



Nematodes of order Rhabditida of genus *Paracrobeles laterellus* (Heyns,1968) and *Acrobeles andalusicus* (Von Linstow, 1877) from dist. Aurangabad (M.S.) India.

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Abstract

The genus *Paracrobeles* and *Acrobeles* of plant nematodes has been described from different region of Aurangabad. The *Paracrobeles* species is characterized by body small, cylindrical, curved, cuticle annulated, annuli with longitudinal striation. Body length 0.59 mm. Lateral field, with three incisures. Lip region weakly offset, consisting of six lips arranged in three pairs, Six outer labial and four cephalic papilliform, sensilla arranged in a cephaloboid manner. Metastegmostoma, isthmus narrow, bulb oval. Nerve ring and excretory pore vary in position .Reproductive system monodelphic, prodelphic, spermatheca present. Vagina straight and perpendicular to body. Vulva with a depression. Tail conoid, slightly curved to ventral side. *Acrobeles undalusicus*(Von linstow,1877) also described with description, measurement with illustrations

Keywords: *Paracrobeles*, *Acrobeles*, Plant nematode, Aurangabad, India.

Introduction

Nematodes constitutes the largest and the most ubiquitous groups of the animal kingdom. Nematodes are important pests of crop plants in both developed and developing countries of the world. Plant parasitic nematodes are major destructive pest of agriculture. In India about 10-20% crop losses occurred due to Nematodes. Rhabditid nematodes are an interesting zoological taxon. They are very abundant in all types of soil

and sediments of freshwater bodies and play important ecological roles mainly as primary consumers. Their free-living forms display saprophagous or bacteriophagous feeding habits .However, studies of nematodes belonging to the order Rhabditida Chitwood 1933 started several year ago (shokoohi et al. 2007a, b, c, 2008, shokoohi and aBolaFia 2011).

Paracrobeles laterellus added by Heyns in 1968, from South Arica. *Paracrobeles laterellus* has also been reported from Namibia by Rashid et. al. 1990. Since the three new species have been described such as *Paracrobele spusmmophilus* by Navarro and Lluch in 1999 from Spain and, it was also reported from Italy by Orselly and Vinci Guerra in 2002. *Paracrobeles mojavicus* by Taylor, Baldwin and Mundo-Ocampo in 2004 from California USA and *Paracrobeles desterticola* by Abolafia, Divaslar, Panahi and Shokoohi in 2014 from Iran.

The genus *Acrobeles* is closely related to cephalobus and is included because of its curiosity and because it illustrates a labial development of unusual interest. Established by Von Linstow in 1877. After that many scientists worked on this genus worldwide like Rashid et al 1985, Bostrum 1990, Abolafia J., R. Pena Santiago 2004 And Shokoohi et. al. 2007, Negin Amirzadi et al 2013. Representative of this group are bacterial feeders (Yeates et al 1993) and are abundant in different type of soil.

The present paper, a part of the series on rhabditids of species *Paracrobeles laterellus* (Heyns, 1968) and *Acrobeles andalusicus*, (Von Linstow, 1877) from Aurangabad Dist. India.

Materials and Methods

Sample collection

Soil samples were collected from around the roots of citrus plant up to the depth of 0-15 cm. The samples were mixed to make a composite sample. From the composite soil sample 250 gm of soil was taken for further processing.

Plant Nematodes collection

Extracting the nematodes by Cobb's sieving and decanting method (1918) followed by Bearmann's funnel technique (Schindler 1961). Extracted sample was observed under stereoscopic binocular microscope for collection and Syracuse counting disc. Isolated nematodes were killed in hot water and fixed in FAA (Formal acetic acid)

solution. Based on morphological characteristics of adult and juvenile forms the nematodes were identified up to generic level. (Mai and Lyon, 1975).

Paracrobeles laterellus (Heyns, 1968)

Description

Specimen of plant nematodes collected from the soil around orange plant of Kannad, Dist. Aurangabad, M. S. India in the month of December 2015. Collected specimens were observed and identified.

