



A new thelastomatid of the genus *Blatticola* Schwenk, 1926 (Nematoda, Thelastomatidae) a parasite of cricket (Orthoptera, Gryllidae) from Argentina

Um novo thelastomatide do gênero Blatticola Schwenk, 1926 (Nematoda, Thelastomatidae) parasita de grilo (Orthoptera, Gryllidae) da Argentina

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Abstract

Blatticola biannulata n. sp. (Oxyurida, Thelastomatidae) a parasite of the cricket *Anurogryllus muticus* (De Geer) (Orthoptera, Gryllidae) from Argentina, is described and illustrated. This is the second species of the genus *Blatticola* found parasitizing cricket. Females of this new species is characterized by the cuticle that is annulated from the anterior end up to the middle of the body, the mouth opening being subtriangular in shape surrounded by 8 cephalic papillae, the short stoma with two semicircles sclerotised and the telostoma with one movable tooth, small pore shaped amphids, an oesophagus divided into three parts, anterior cylindrical corpus, isthmus distinct, and basal bulb valvated, the nerve ring situated arounded the isthmus, the intestine broadest anteriorly, eggs oval, smooth shell, in apical view show a triangular section, with three wings, the dorsal one and two lateroventrals, males with one pair of preanal, and two pairs of postanal papillae, and the tail appendage short, conical and pointed, the female has in the top an structure of anchorage, like structure of grasp.

Keywords: *Blatticola biannulata* n. sp. Oxyurida. Gryllidae. Taxonomy.

Resumo

Blatticola biannulata n. sp. (Oxyurida, Thelastomatidae), é um parasita do grilo *Anurogryllus muticus* (De Geer) (Orthoptera, Gryllidae) da Argentina, neste artigo é descrito e ilustrado. É a segunda espécie do gênero *Blatticola*

encontrada parasitando grilos. As fêmeas desta nova espécie são caracterizadas pela cutícula dividida em anéis a partir da extremidade anterior até o meio do corpo. A abertura da boca, em forma subtriangular, é cercada por oito papilas cefálicas. O estoma é curto com dois semicírculos esclerotizados, já o telostoma possui um dente móvel. Ocorre um pequeno anfídio em forma de poro. O esôfago é dividido em três partes, um corpo anterior cilíndrico, um istmo distinto (com anel nervoso ao seu redor) e um bulbo basal valvado. O intestino é amplo e anterior. Sob a vista apical evidencia-se uma seção triangular, com três linhas, uma dorsal e duas latero-ventrais. Os machos possuem um par de papilas pré-anal e dois pares pós-anal. O apêndice caudal é curto, cônico e espiculado. As fêmeas, na região superior, possuem uma estrutura de ancoragem. Os ovos são ovalados e sua casca é delgada.

Palavras-chave: *Blatticola biannulata* n. sp. Oxyurida. Gryllidae. Taxonomia.

Introduction

The genus *Blatticola* was proposed by Schwenk (1) in 1926, to designating *B. blatticola* as type species. In 1932 Chitwood (2) considered this species a synonym of *B. blattae* Graeffe (3). The confused taxonomic history of the genus and of the type species was clarified by Dale (4) in 1966. The emended diagnosis of the genus given earlier was modified by Adamson & van Waerebeke (5) to accommodate the species described by Chitwood (2) in a revision of the group of thelastomatids. The genus *Blattellicola* Basir (6) and *Blatellicoloides* Farooqui (7) agree with *Blatticola* in all essential respects and they are considered synonymous. All the species described up to the present are parasites of cockroaches from all major regions of the world. While conducting field surveys on agricultural pests in Argentina in areas of La Plata, Buenos Aires province, we found nymphs of crickets parasitized by a species of this group of thelastomatids. Achinelly and Camino (8) described a new species *Blatticola cristovata*, which was the first report from a cricket in Argentina. In this contribution we report another new species of the genus, *Blatticola biannulata* n. sp. a parasite of the cricket *Anurogryllus muticus* (De Geer) (Orthoptera, Gryllidae) found in Argentina.

