Worm Burdens in Outbred and Inbred Laboratory Rats with Morphometric Data on *Syphacia muris* (Yamaguti, 1935) Yamaguti, 1941 (Nematoda, Oxyuroidea)

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Syphacia muris *worm burdens were evaluated in the rat* Rattus norvegicus *of the strains Wistar (outbred), Low/M and AM/2/Torr (inbred), maintained conventionally in institutional animal houses in Brazil. Morphometrics and illustration data for* S. muris *recovered from Brazilian laboratory rats are provided for the first time since its proposition in 1935.*

Key words: *Syphacia muris* - prevalence - morphometrics - laboratory rats - Brazil

Efforts have been made worldwide in order to detect, identify and study ecto and endoparasites of laboratory animals, aiming at the achievement of proper procedures regarding the control or eradication of parasitism, considering the important role these animals play in scientific research. In this scope, worm burdens in mice and rats have been analyzed, compared and regarded as essential targets of investigation (Eaton 1972, Kamiya at al. 1979, Scott & Gibbs 1986, Cheng & Xinmei 1990).

In Brazil, complete reports related to helminths parasitizing outbred and inbred laboratory mice are those of Pinto et al. (1994), when parasites were identified, described, illustrated, worm burden quantified and prevalences established for Swiss Webster, C57Bl/6 and DBA/2 strains, with a further proposition of an adaptation of the anal swab technique for the detection of oxyurid infections in C57Bl/6, C57Bl/10, CBA, BALB/c, DBA/2 and C3H/He mice (Gonçalves et al. 1998).

The present approach adds new information to these previous studies and is related to the comparison of worm burdens in laboratory rats from institutional animal houses as well presents the first morphometric data on *Syphacia muris* (Yamaguti, 1935) Yamaguti, 1941, obtained from Brazilian hosts.

MATERIALS AND METHODS

Thirty adult male rats (*Rattus norvegicus* Berkenhout, 1769) of different strains (10 Wistar, 10 Low M/2 and 10 AM/2/Torr) were obtained from two institutional animal houses in Rio de Janeiro, RJ, Brazil, not named for ethical reasons. Weights of rats were: 360-560g (Wistar), 215-280g (Low M/2) and 175-287g (AM/2/Torr). Samples were randomly obtained and animals were properly sacrificed in an ether chamber and necropsied according to established procedures (Apa 1989). Parasites were recovered in a 0.85% NaCl solution and fixed in hot 10% formaldehyde. Worm burdens were evaluated and quantified under an Olympus stereoscope microscope. Worms were then dehydrated in an ethanol series (70º-100º GL), cleared in phenol and preserved either as whole mounts in a 1:1 solution of Canada balsam and beechwood creosote or as wet material. Preparation of *en face* mounts is in accord to Anderson (1958). Parasites were examined in a brightfield Olympus microscope and micrographs were obtained in a Zeiss Axiophot system. Measurements are in micrometers (μm) unless otherwise indicated and means are in parentheses. Studied specimens were deposited in the Helminthological Collection of the Oswaldo Cruz Institute (CHIOC).

RESULTS

Rats of the different strains were parasitized with *S. muris*, widely distributed and a very common nematode species to occur in these hosts. Nevertheless, morphometric data on specimens recovered from laboratory animals in Brazil are still unavailable.

The authors dedicate this paper in honour of the Oswaldo Cruz Institute in the occasion of the centenary of its foundation, May 25th, 2000.

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Syphacia muris (Yamaguti, 1935)
Yamaguti, 1941
(Figs 1-5)

Redescription

Morphometrics based on five adult males and five adult females. Oxyuroidea, Oxyuridae, Syphaciinae. Small, thick worms, white when alive. Cephalic inflations conspicuous. Great sexual dimorphism.

Males: body 1.0-1.1 (1.02) mm long, 60-100 (76) wide, with three prominent mamelons on the ventral surface of posterior portion; distance between mamelons, 70-75 (71). Mouth with three lips. The two subventral contain a papilliform structure each, not projecting beyond the cuticule, while the dorsal presents two similar structures, one on either side. Esophagus, with bulb, 140-160 (148) long; bulb globular 40-50 (48) in diameter. Nerve ring 90-105 (96) from anterior end. Excretory pore not observed. Single spicule 50-56 (52) long. Gubernaculum 20-30 (22) long, with a hook-shaped distal process. Three pairs of caudal papillae. Cloacal aperture 340-360 (348) from posterior extremity. Caudal appendage 100-130 (118) long.

