

**FIRST RECORD OF *LONGIDORELLA XENURA* AND  
*ORIVERUTUS PARVUS* (NEMATODA: NODIIDAE)  
IN CUC PHUONG NATIONAL PARK, VIETNAM**

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**ABSTRACT:** *Longidorella xenura* and *Oriverutus parvus* from Cuc Phuong National Park are described and illustrated for the first time in Vietnam. *Longidorella xenura* species is characterized by its small body 0.72 mm long; lip region continuous; odontostyle typical of the genus, slightly arched; odontophore linear, rod-like; female genital system didelphic-amphidelphic; tail conical elongated with finely rounded tip. *Oriverutus parvus* species is characterized by its body 0.64-0.68 mm long; lip region slightly angular, offset by depression or weak constriction; lips moderately amalgamated with protruding papillae but not typically lobe-like; odontostyle moderately robust; odontophore rod-like; female genital system didelphic-amphidelphic; tail conical with pointed tip.

**Keywords:** Dorylaimida, Nordiidae, *Longidorella xenura*, *Oriverutus parvus*, morphology, Vietnam.

## INTRODUCTION

Nordiidae is poorly known dorylaimid family of free-living nematodes in Vietnam, with only one described species as *Actinolaimoides angolensis* (Andrássy, 1963) Siddiqi, 1982, which was collected from Cuc Phuong National Park in northern Vietnam by Andrásy (1970). In this paper, two species of *Longidorella xenura* and *Oriverutus parvus* in this area were recorded for the first time in Vietnam. Based on high resolution microphotographs, our study allows having better characterization of those species.

## MATERIALS AND METHODS

Soil samples were collected from a pristine tropical forest in Cuc Phuong national park, Vietnam. Nematodes were extracted from soil sample by modified Baermann funnel technique [3], killed by heat, fixed in formaldehyde 4%, transferred to anhydrous glycerol according to Siddiqi (1964) [10], and mounted on glass slides for their handling. Specimens were photographed with a Nikon Eclipse 80i microscope and a Nikon DS digital camera. Raw photographs were edited using Adobe® Photoshop® CS.

## RESULTS AND DISCUSSION

### Redescription

### *Longidorella xenura* Khan & Siddiqi, 1963 (Fig. 1)

*Syn.: Enchodorella xenura* (Khan & Siddiqi, 1963) Siddiqi, 1964; *Nordia thornei* Jairajpuri & Siddiqi, 1964 [syn. by Andrásy (1966)]; *Longidorella suviswa* Patil & Khan, 1982 [syn. by Siddiqi (2007)]; *Longidorella xesua* Saha, Lal & Singh, 2002 [syn. by Siddiqi (2007)].

**Material examined:** Two females, in a very good condition.

**Female:** Moderately slender nematodes of small size, 0.72 mm long. Body cylindrical, tapering towards both extremities, but more so towards posterior end as tail is conical. Habitus curved ventrad after fixation to an open 'C' shape. Cuticle 2.0 µm thick in anterior region, 3.0 µm in mid-body and 4.0-4.5 µm on tail, nearly smooth throughout the body, although visibly irregular at ventral side of caudal region (see figure 1). Lateral chord 5.5-7.0 µm wide at mid-body, occupying about one-fourth (23%) of corresponding body diameter. Lip region continuous, 2.4 as broad as high and approximately one-fifth (20%) of body diameter at neck base. Amphid fovea cup-shaped, its aperture 4-6 µm or about three-fourths (70%) of lip region diameter. Cheilostom cylindrical, lacking any differentiation. Odontostyle typical of the genus, slightly arched, 7.2 times as long as lip region width and about 6.0% of total body length.