Material and methods

Adults and nymphs of the cricket *Anurogryllus muticus* (De Geer) (n=50) were found in a recreational park, in Villa Elisa (S 34° 54'; W 57° 58'), La Plata, Buenos Aires, Argentina. They were collected during 2006-2007 spring, using tensioactive

solution with tap water (1:3), the insects were put in plastic containers by hand and later transferred to individual vials. The insects were kept at 5°C for 10 min, and then dissected in Petri dishes filled with distilled water under a stereoscope microscope. A transverse incision was made along the posterior end of the abdomen and the digestive tract was removed to obtain the parasites. The nematodes were killed by placing them in distilled water at 60°C for 2 min. They were removed to 50% TAF solution in water for 48 h, then into pure TAF. Fixed specimens were used for drawings and measurements with the aid of a lucida camera mounted on a Zeiss compound microscope. All measurements are in µm, and presented as the mean and standard deviation, with ranges in parenthesis. Scanning electron micrographs obtained using a JEOL JSM-100 scanning electron microscope, and were used to describe the external ultrastructure of the cuticle of the nematodes. Specimens prepared for scanning electron microscopy were fixed in a cold solution of 1.5% glutaraldehyde/ 1.5% formaldehyde in 0.1M acidulate buffer (pH 7.35) overnight, postfixes in cold aqueous solution of 1% osmium peroxide overnight, transferred to 70% ethanol and hydrated in ethanol. The nematodes were dehydrated in a graded series of ethanol washes from 10% to 90%, to finish the dehydration in absolute alcohol (100%), and then critical point dried with liquid CO₂, mounted on SEM stubs, and coated with gold for 1 hour.

Description

Blatticola Schwenck, 1926.

Blatticola biannulata n. sp. (Figures 1 and 2).