Females: body 2.5-2.8 (2.74) mm long, 170-200 (190) wide. Mouth as referred for the males. Esophagus, with bulb, 190-210 (202) long. Bulb globular 40-80 (72) x 50-80 (72) in diameter. Nerve ring and excretory pore 100 and 400-550 (460) from anterior end, respectively. Vulva 720-750 (730) from anterior extremity. Eggs 60-72 (69) long by 28-32 (29) wide. Anus 340-360 (350) from posterior end.

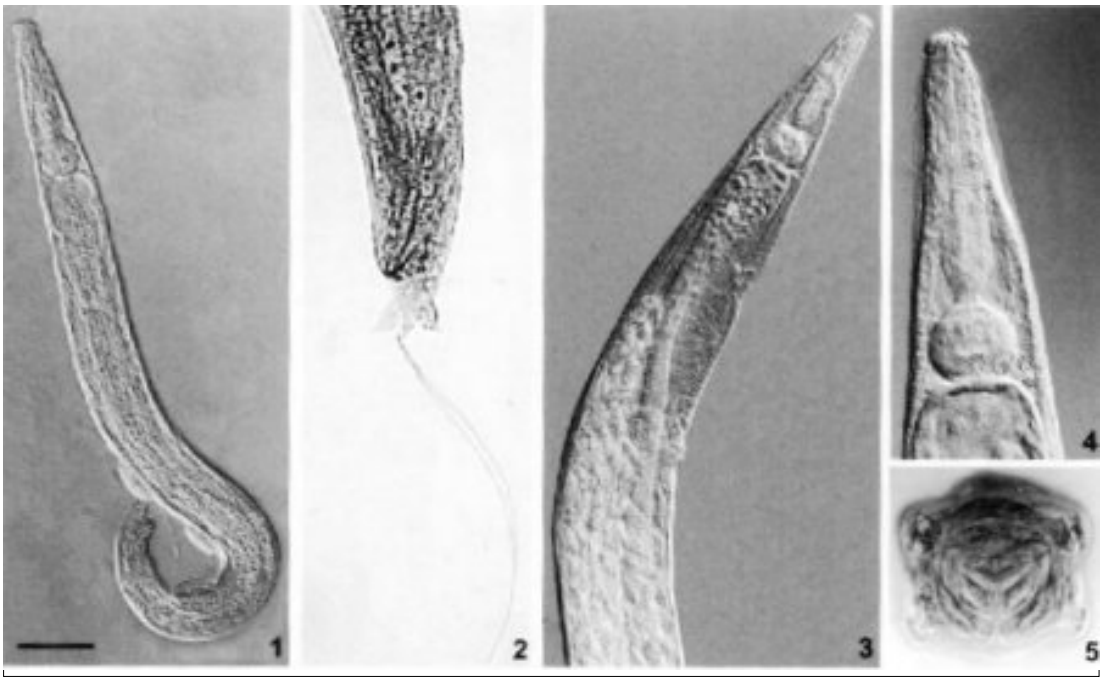
Taxonomic summary

Host: *Rattus norvegicus* (Berkenhout, 1769)
Site of infection: large intestine
Locality: Rio de Janeiro, RJ, Brazil
Deposit of specimens: CHIOC no. 34207 a-k (whole mounts), 33895 (wet material)

Results so far obtained show that the total of recovered worms in AM/2/Torr rats is of 4,344 *S. muris*, with a minimum of 172, a maximum of 1,093 and a mean of 434.4 worms/animal. In Low/M rats, the total corresponds to 2,694 worms, with a minimum of 149, a maximum of 494 and a mean of 269.4 worms/animal. Specimens of Wistar strain presented a total of 1,309 worms, with a minimum of 28, a maximum of 308 and a mean of 130.9 worms/animal (Table).

