**SYPHACIA (SYPHACIA) ABERTONI** n. sp. (NEMATODA: OXYURIDAE) FROM **ZYZOMYS ARGURUS** (THOMAS) (RODENTIA: MURIDAE) FROM NORTHERN AUSTRALIA.

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**Summary**

*Syphacia (Syphacia) abertoni* n. sp. (Nematoda: Oxyuridae) is described from the caecum of *Zyzomys argurus* (Thomas, 1889) (Rodentia: Muridae) from two locations in northern Australia: Mount Isa, Queensland and Coomalie Creek, Northern Territory. *Syphacia abertoni* is distinguished from other members of the genus by the presence of cervical alae, an elongated oval cephalic plate, size of eggs, and lengths of spicule and gubernaculum.

**KEY WORDS:** *Syphacia*, Oxyuridae, *Zyzomys*, Muridae, Conilurini, new species.

**Introduction**

The genus *Syphacia* Seurat, 1916 (Oxyuridae) has a cosmopolitan distribution in cricetid and murid rodents (Hugot 1988). There are currently four known species of *Syphacia* present in the Australasian biogeographic region. These are *S. muris* Yamaguti, 1935, a cosmopolitan species, *S. darwini* Hugot & Quentin, 1985, found in Australian representatives of the Australasian rodent genus *Melomys* Thomas, 1922 (see Hugot & Quentin 1985) and *S. australasiensis* Smales, 2004 recorded from *Rattus leucopus* (Gray, 1867) from Australia and New Guinea (Smales 2004). *Syphacia longaecauda* Smales, 2001 has been recorded only from *Melomys* spp. from Papua New Guinea and West Papua (Smales 2001).

Of the four tribes of native rodents, subfamily Hydromyinae, present in Australia, the Conilurini are the only clade to be wholly endemic to Australia (Strahan 1995). The tribe includes the genus *Zyzomys* Thomas, 1909, is the largest and most diverse tribe of Australian rodents, and the only tribe that has adapted to arid conditions (Strahan 1995). The Conilurini are thought to have evolved from ancestral forms of rodents that migrated to Australia about seven million years ago, as part of the first of three waves of rodent migrations to Australia, mainly from south east Asia during the Pliocene (Godthelp 2001).

While examining helminth material for a parasitological study of *Zyzomys argurus* (Thomas, 1889), a new species of *Syphacia* was discovered and is described herein.

**Materials and methods**

*Zyzomys argurus* were live trapped at Moondarra Dam, Mount Isa, Queensland (20°32’S, 139°28’E), and euthanased using an intraperitoneal injection of pentobarbital sodium. The viscera of the hosts were freshly dissected and examined for parasites. Additional specimens held at the CSIRO Wildlife Collection, Canberra (CSIRO) collected from *Z. argurus* from Microwave Hill, Coomalie Creek, Northern Territory (13°S, 131°10’E) were also examined. Nematodes were fixed in 10% formalin and stored in 70% ethanol, before being cleared in lactophenol and examined under an Olympus CH microscope. Measurements and drawings were made with the aid of an ocular micrometer and a drawing tube. Measurements are given in μm, and presented as the range of lengths for 10 specimens, followed by the mean and standard deviation, in parentheses. The material from Mount Isa was deposited in the South Australian Museum, Adelaide (SAM).
Results

*Syphacia (Syphacia) abertoni* n. sp.

Figures 1-8. *Syphacia (Syphacia) abertoni* n. sp. 1. Female, lateral view. 2. Female, anterior end, lateral view. 3. Male, lateral view. 4. Male, posterior end, ventral view. 5. Spicule and gubernaculum, with accessory piece, lateral view. 6. *En face* view. 7. Egg. 8. Female, anterior end, dorso-ventral view. Scale bars = 250 μm 1; 100 μm 2, 3; 50 μm 7; 25 μm 4; 20 μm 6; 10 μm 5, 8.
Holotype
Male from caecum of *Zyzomys argurus*, Coomalie Creek, Northern Territory, Australia. (13ºS, 131º10'E) 30.vii.1995, coll. P. Haycock. SAM AHC32349

Allotype
Female, same data SAM AHC32350

Paratypes
Same data. 19 males, 179 females. CSIRO N4982

Other material examined
From caecum of *Zyzomys argurus*, Mount Isa, Queensland, Australia. (20º32'S, 139º28'E) 27.vii.2004, coll. H. Weaver. 22 male, 133 female. SAM AHC32351

Description
Cuticle with faint transverse striations. Cephalic plate oval, elongated laterally; amphids and cephalic papillae close together laterally. Cephalic plate width 340, amphids 102 apart. Three distinct lips. Deirids not seen. Cervical alae present.