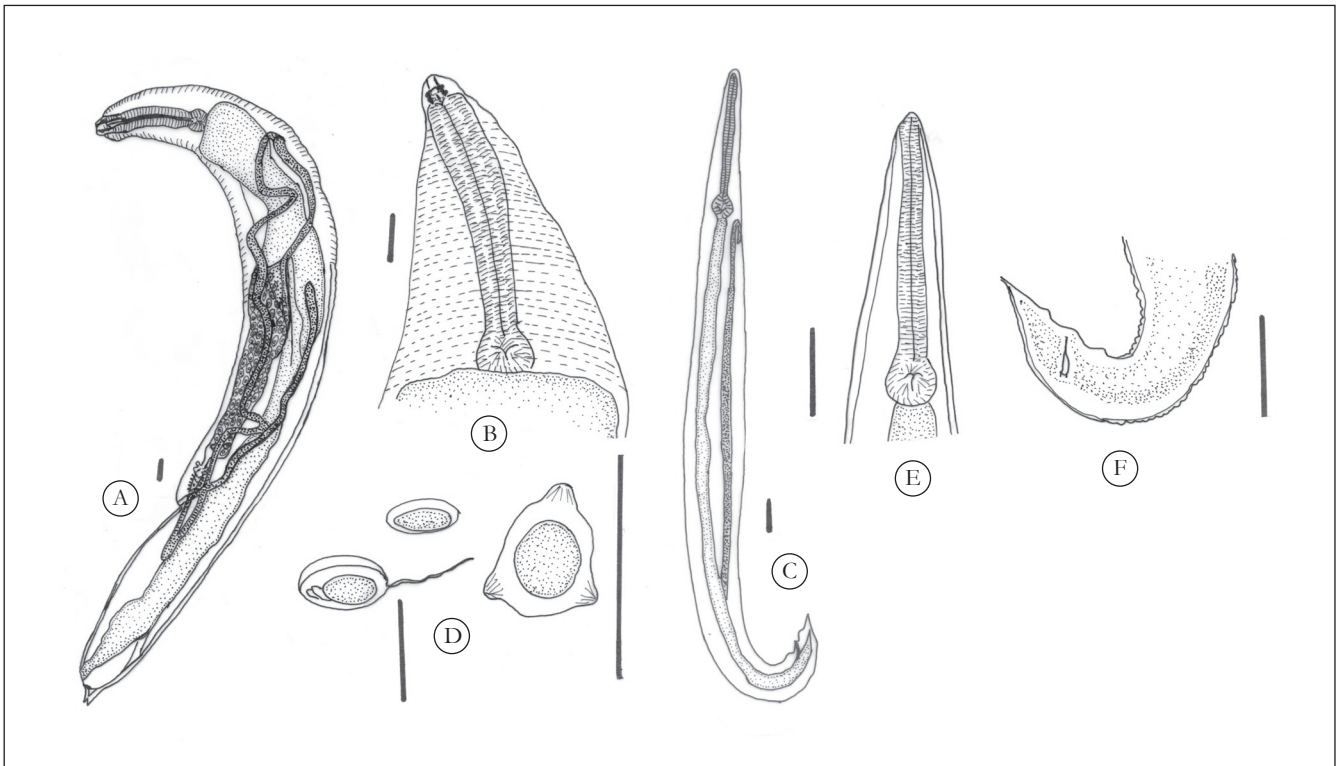


Figure 1 - *B. biannulata* n. sp. A - Female; B - Anterior end of female; C - Male; D - Eggs: lateral view and anterior view; E - Anterior end of male; F - Posterior end of male, lateral view. Bars = 100 μ m

Source: Research data.