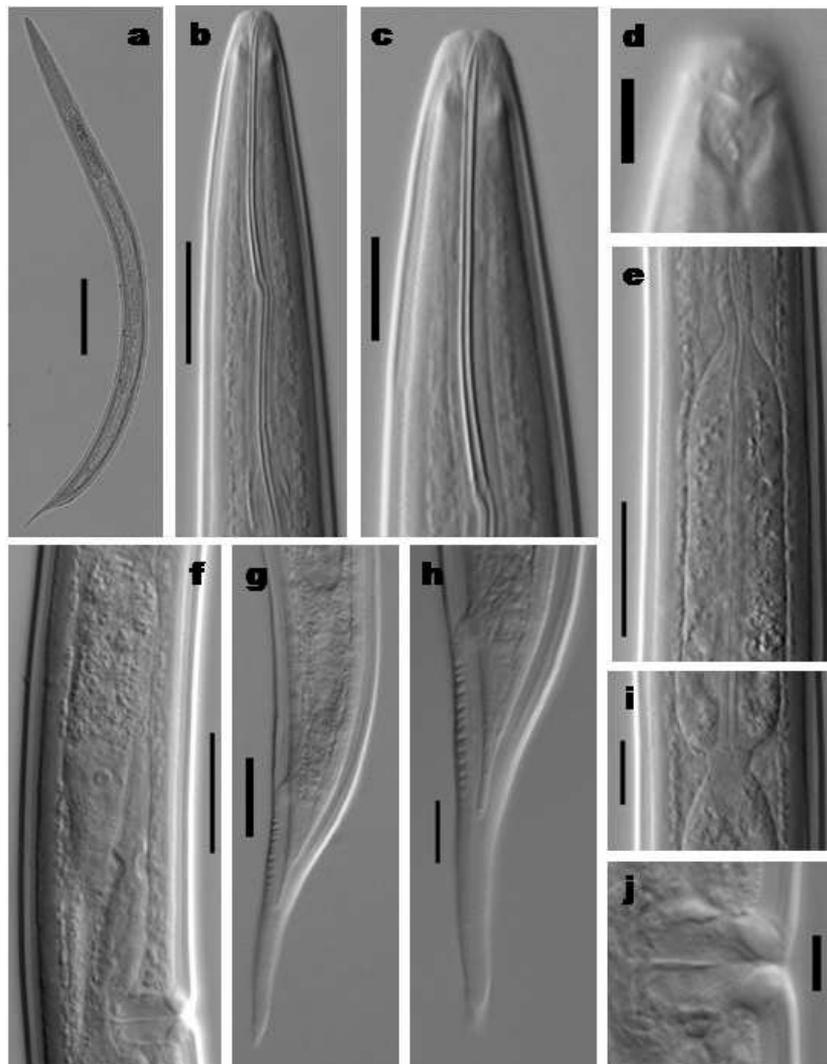


Figure 1. *Longidorella xenura* Khan & Siddiqi, 1963 (female, LM)

a. Entire; b, c. Anterior region in median view; d. Lip region in surface view; e. Pharyngeal enlargement; f. Anterior genital branch; g. Posterior body region; h. Caudal region; i. Pharyngo-intestinal junction; j. Vagina. (Scale bars: a = 100  $\mu$ m; b, e-g = 20  $\mu$ m; c, h, i = 10  $\mu$ m; d, j = 5  $\mu$ m).

Guiding ring at 25  $\mu$ m from anterior end. Odontophore linear, rod-like as long as odontostyle. Anterior region of pharynx slender and poorly muscular, enlarging abruptly and separate from basal expansion by a short and weak narrowing; basal expansion 4.5-5.8 times as long as broad, 2.7-3.2 times as long as body diameter, occupying up to two-fifths (38-39%) of total neck length; pharyngeal gland nuclei located as follows: DO = 63-64, DN = 67-68,

S<sub>1</sub>N<sub>1</sub> = 81, S<sub>1</sub>N<sub>2</sub> = 88 S<sub>2</sub>N = 93-94. Cardia conical, 10  $\times$  6.0  $\mu$ m. Genital system didelphic-amphidelphic, with both branches equally and well developed, the anterior branch is 80-87  $\mu$ m and the posterior branch is 80-83  $\mu$ m long. Ovaries well developed, often surpassing the sphincter level, the anterior part is 68-76  $\mu$ m and the posterior part is 56-60  $\mu$ m long, with oocytes arranged in a single row. Oviduct quite short 35-38  $\mu$ m long or 1.1-1.2 times

corresponding body diameter, consisting of slender part with prismatic cells and a very poorly developed *pars dilatata*. A distinct sphincter separates oviduct and uterus. Uterus a simple tube, 19-25  $\mu\text{m}$  long or 0.6-0.7 times corresponding body diameter. Vagina extending inwards 13  $\mu\text{m}$  or about two-fifths (37-43%) of body diameter: *pars proximalis* as long as broad,  $7-9 \times 7-8 \mu\text{m}$ , with somewhat sigmoid walls and surrounded by weak musculature; *pars refringens* with (in lateral view) two close pieces measuring  $3 \times 4 \mu\text{m}$  and with a combined width of 8  $\mu\text{m}$ ; and *pars distalis* very short.