Male
Body length 1100 - 1300 (1221 ± 63.1), maximum body width 67 - 96 (85.2 ± 9.1). Oesophagus length 156 - 199 (181.7 ± 17.5), oesophageal bulb width 41 - 55 (49.3 ± 5.9). Nerve ring 67 - 91 (81.3 ± 8.3), excretory pore 276 - 403 (340.3 ± 45.2) from anterior end. Anterior mamelon length 46 - 67 (53.3 ± 7.3), middle mamelon length 43 - 60 (52.8 ± 6.5), posterior mamelon length 34 - 62 (49.8 ± 7.9). Anterior end to anterior mamelon 396 - 667 (533 ± 91.4), anterior mamelon to middle mamelon 34 - 96 (57.1 ± 19), middle mamelon to posterior mamelon 29 - 84 (60.2 ± 15.4). Spicule length 50 - 60 (55 ± 4), gubernaculum 26 - 36 (30.2 ± 3.2). 2 pairs small cloacal papillae, 1 pair large postanal papillae present. Tail length 115 - 170 (147 ± 18).

Female
Body length 2640 - 3264 (3060 ± 186.7), maximum body width 156 - 280 (185.6 ± 45.3). Oesophagus length 259 - 295 (277.2 ± 12.2), oesophageal bulb width 67 - 82 (73 ± 3.7). Nerve ring 130 - 149 (136.5 ± 6.8), excretory pore 460 - 600 (539 ± 43.7), vulva 730 - 850 (787.5 ± 51) from anterior end. Eggs 65 – 77 x 19 - 29 (68 ± 5.7 x 24 ± 2.8). Tail length 350 - 650 (431 ± 94).

Etymology
This species is named to honour ecologist Dr John Aberton.

Discussion
*Syphacia (Syphacia) abertonii* n. sp. belongs in the genus *Syphacia* because it possesses the characteristics described by Hugot (1988). *Syphacia (S.) abertonii* n. sp. belongs in the subgenus *Syphacia* Hugot, 1988 because it has neither the quadrangular shaped cephalic plate and lateral alae that characterise the subgenus *Cricetoxyuris* Hugot, 1988, nor the short, conical tail and buccal ornamentation that characterise the subgenus *Seuratoxyuris* Hugot, 1988. Rather, it has an oval cephalic plate, cervical alae and a tail typical of the subgenus *Syphacia*.

*Syphacia abertonii* resembles Quentin’s (1971) group VI; a cluster of species comprising *S. alata* Quentin, 1968, *S. frederici* Roman, 1945, *S. vandenbrueli* Bernard, 1961 and *S. petrusewiczi* Bernard, 1966. Hugot (1988) moved *S. petrusewiczi* into the subgenus *Seuratoxyuris* and Hasegawa et al. (1994) moved *S. frederici* into *Seuratoxyuris*, because of the shape of the tail. *Syphacia abertonii*, smaller than both *S. alata* and *S. vandenbrueli*, can be further distinguished from *S. alata* by oesophagus length and bulb width, size of eggs, spicule and tail length, and from *S. vandenbrueli* by egg size, length of spicule and gubernaculum (Table 1).
**Table 1.** Measurements of *Syphacia abertoni*, compared with species found in the Australasian bioregion (*S. darwini*, *S. australasiensis*, *S. longaecauda*, *S. muris*) (see Hugot & Quentin 1985, Smales 2001; 2004) and species from Group VI (see Quentin 1971). Measurements for *S. muris* may be erroneous, see Hasegawa & Tarore 1996).

|                      | S. alata | S. vandenbrueli | S. longaecauda | S. australasiensis | S. darwini | S. muris | S. abertoni |
|----------------------|----------|----------------|----------------|-------------------|------------|----------|------------|
| **♂**                | 1500-1860 | 1400-14250 | 1140-1250 | 4410-6410 | 1600-2050 | 4000-4400 | 690-1250 | 1900-2000 | 1865 | 3960 | 1140 | 1430 | 1100-1300 | 2640-3284 |
| **♀**                | 1560-6300 | 1250-6300 | 1200-3600 | 310-3600 | 100-2050 | 1900-3500 | 300-2050 | 1900-2000 | 280 | 1200 | 1100 | 1430 | 1100-1300 | 2640-3284 |
| **body length**      | 1400-1600 | 1300-2600 | 1520-3100 | 834-950 | 370-490 | 616-850 | 142-181 | 355-436 | 247 | 700 | 115 | 300 | 115-170 | 350-650 |
| **body width**       | 120-240   | 250-312     | 152-190    | 834-950 | 370-490 | 616-850 | 142-181 | 355-436 | 247 | 700 | 115 | 300 | 115-170 | 350-650 |
| **tail length**      | 210-790   | 152-190    | 834-950   | 370-490 | 616-850 | 142-181 | 355-436 | 247 | 700 | 115 | 300 | 115-170 | 350-650 |
| **from ant. end to nerve ring** | 110-166 | - - | 111-148 | 119-127 | 75-120 | 107-135 | 110 | 120 | 100 | 200 | 00 | 150 | 150-180 | 150-180 |
| **excretory pore**   | 400-580   | 243         | 390-608   | 375-436 | 470-632 | 228-462 | 315-570 | 400 | 750 | 290 | 225 | 276-403 | 460-600 |
| **vulva**            | - 880     | - 756-1216 | - 765-986 | - 436-804 | - 930 | - 360 | - 730-850 | - 436-804 | - 930 | - 360 | - 730-850 | - 436-804 | - 930 | - 360 | - 730-850 |
| **1st mamelon**      | 580       | - -         | - -       | 600-850 | - 297-583 | - 830 | - 500 | - 396-667 | - 830 | - 500 | - 396-667 | - 830 | - 500 | - 396-667 | - 830 | - 500 | - 396-667 |
| **oesophagus length**| - -       | 121-152    | 234-281   | 240-355 | 408-456 | 148-208 | 187-355 | 230 | 320 | 160 | 120 | 156-199 | 259-295 |
| **oesophageal bulb width** | 70-110   | 45.6-53.2 | 93-114    | 60-93 | 121-127 | 46-55 | 73-82 | 50 | 100 | 40 | 30 | 41-55 | 67-82 |
| **eggs**             | - 95-97 x 34-40 | - 82-103 x 26-41 | - 94-100 x 34-42 | - 82-95 x 29-36 | - 90-35 x 29-36 | - 90-30 x 19-29 | - 65-77x | - 19-29 |
| **spicule**          | 76-70     | 40.5-56.7   | - 76-97   | - 61-88 | - 80 | - 48 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 | - 50-60 |
| **gubernaculum**     | 29-42     | 18.9-24.3   | - 39-47   | - 29-36 | - 40 | - 28 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 | - 26-36 |