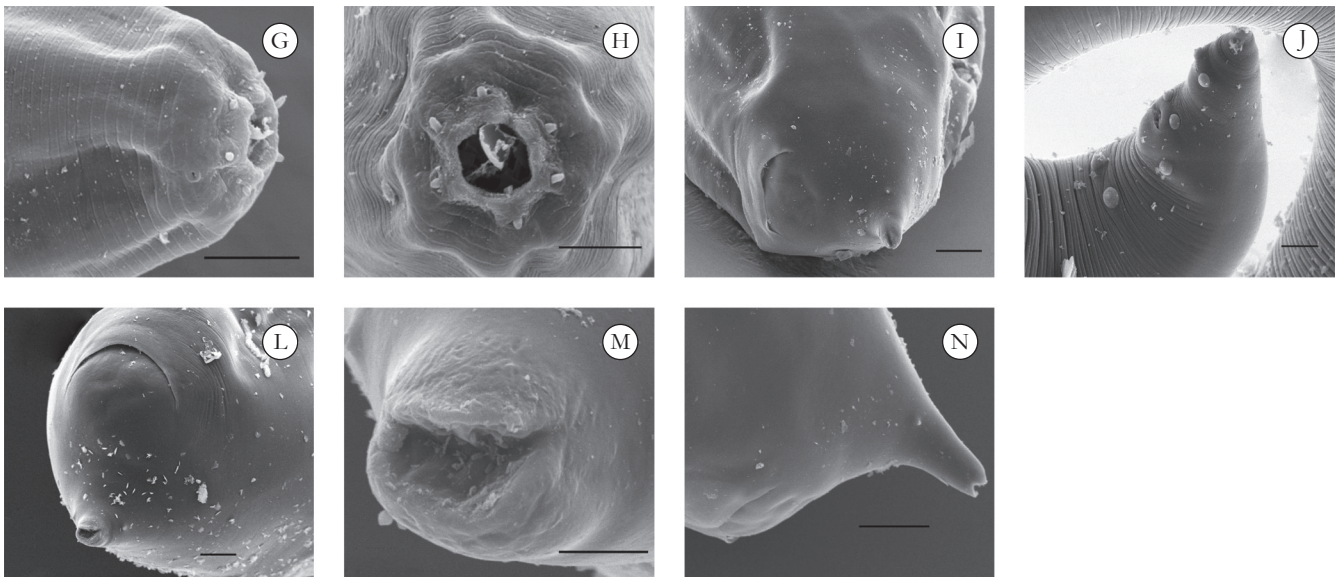


Figure 2 - *B. biannulata* n. sp. G - Anterior end of the female, finger shaped cephalic papillae. H - Front view of anterior end of female; I, L, M, N - Posterior end of female showing the structure of anchorage of the tail appendage; J - Posterior end of male with genital papillae. Bars = G, H, J, M: 10 μ m; I, L, N: 20 μ m

Source: Research data.

Small nematodes. Cuticle of the female annulated from anterior end up to middle of body. The first three rings bigger than the remaining rings (Figures 1B and 2G). Mouth surrounded by six finger-shaped cephalic papillae (Figures 2G and 2H). The first annul has the cephalic papillae, small amphids, pore-shaped, amphidial apertures small and circular positioned between second and third annulies (Figure 2H). Stoma longer than broad, with two semicircles sclerotised and the telostoma with one movable tooth (Figure 1B). Oesophagus tripartite, indistinctly sclerotised at anterior end, with corpus subparallel-sided, expanded posteriorly, short isthmus, and basal bulb valvated (Figure 1B). Nerve ring situated around isthmus. Excretory pore posterior to anterior end of intestine. Intestine broad decreasing in width posteriorly. Vulva posterior, not protruding, with one lip more developed; vagina long and narrow (Figure 1A). Uterus single, directed anteriorly from vagina, and looping near anterior end of intestine, then posteriorly to posterior end of intestine, looping again and ascend anteriorly to level of vagina. Ovary single directed anteriorly to anterior end of intestine, near excretory pore. Eggs oval, with smooth shell, in apical view showing triangular section, with three wings, with dorsal wing and two lateroventrals wings (Figure 2D). Tail appendage short, conical and pointed, with anchorage-like structure at tip for grasping (Figures 1A, 2I, 2L, 2M and 2N).

Female (n = 12): Total length: $4,532 \pm 286.29 \mu\text{m}$ (4,250-5,210); diameter of head at level of cephalic papillae: $25.13 \pm 4.6 \mu\text{m}$ (18.8-36); stoma length: $17 \pm 2.33 \mu\text{m}$ (14-20); stoma width: $11.56 \pm 2.6 \mu\text{m}$ (7.05-16); width of body at level of nerve ring: $195.25 \pm 25.92 \mu\text{m}$ (178-220); maximum body diameter: $415 \pm 49.69 \mu\text{m}$ (340-500); width of body at level of posterior end: $123.17 \pm 40.42 \mu\text{m}$ (100-230); width of body at level of vulva: $246.33 \pm 47.59 \mu\text{m}$ (120-300); distance anterior end to nerve ring: $440 \pm 52.32 \mu\text{m}$ (398-488); oesophagus length: $561.66 \pm 63.94 \mu\text{m}$ (400-650); distance from anterior end to excretory pore: $933 \pm 205.11 \mu\text{m}$ (700-1300); vagina length: $308.75 \pm 29.87 \mu\text{m}$ (290-340); vagina width: $38.5 \pm 11.65 \mu\text{m}$ (24-60); V (distance from anterior end to vulva/body length x 100): $81.32 \pm 3.38 \%$ (75.6-84.8); length and width of eggs: $84.8 \pm 2.1 \mu\text{m}$ (84.6-86.95) x $38.2 \pm 3.4 \mu\text{m}$ (37.6-39.95); tail appendage length: $86.87 \pm 39.92 \mu\text{m}$ (44-156).

