site in host: bile ducts.  
*Triodontophorus serratus* (Looss, 1900)  
 Site in host: large intestine.

#### **Rabbit** (*Oryctolagus cuniculus* L.)

Number of hosts: 52.

#### **NEMATODA**

*Graphidium strigosum* Railliet & Henry, 1909  
 Frequency of occurrence: 21.6%.

Site in host: stomach.

Locality: Fonte Faneca, Lagoa do Congro, Altiprado.

*Passalurus ambiguus* (Rud., 1819) Duj., 1845

Frequency of occurrence: 39.2%.

Site in host: large intestine.

Locality: Fonte Faneca, Lagoa do Congro, Achada, Achadinha, Altiprado.

*Trichostrongylus retortaeformis* (Zeder, 1800)

Frequency of occurrence: 9.8%.

Site in host: small intestine.

Locality: Fonte Faneca e Altiprado.

### CESTODA

*Cysticercus pisiformis* (Bloch, 1780)

Frequency of occurrence: 32.3%.

Site in host: peritoneal cavity.

Locality: Achada, Achadinha, Altiprado, Lagoa do Congro, Fonte Faneca.

### DIGENEA

*Fasciola hepatica* L., 1758

Frequency of occurrence: 0.7% (MENDONÇA 1987).

Site in host: bile ducts.

Locality: Achadinha.

### Sheep (*Ovis aries* L.)

Number of hosts: 2.

### NEMATODA

*Haemonchus contortus* (Rud., 1803)

Frequency of occurrence: 100%.

Site in host: abomasum.

*Ostertagia ostertagi* (Stiles, 1892) Ransom, 1907

Frequency of occurrence: 100%.

Site in host: abomasum.

*Teladorsagia circumcincta* (Stadelman, 1894)

Frequency of occurrence: 100%.

Site in host: abomasum.

*Teladorsagia trifurcata* (Ransom, 1907)

Frequency of occurrence: 100%.

Site in host: abomasum.

### DIGENEA

*Fasciola hepatica* L., 1758

Site in host: bile ducts.

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