Vulva a post-equatorial, transverse slit. Prerectum about 1.7 time and rectum approximately 0.7-1.1 time of anal body diameter long. Tail conical elongated with finely rounded tip; ventrally nearly straight, dorsally first convex and then somewhat concave; the cuticle at the anterior ventral side of tail shows distinct irregularities consisting of coarse striation and or weak wrinkles; hyaline portion 35  $\mu\text{m}$  long or about one-half of tail length; caudal pores two pairs, sub-dorsal, at the middle of tail.

*Male*: Not found.

Table 1. Morphometric data of *Longidorella xenura* Khan & Siddiqi, 1963, All measurements are in  $\mu\text{m}$  except ratios a, b, c, c' and L in mm.

Reference	Distribution	<i>Longidorella xenura</i>	
		India	Vietnam
		Khan & Siddiqi (1963)	Present paper
		Type material	Paratype
n		?? ♀♀	2 ♀♀
L		0.69-0.75	0.72, 0.72
a		22-24	20.7, 24.1
b		2.8-2.9	3.0, 3.0
c		?	9.3, 11.1
V		59-61	57, 59
c'		?	3.6, 4.3
Lip region diameter			6.0, 6.0
Odontostyle length		44	43, 43
Odontophore length		?	40, 45
Neck length		?	239, 240
Pharyngeal expansion length		?	90, 93
Body diameter - neck base		?	29, 33
Body diameter - mid-body		?	30, 35
Body diameter - anus		?	18, 18
Prerectum length		?	30, 30
Rectum length		?	12, 20
Tail length		?	65, 78

?. no information.

### Remarks

The two Vietnamese females perfectly fits with the previous ones (Khan & Siddiqi, 1963 [6]; Loof, 1964 [7]; Jairajpuri & Siddiqi, 1964 [5], as *Nordia thornei*; Jairajpuri & Hooper, 1969 [4], Suryawanshi, 1971 [12]; Patil &

Khan, 1982 [8], as *Longidorella suviswa*; Saha et al., 2002 [9], as *L. xesua*), although new morphological details as well as morphometrics are herein provided, especially those referring to genital system. It is remarkable that *pars refringens vaginae* are well developed in the two specimens examined.

*Longidorella xenura* is only known to occur in tropical areas so far, since it has been repeatedly reported from India, also from Venezuela (Loof, 1964) and Cameroon (Siddiqi, 2007) [11], and now from Vietnam.

***Oriverutus parvus* Ahmad & Araki, 2002 (Fig. 2)**

*Material examined:* Two females, in acceptable condition.