Males smaller in size than females. Cuticle slightly annulated along body. Amphids small and pore-shaped. Cephalic papillae not visible with light microscopy. Stoma longer than broad, with two semicircles sclerotised; telostoma with one tooth, like in female. Oesophagus and intestine similar as in female (Figures 1C and 1E). Nerve ring surrounding isthmus. Excretory pore posterior to anterior end of intestine. Testis single, extending anteriorly, and then reflexed posteriad linearly towards posterior end of the body. Ejaculatory duct evident. Spicule single, small, linear, straight forming an arrow, without sculpture, tip pointed (Figure 1F). Capitulum and gubernaculum absent. Genital papillae arranged ventrolaterally in one pair of preanal papillae, and two pairs of postanal papillae (Figure 2J). Tail appendage short, wide, conical and pointed (Figure 1F).

Male (n = 8): Total length: $2,377 \pm 238.60 \mu\text{m}$ (2,210-2,650); diameter of head at level of cephalic papillae: $17.24 \pm 2.71 \mu\text{m}$ (14.1-18.8); stoma length: $7.44 \pm 2.45 \mu\text{m}$ (4.7-9.4); stoma width: $5.49 \pm 0.68 \mu\text{m}$ (4.7-5.9); width of body at level of nerve ring: $177.82 \pm 19.71 \mu\text{m}$ (155.1-190.35); maximum body diameter: $215.15 \pm 30.73 \mu\text{m}$ (192-250); width of body at anus level: $52.3 \pm 9.88 \mu\text{m}$ (44.65-63.45); distance anterior end to nerve ring: $228.7 \pm 15.28 \mu\text{m}$ (212-242); oesophagus length: $289 \pm 45.8 \mu\text{m}$ (256.15-304.75); distance from anterior end to excretory pore: $405 \pm 162.2 \mu\text{m}$ (239.7-564); spicule length: $43 \pm 4.8 \mu\text{m}$ (37.6-47); spicule width: $4.7 \pm 2.04 \mu\text{m}$ (3.5-7.05); tail appendage length: $73.5 \pm 3.8 \mu\text{m}$ (70.05-77.55).

Taxonomic summary

- *Type host*: nymphs of the cricket *Anurogryllus muticus* (De Geer) (Orthoptera, Gryllidae).
- *Type locality*: Recreational Park, in Villa Elisa (S 34° 54'; W 57° 58'), La Plata, Buenos Aires, Argentina.
- *Etymology*: The name refers to the two semicircles in the stoma.
- *Type material*: Deposited in the Helminthological collection of the Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina.
- *Site of infection*: Intestine, midgut.
- *Prevalence*: 20%.
- *Number of nematodes per nymph*: 1-10.

Remarks

B. biannulata n. sp. is closed to six species of the genus: *B. barryi* Zervos (9); *B. caucasica* Skrjabin (10); *B. cristovata* Achinelly e Camino (8); *B. monandros* Zervos (11); *B. supellaimae* Rao e Rao (12); *B. tuapakae* Dale (4); by having the intestine of female tapered posteriorly, and the nerve ring is located around the corpus. *B. barryi* can be distinguished from the new species by having the vulva to a distance of 17% of the length of the body, cuticle annulated only anteriorly, distinct rectal glands, the eggs with operculum, the male with three pairs of genital papillae, and two shallow constrictions in the tail. *B. caucasica* is distinguished by having mainly the male four pairs of genital papillae which two pairs are preanal and two pairs are postanal. *B. cristovata* can be distinguished by having the stoma without tooth, with thick sclerotised walls forming three pairs of plates aligned in two rows with three pairs of plates, and the genital papillae arranged ventrolaterally in one pair of preanal, one pair of adanal and two pairs of postanal papillae. *B. monandros* can be characterized by the distance from vulva to anus about 7-17% of body length, three pairs of tail genital papillae, the cuticle annulated only anteriorly, tail without sharply linear point, corpus not broadest medially, flask shaped, the egg with operculum, and the spicule short (less than 15 µm). *B. supellaimae* is separated by having the distance from vulva to anus about 5% of body length, four pairs of tail papillae, tail conical, sharply linear point, and the nerve ring located around half corpus. *B. tuapakae* is different by the distance from vulva to anus about 7 % of body length, the three pairs of tail papillae, the cuticle annulated only anterior, the tail convex conoid, tending subulated near tip. Also we can compare our species with the type species, *B. blattae* Chitwood (4), since this one possesses the diagnostic characteristics of the genus, but differs from our new species by the female with the posterior part of the intestine broader than medial intestine, outstretched testis in the male, and the nerve ring situated around the isthmus, near base the corpus.