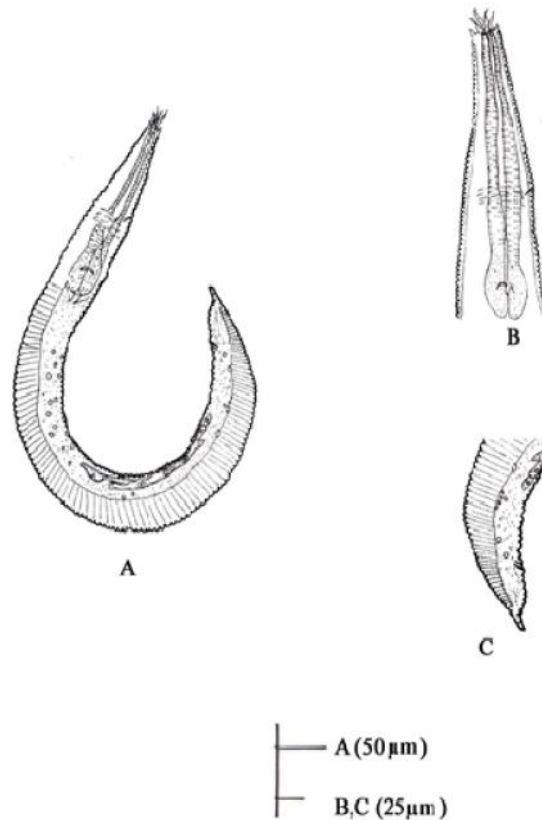
Male: Not found.

Female: Body small, cylindrical, curved, cuticle annulated, annuli with longitudinal striation. Body length 0.59 mm. Lateral field, with three incisures. Lip region weakly offset, consisting of six lips arranged in three pairs, one dorsal and two sub-ventral. Pairs of lips separated by primary axils with two acute triangular guarding processes, secondary axils shallow. Cephalic probolae four long and slender tines.

Labial probolae deeply bifurcate with long slender prongs. Six outer labial and four cephalic papilliform sensilla arranged in a cephaloboid manner. Amphid aperture rounded. Metastegmostoma, anteriorly directed tooth, pharyngeal corpus anteriorly spindle shaped posterior elongate bulbous with dilated lumen, isthmus narrow, demarcated by a break in muscular tissue, bulb oval. Nerve ring and excretory pore vary in position from the level of metacarpus.

Reproductive system monodelphic, prodelphic, Ovary reflexed posteriorly at oviduct, ovary straight posterior to vulva; spermatheca present. Vagina straight and perpendicular to body. Vulva with a depression. Post-vulval uterine sac present. Tail conoid, slightly curved to ventral side.

Figure: 1 *Paracrobeles laterellus* (Heyns, 1968)
Female



A- Whole body
B- Anterior region
C- Posterior region

Acrobeles andalusicus, (Von Linstow, 1877)

Description

Specimen of the plant nematode collected from the soil around the lemon plant at Sillod, Dist. Aurangabad, M. S. India in the month of February 2015. Collected specimen were observed and identified.

Female: Female small, almost cylindrical, Body length 0.72 mm , ventrally curved after fixation. Cuticle “single” but with a punctuation under every annules, annules 2.8 μ m in width, this more apparent at anterior body end. Lateral fields with

three incisures, Primary axils U-shaped and secondary axils V-shaped. Head region set off with the neck, three high labial probolae present, each prongs having 4 tines at inner margins and 5 at outer margins, and two elongate apical tines which adopt V shape under light microscope.

Amphid opening circular. Stoma cephaloboid with well distinct parts. Pharynx cephaloboid and 222.6 μ m in length, corpus cylindrical isthmus 34.4 μ m in length, with procorpus longer than metacarpus; isthmus narrower than metacarpus; basal bulb ovoid with vulvular apparatus at middle part; Length of nerve ring from anterior end measures 148.4 μ m, nerve ring located at level of isthmus, at 64-70% of neck length.

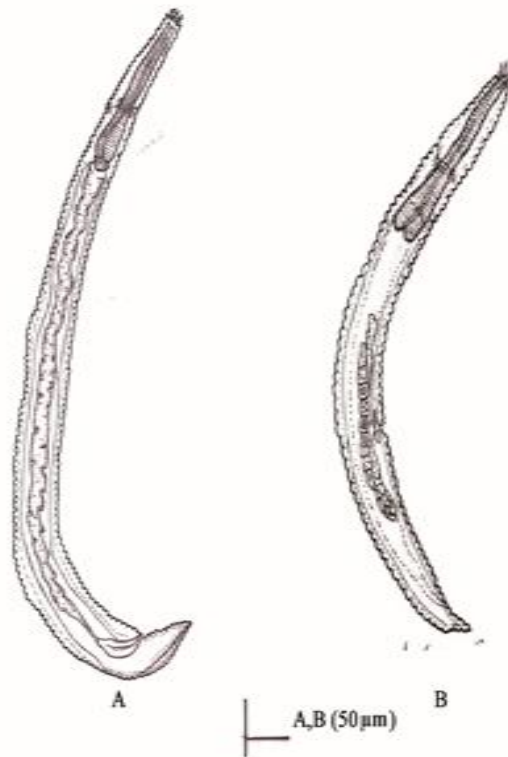
Excretory pore opening located at level of isthmus, 46-51 annuli from lip region. Length of excretory pore from anterior end measures 138.8 μ m. Cardia conoid, surrounded by intestinal tissue. Reproductive system monodelphic-prodelphic, located the right side of intestine. Ovary with flexure, with only one row of oocytes. Oviduct short.