DISCUSSION

Syphacia muris, the common pinworm of rats, was proposed by Yamaguti (1935) as *Enterobius muris* recovered from *R. norvegicus* var. *albus* Fitzinger in Kioto, Japan, based on female specimens and was compared with *Enterobius*



Syphacia muris. Fig. 1: male, total, lateral view (Bar = 0.1 mm). Fig. 2: male, posterior extremity, ventral view (Bar = 0.06 mm). Fig. 3: female, anterior portion lateral view (Bar = 0.06 mm). Fig. 4: female, anterior extremity, lateral view (Bar = 1mm). Fig. 5: female, head, *en face* view (Bar = 0.008 mm). Bar common to Figs 1-5. Figs 1, 3 and 4 were obtained in a Differential Interference Contrast (DIC) system.

TABLE

Comparative ratios of total (t), maximum (ma) and minimum (mi) *Syphacia muris* worm burdens in rats of the different strains

Strains	t	ma	mi
Wistar x Low/M	1: 2.0	1: 1.6	1: 5.3
Low/M x AM/2/Torr	1: 1.6	1: 2.2	1: 1.1
AM/2/Torr x Wistar	1: 0.3	1: 0.2	1: 0.1

N = 10 rats /strain

vermicularis Leach, 1853, considering their similarities.

Later, during investigations related to the helminth fauna of Japanese mammals, Yamaguti (1941) described the males of the species proposed in 1935 and changed the original allocation of *E. muris* to the genus *Syphacia* Seurat, 1916 in a new combination presently accepted.

Although its worldwide distribution, *S. muris* has never been redescribed and illustrated on basis of specimens recovered from Brazilian hosts, since its proposition. Vicente et al. (1997) in a survey of nematodes parasitizing mammals in Brazil, reproduce data on *S. muris* after Yamaguti (1935). In fact, few are the morphometric data on this species, considering that most papers refer either to its reaction to drugs or prevalence (Weiss & Ernst 1981, Bressan et al. 1997).

Previous results on the prevalence of *S. muris* in laboratory and wild rats show that worm burdens have been considered and the zoonotic importance of *S. muris* emphasized taking into account that it may accidentaly infect man by contamination of food with faeces of infected murine hosts (Jueco & Zabala 1990).

Another approach reports to the use of oxyurid nematodes of rats and mice as test organisms in chemotherapeutic studies on enterobiasis when loads of *S. muris* in rats were compared to those of *Syphacia obvelata* (Rudolphi, 1802) Seurat, 1916 in mice and figures of both parasites provided (Hussey 1957). Quentin (1971) redescribing and illustrating species of *Syphacia* Seurat, 1916, during a report on the comparative morphology of the cephalic and genital structures observed in this group, refers to *S. muris* from rats in France.

Specimens of *S. muris* recovered from Brazilian rats of the different strains do not present significant differences and data obtained confirm the results of Yamaguti (1935, 1941) and Quentin (1971).

Prevalences of ecto and endoparasites in mice and rats from animal houses were previously evaluated in Brazil (Pinto et al. 1994, Bressan et al. 1997). Nevertheless, Bressan et al. (1997) do not report to any particular strain and only refer to rats and mice as originated from conventional breeding colonies. Animals were investigated for the frequency of helminth eggs with the employment of the method of Willis and anal swab examination. With these techniques, 32 and 61.7% of the rats, respectively, were positive for *Syphacia* sp. eggs. Necropsies were further performed and based on presented data, an overall prevalence of 71.8% was calculated (present paper) for rats infected with *Syphacia* sp. worms. Syphaciinae nematodes recovered from mice and rats were not identified to the specific level and authors refer to *Syphacia* sp. occurring in both hosts either reporting to the prevalences of infection or to positive animals regarding to necropsy and fecal examination, when mice and rats were totalized together and referred to as "positive animals". Therefore, we suppose that the species should be related to *S. muris* parasitizing rats and *S. obvelata* infecting mice. Thus, further comparison of the present results with those obtained by Bressan et al. (1997) is unavailable and this fact reinforces the importance of a proper identification of the parasites, whenever they are under investigation.

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