Blatticola biannulata n. sp. is characterized by *i*) the females has the cuticle annulated up to the middle of the body, *ii*) the mouth opening subtriangular surrounded by 8 cephalic papillae, *iii*) the stoma short with two semicircles sclerotised and

the telostoma with one movable tooth, *iv*) amphids small pore shaped, *v*) oesophagus divided into three parts, anterior cylindrical corpus, isthmus distinct, and basal bulb valvated, *vi*) the nerve ring situated around the isthmus, *vii*) the intestine broadest anteriorly, *viii*) eggs oval, smooth shell, in apical view show a triangular section, with three wings, the dorsal one and two lateroventrals, *ix*) males with one pair of preanal, and two pairs of postanal papillae, and the tail appendage short, conical and pointed, *x*) the female has in the top an structure of anchorage, like structure of grasp.

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References

1. Achinelly MF, Camino NB. A new species of *Blatticola* Schwenk, 1926. (Oxyurida, Thelastomatidae) a parasite of *Anurogryllus muticus* (De Geer, 1773) (Orthoptera, Gryllidae) from Argentina. *Papéis Avulsos de Zoologia*. 2007;47:181-6.
2. Adamson ML, Van Waerebeke D. Revision of the Thelastomatoidea, Oxyurida of invertebrate host. I. Thelastomatidae. *Systematic Parasitology*. 1992; 21(1):21-63.
3. Basir MA. Nematodes parasitic on Indian cockroaches. *Proc Indian Acad Sci*. 1940;12: 8-16.
4. Chitwood BG. A synopsis of the nematodes parasitic in insects of the family Blattidae. *Z Parasit*. 1932;5:14-50.
5. Dale PS. *Blatticola tuapakae* and *Protellina gurri* n. spp., nematode parasites of the black roach. *NZJ Sci*. 1966;9:538-44.
6. Farooqui MN. *Blatellicoloides blatti* gen. et sp. nov. from *Blatella germanica*. *Ind J Helminthol*. 1966;18:97-100.
7. Graeffe E. Beobachtungen über Radiaten und Würmer in Nizza. *Denkschriften der Schweizerischen Naturforschenden Gesellschaft*. 1860;17:59.

8. Rao PN, Rao VJ. A description of a new nematode of the genus *Blatticola* (Schwenk, 1926). 13 *Annals and Magazine of Natural History*; 1965. p. 273-5.
9. Schwenk J. Fauna parasitologica dos blattideos do Brasil. *Sciences Medica*. 1926;4:491-504.
10. Skrjabin KI. Sur deux nouveaux nematodes parasites de myriapodes. 27 *Annuaire du Musée Zoologique de l'Academie des Sciences de l'URSS, Leningrad*. 1923. p. 304-9.
11. Zervos S. *Blatticola monandros* n. sp. (Nematoda: Thelastomatidae) from the blattellid cockroach *Parellipsidion pachycercum*. *NZJ Sci*. 1983;10:329-34.
12. Zervos S. *Protellus dalei* n. sp., *Blatticola barryi* n. sp., and *Suifunema mackenziei* n. sp., thelastomatid nematodes from New Zealand cockroaches. *NZJ Sci*. 1987;14:239-50.

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