Spermatheca well developed. Post uterine sac with length 0.6 times that of the corresponding body diameter. Vagina with inner walls with medium fold, vulva not protruding, located posterior to mid part of body. Rectum 0.9-1.0 times the anal body diameter. Tail conical.

Male:- General morphology similar to female, body curved ventrally after fixation, large than female. Body length 0.9 mm; cuticle single with annuli 2.8 μ m in width. Pharynx 205.5 μ m in length, Nerve ring from anterior end 167.5 μ m in length. Excretory pore from anterior end 167.5 μ m in length.

Reproductive system monorchid, Tail conical curved at distal part. Genital papillae including four pairs, one pairs dorsally, one pair laterally, and two pairs near tail terminus. Spicules 47 μ m in length, Spicules curved ventrally, manubrium bent ventrally and rounded; Gubernaculum long and well developed, curved ventrally.

**Figure : 2 *Acrobeles andalusicus*, (Von Linstow, 1877)
Male and Female**



A- Whole body of male
B- Whole body of female

Discussion

In present study two genus *paracrobeles* , *acroleles* from order rabditida of family cephalobidae are identified. Representative of this family are mostly terrestrial and bacteria consuming nematodes. The Mojave Desert and especially the Kelso Dunes seem to be an area with a high diversity of species of the family Cephalobidae Filipjev, 1934.

Genus *Paracrobeles* established by Heyns 1968. So far they have been found in warm, dry sandy soil in southern Africa, Spain, Italy, California and Iran(Heyns 1968; Rashid et al. 1990; Navarro & Lluch 1999; Orselly & Vinciguerra 2002; Rashid et al. 1990; Taylor et al. 2004; Abolafia et al. 2014; Joaquin Abolafia et al 2019).

The genus *Acrobeles* is closely related to cephalobus and is included because of its curiosity and because it illustrates a labial development of unusual interest. Established by Von Linstow in 1877. After that, many scientists worked on this genus worldwide by R. Pena Santiago 2004. In addition, Shokoohi et al. 2007 latter on it is also redescribed by Negian Amirzadi et al 2013.

The nematode under discussion comes closer to *Paracrobeles laterellus* (Heyns, 1968). In possessing, body length of 0.59 mm, cuticle annulated, lateral field with three incisure, lip region weakly offset , consisting of six lips arranged in three pairs, six outer labial and four cephalic papilliform, sensilla arranged in a cephaloboid manner, Amphid aperture rounded, metastegmostoma, nerve ring and excretory pore vary in position, Reproductive system monodelphic, spermatheca present, vagina straight, vulva flat, tail conoid.

However, it differs from *Paracrobeles laterellus* (Heyns, 1968) in 'a' value (17-25 μm) against (11.23 μm) in *Paracrobeles laterellus* (Heyns, 1968) and in stoma length (12 μm) against (13 μm) in *Paracrobeles laterellus* (Heyns, 1968).

The nematodes under discussion comes closer to *Acrobeles andalusicus*, (Von Linstow, 1877) in possessing body length 0.72 mm, almost cylindrical ventrally curved after fixation, cuticle single but with punctuation under every annulus. Lateral field with three incisures. Primary axils U shaped and secondary axils V shaped, Head region set off with the neck, hence high labial probolae present.

Amphid opening circular, stoma cephaloboid with well distinct part, vulvular apparatus at middle part . Nerve ring from anterior end 148.4 μm , nerve ring located at level of isthmus. Excretory pore located at level of isthmus in lateral position. Cardia conoid, reproductive monodelphic-prodelphic . Vulva at mid body, Tail conical.

However, it differs from *Acrobeles andalusicus* (Von Linstow, 1877). Shorter female body (0.72 μm) against (0.77 μm) in *Acrobeles andalusicus* (Von Linstow, 1877), vagina with inner walls medium folds less developed against well developed in *Acrobeles andalusicus* (Von Linstow, 1877), female tail (65 μm) against (72 μm) in *Acrobeles andalusicus*(Von Linstow, 1877), and spicules (47 μm) against(55 μm). Comparison with material examined by Shokoohi et al. having long and well developed gubernaculum against shorter gubernaculum.

As the character differences are minor, it is redescribed here as *Paracrobeles laterellus* (Heyns, 1968) and *Acrobeles andalusicus* (Von Linstow, 1877). It is collected from the soil around orange and the lemon plants in Sillod, District Aurangabad (M.S.) India.

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