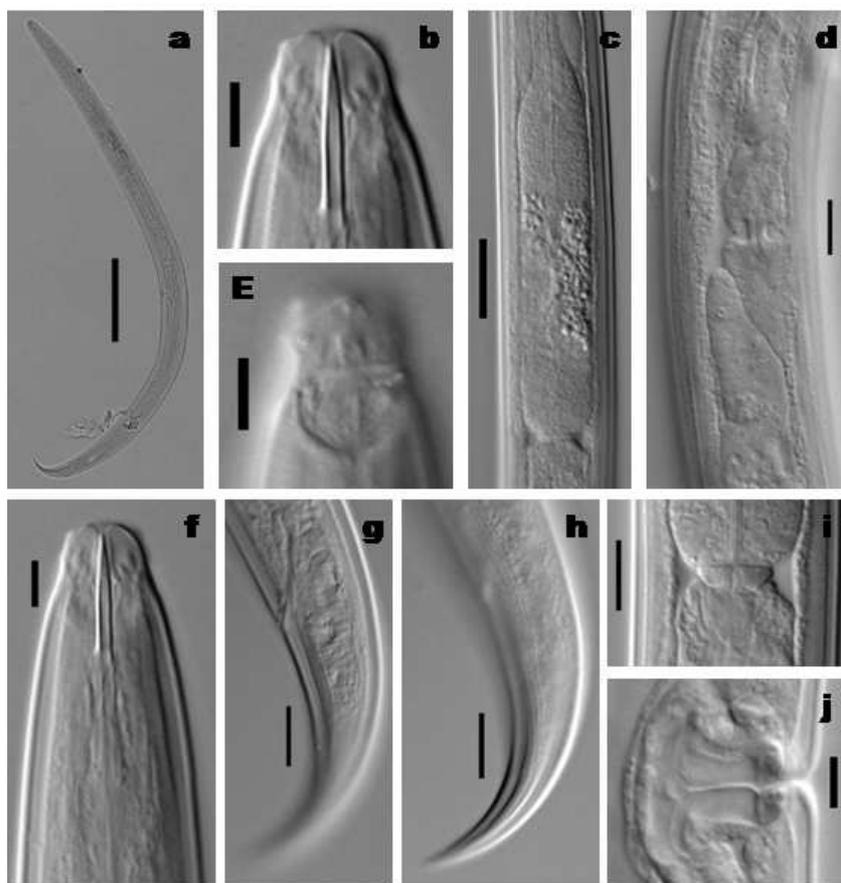


Figure 2. *Oriverutus parvus* Ahmad & Araki, 2002 (female, LM).

a. Female, entire; b, f. Anterior region in median view; c. Pharyngeal expansion; d. Female, posterior genital branch; g, h. Caudal region; i. Pharyngo-intestinal junction; j. Vagina. (Scale bars: a = 100  $\mu$ m; b, e, f, j = 5  $\mu$ m; c = 20  $\mu$ m; d, g, h, i = 10  $\mu$ m).

*Female:* Moderately slender nematodes of small size, 0.64-0.68 mm long. Habitus after fixation curved ventrad, C-shaped. Body cylindrical, tapering towards both ends, but more so posteriorly due to conical tail. Cuticle 2.0  $\mu$ m thick in anterior region, 2.5  $\mu$ m at mid-body and 2.5  $\mu$ m on dorsal region of tail; outer layer with very fine transverse striation and thinner than inner one. Lateral chord 7.0  $\mu$ m wide or occupying one-fifth (23%) of mid-body

diameter, lacking any particular differentiation. Body pores obscure in material examined. Lip region slightly angular, offset by depression or weak constriction, 1.9 times as wide as high, and about one-third of body diameter at neck base; lips moderately rather amalgamated, with protruding papillae but not typically lobe-like. Amphid fovea cup-shaped, its aperture occupying 7.0  $\mu$ m or about two-thirds of lip region diameter. Cheilostom almost cylindrical,

with no special differentiation. Odontostyle moderately robust, approximately 8.5 times as long as wide, 1.2-1.4 times longer than lip region diameter or 1.68% of total body length; aperture about one-fourth of total length. Odontophore 1.3-1.5 times as long as odontostyle, rod-like. Guiding ring simple, located at 5.0-5.5  $\mu\text{m}$  or 0.6-0.7 lip region diameter from anterior end. Pharynx consisting of a slender muscular anterior portion enlarging gradually, pharyngeal expansion 4.7 times as long as broad and 2.7-2.8 corresponding body diameter long, occupying about two-fifths (40%) of total neck length. Cardia short, with three well developed cardia glands. Genital system didelphic-amphidelphic, with both branches equally and well developed, anterior branch is 105  $\mu\text{m}$  and posterior branch is 100  $\mu\text{m}$  long; ovaries large, the anterior 60  $\mu\text{m}$  and the posterior 66  $\mu\text{m}$  reaching level of sphincter, and with oocytes first in two or more rows, then in one row; oviduct short, the anterior 45  $\mu\text{m}$  and the posterior 50  $\mu\text{m}$  or 1.6 body

diameter long, consisting of a slender portion with prismatic cells and a moderately developed *pars dilatata* with distinct lumen; sphincter well marked between oviduct and uterus; uterus a simple tube-like structure, 30-32  $\mu\text{m}$  long or as long as body diameter; vagina extending inwards 13.0  $\mu\text{m}$  or about two-fifths (40%) of body diameter: *pars proximalis* wider than long, 10.0  $\mu\text{m}$   $\times$  8.0  $\mu\text{m}$ , with convergent walls and enveloped by weak circular musculature, *pars refrigens* with (in lateral view) two drop-shaped sclerotizations, as long as wide, 3.0-4.0  $\times$  3.0  $\mu\text{m}$ , and with a combined width of 7.0-8.0  $\mu\text{m}$ , and *pars distalis* short, 2.0  $\mu\text{m}$  long; vulva a slightly post-equatorial transverse slit. Prerectum about 2.5 time and rectum is 1.5 time of anal body diameter long. Tail conical with pointed tip, regularly curved ventrad; hyaline portion very short; caudal pores two pairs, at the posterior half of tail, one subdorsal, another subventral.