*Syphacia abertoni* can be distinguished from all other *Syphacia* species found in the Australasian region by having cervical alae. It can be further distinguished from *S. muris* by an elongated oval not square-shaped cephalic plate; from *S. darwini* by having three not two mamelons; from *S. australasiensis* by smaller egg size, wider cephalic plate (see Smales 2004) and shorter gubernaculum and spicule. *Syphacia abertoni* can be further distinguished from *S. longaecauda* by smaller gubernaculum and spicule, smaller egg size and tail length (Table 1).

This is the first record of an oxyurid from a conilurine host. Oxyurid nematodes including the genus *Syphacia* have a single host life cycle, where worms can be directly transmitted from one individual host to another. *Zyzomys argurus* has a distribution across northern Australia, including arid areas and prefers rocky habitats. Therefore the presence of a nematode such as *Syphacia* with a direct life cycle will be favoured. Moreover, these habitats are often not shared with other rodent species (Fleming 1995), so limiting the relative abundances of other rodent species present for any host-switching to occur. This mode of transmission is indicative of coevolution between the host and parasite genera, a model suggested as the mode of speciation for oxyurids by Hugot (1988).

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**References**

Fleming, M.R. (1995) Common rock rat, *Zyzomys argurus* pp 620-621. In Strahan, R. (Ed.) “Mammals of Australia” (Reed Books, Sydney).
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Godthelp, H. (2001) The Australian rodent fauna, flotillas, flotsam or just fleet-footed? pp 319-321
In I. Metcalfe, J.M.B. Smith, M. Morwood & I. Davidson (Eds.) “Faunal and floral migrations and evolution in SE Asia-Australia” (AA Bakema, Lisse).

Hasegawa, H. & Tarore, D. (1996) Syphacia (Syphacia) sulawesiensis n. sp. and S. (S.) muris (Yamaguti, 1935) (Nematoda: Oxyuridae) collected from Rattus xanthurus (Gray, 1867) (Rodentia: Muridae) in north Sulawesi, Indonesia. Tropical Zoology 9, 165-173.

Hasegawa, H., Asakawa, M., Yagi, K. & Takao, Y. (1994) Descriptions of three species of the genus Syphacia (Nematoda: Oxyuridae) from the murids of Japan. Biological Magazine Okinawa 32, 7-15.

Hugot, J.-P. (1988) Les nématodes Syphaciinae parasites de rongeurs et de lagomorphes. Mémoires du Muséum National d'histoire Naturelle 141, 1-148.

Hugot, J.-P. & Quentin, J.-C. (1985) Étude morphologie de six espèces nouvelles ou peu connues appartenant au genre Syphacia (Oxyuridae, Nematoda), parasites de rongeurs cricétidés et muridés. Bulletin du Muséum National d'histoire Naturelle Ser. 4 7, 383-400.

Quentin, J.-C. (1968) Description de Syphacia (Syphacia) alata n. sp., oxyure parasite du rongeur Cricetidae Zygodontomyss lasiurus (Lund, 1839). Bulletin du Muséum National d'histoire Naturelle Ser 2 4, 807-813.

Smales, L.R. (2001) Syphacia longaecauda n. sp. (Nematoda: Oxyuridae) Syphacine from Melomys spp. (Muridae: Hydromyinae) from Papua New Guinea and Irian Jaya, Indonesia. Parasite 8, 39-43.

Smales, L.R. (2004) Syphacia (Syphacia) australasiensis sp. nov. (Nematoda: Oxyuridae) from Rattus leucopus (Muridae) from Papua New Guinea and Australia. Transactions of the Royal Society of South Australia 128, 47-51.

Strahan, R. (1995) “Mammals of Australia” (Reed Books, Sydney).