*Male:* Unknown.

Table 2. Morphometric data of *Oriverutus parvus* Ahmad & Araki, 2002. All measurements are in  $\mu\text{m}$  except ratios a, b, c, c' and L, in mm.

Reference	Distribution	<i>Oriverutus parvus</i>		
		Japan [1]		Vietnam (Present paper)
		Holotype	Paratype	Paratype
n		1♀	2♀♀	2♀♀
L		0.69	0.66-0.72	0.64, 0.68
a		22	20-21	20.7, 22.1
b		3.2	3.2-3.2	2.8, 3.0
c		17.3	17.7-18.6	12.8, 13.7
V		54	55	59.1, 53.8
c'		1.96	1.85-1.87	3.1, 3.1
Lip region diameter		10	10-11	8.0, 8.0
Odontostyle length		13	13-14	12.0, 14.0
Odontophore length		16.5	17-18	24, 24
Guiding ring from anterior end		5.7	6.5	5.0, 5.5
Neck length		206	205-222	225, 225
Pharyngeal expansion length		81	83-84	90, 90
Body diameter - neck base		?	?	32, 33
Body diameter - mid-body		?	?	31, 31
Body diameter - anus		?	?	16, 16
Prerectum length		45	40-48	40, 40
Rectum length		18	18-20	22, 22
Tail length		39	37-39	50, 50

?. no information

## Remarks

The two specimens examined are morphometrically very similar to type specimens from Japan [1], although the tail is longer in Vietnamese specimens (50 vs 37-39,  $c = 13-14$  vs  $c = 17-19$ ,  $c' = 3.1$  vs  $c' = 1.8-2.4$ ). Taking into account that only a few specimens (three and two, respectively) have been hitherto studied in both cases, they are tentatively regarded as belonging to the same species, although it might be different.

Ahmad (2007) [2] described four females from Singapore and identified them as *O. parvus*, but they are larger (body length 0.87-0.97 mm) and bear longer odontostyle (15-16  $\mu\text{m}$ ). Hence this material might not be nonspecific with the previous one. This species is reported for the first time in Vietnam.

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**PHÁT HIỆN MỚI HAI LOÀI TUYẾN TRÙNG THUỘC HỌ NORDIIDAE  
(NEMATODA: DORYLAIMIDA) CHO KHU HỆ VIỆT NAM  
Ở VƯỜN QUỐC GIA CÚC PHƯƠNG**

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**TÓM TẮT**

Tuyến trùng sống tự do trong đất họ Nordiidae là một trong những họ thuộc bộ Dorylaimida ít được biết đến nhất ở Việt Nam, cho đến nay, mới chỉ có 1 loài *Actinolaimoides angolensis* (Andrássy, 1963) Siddiqi, 1982 được phát hiện từ Vườn quốc gia Cúc Phương. Bài báo này ghi nhận thêm 2 loài tuyến trùng cho khu hệ Việt Nam là *Longidorella xenura* Khan & Siddiqi, 1963 và *Oriverutus parvus* Ahmad & Araki, 2002.

Loài *Longidorella xenura* Khan & Siddiqi, 1963 có kích thước cơ thể nhỏ, L = 0,72 mm; vùng môi tròn và không tách biệt với đường viền cơ thể. Odontostyle dài, mảnh mai cong nhẹ hình cánh cung đặc trưng cho giống. Con cái có hệ sinh sản đôi *didelphic-amphidelphic* với hai nhánh phát triển đều nhau. Đuôi hình chóp kéo dài với mút đuôi tròn.

Loài *Oriverutus parvus* Ahmad & Araki, 2002 có kích thước cơ thể nhỏ, L = 0,64-0,68 mm, vùng môi hình chữ nhật hơi tách biệt với đường viền của cơ thể và có phần phụ nhỏ cao, các môi hợp lại với nhau chứ không tạo dạng thùy đặc trưng của giống *Oriverutus*. Odontostyle ngắn, lumen rõ ràng, lỗ mở rộng. Con cái có hệ sinh sản đôi *didelphic-amphidelphic* với hai nhánh phát triển đều nhau. Đuôi hình chóp kéo dài và uốn cong về phía bụng với mút đuôi tròn.

*Từ khóa:* Dorylaimida, Nordiidae, ghi nhận mới, tuyến trùng, Cúc Phương, Việt Nam.

*Ngày nhận bài:* 8-1-2013