

## Systematic Study of Dorylaimida from Korea\*

### 1. Three Unrecorded Species of Longidorinae (Dorylaimida : Longidoroidea) from Korea

## 韓國產 槍線蟲目的 系統分類學的 研究

### 1. 韓國產 바늘線蟲亞科의 3 未記錄種에 관하여

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**Abstract** – Hitherto only one species of Longidorinae, *Longidorus sylphus* was recorded from Korea by Choi and Moon (1988). Three unrecorded species of Longidorinae, *L. litchii*, *L. himalayensis* and *Paralongidorus sali* were found in Korea for the first time during the systematic study of Dorylaimida from Korea. They are described and illustrated. Some differences are discussed.

**Key Words** – Longidorinae, *Longidorus litchii*, *L. himalayensis*, *Paralongidorus sali*, Korea

**초 록** – 지금까지 한국에서는 바늘선충아과에 *Longidorus sylphus* 1종만 알려졌으나 금번 한국산 창선충목의 계통분류학적 연구중, *L. litchii*, *L. himalayensis*, *Paralongidorus sali* 등 3종의 바늘선충이 새로이 발견되어 그 형태적 특징을 기술 도시하였다.

**검색어** – 바늘線蟲亞科, 히말라야바늘선충, 낙우송바늘선충, 사리바늘선충, 韓國

## Materials and Methods

The nematodes were fixed with 70°C hot F:G 4-1 fixative and dehydrated by Seinhorst's rapid glycerin method. Measurements were made with a drawing attachments.

## =*Neolongidorus himalayensis* Khan, 1987

· 히말라야바늘선충 (신칭)

(Figs. 1, 4)

**Measurements:** Female(n=10): L=3.9mm ± 0.5(3.4~5.0); a=88.3 ± 8.4(79.5~104.0); b=9.6 ± 1.8 (7.1~12.3); c=118.8 ± 7.4(107.4~130.0); c' =0.9 ± 0.1(0.8~1.0); V=49.2% ± 1.6(47.6~53.1); Odontostyle=136.5 μm ± 5.0 (126.7~144.2); Odontophore=70.8 μm ± 9.5 (59.5~88.2); Anterior end to guide ring=74.3 μm ± 3.2 (69.3~79.8). Tail length=29.6 μm ± 1.4 (28.0~32.2); Oesophagus length=421.4 μm ± 57.7 (332.1~523.2); Body

## Description

***Longidorus himalayensis* (Khan, 1987) Xu and Hooper, 1990**

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width=45.1  $\mu\text{m} \pm 4.8$  (39.9~53.9); Lip width=15.0  $\mu\text{m} \pm 1.0$  (13.3~16.1).

**Female:** Body ventrally curved in "C" shape when relaxed by gentle heating. Body tapering anteriorly with rather narrow 13.3~16.1  $\mu\text{m}$  width. Lateral body pores present. Lip region roundly conical and slightly depressed. Amphidial pouch symmetrically bilobed. Odontostyle typical of the genus, odontostyle and odontophore junction simple not forked. Spear guide ring single, located at 69.3~79.8  $\mu\text{m}$  from anterior end. Oesophagus dorylaimid, posterior part cylindroid. Cardia rounded. Vulva as a depressed transverse slit. Gonads didelphic, amphidelphic, reflexed. Prerectum not distinct, rectum 14.7~28.0  $\mu\text{m}$  long. Tail dorsally convex conoid, 28~32.2  $\mu\text{m}$  long, anal body width long and terminus with considerably thickened cuticle.

**Male:** Not found.

**Discussion:** Korean specimens had a longer body length (3.4~5.0 mm vs. 3.4~3.9 mm), odontostyle slightly longer (126.7~144  $\mu\text{m}$  vs. 115~125  $\mu\text{m}$ ) and guide ring slightly posteriorly located (69.3~79.8  $\mu\text{m}$  vs. 55~60  $\mu\text{m}$ ).

**Locality and habitat:** Taebaek mountain (*Rhododendron yedoense* var. *poukhanense* Nak)

### *Longidorus litchii* Xu and Cheng, 1992

낙우송마늘선충 (신칭)

(Figs. 2, 4)

**Measurements:** Table 1.

**Female:** Body medium size, ventrally curved as "C" shaped when relaxed by gentle heat, tapering towards both ends. Lip region broadly rounded anteriorly, 14.0~15.4  $\mu\text{m}$  wide at the base, slightly off set from the body contour. Amphids obscure, the base bilobed; amphidial aperture pocket-like. Odontostyle typical of the genus with simple base, odontophore base slightly swollen. Guiding ring single, very posteriorly located, 65.1~81.9  $\mu\text{m}$  from the anterior end. Oesophagus typical of the genus. Cardia well developed, hemispherical. Vulva a transverse slit, vagina extending about half the corresponding body width. Gonads paired, opposed with reflexed ovaries. Prerectum 302.4~356.4  $\mu\text{m}$  long, rectum 28.1~31.5  $\mu\text{m}$  long. Tail rather short, dorsally convex, tip bluntly rounded.

**Male:** Not found.

**Discussion:** Body length slightly shorter (3.03~4.64 mm vs. 4.14~5.29 mm in female) and guide ring more anterior (65.1~81.9  $\mu\text{m}$  vs. 82.5~96.5  $\mu\text{m}$ ) than the original description. The measurements of Korean populations were not much different by localities. But the odontostyle of Jinan population were slightly longer than other populations.

**Locality and habitat:** Kyeryong mountain (*Lindera erythrocarpa* Makino). Sobaek mountain (*Euonymus macropterus* Rupri). Mich'ŏn, Chinyang (*Castanea crenata* S. et. Z.). Chuwang mountain (*Quercus variabilis* Blume). Yongdam, Chinan (*Taxodium distichum* Rich). Jiri mountain (*Pinus koreinsis* et. Z., *Carpinus laxiflora* Blume). Mai mountain, Chinan (*Quercus acutissima* Carri). Sobaek mountain (*Euonymus macropterus* Rupr). Ingye, Sunch ang (*Quercus serrata* Thunb).

### *Paralongidorus sali* Siddiqi and Hooper, 1963

사리마늘선충붙이 (신칭)

(Figs. 3, 5)

**Measurements:** Female(n=9): L=3.34 mm  $\pm 0.21$  (3.0~3.63); a=67.3  $\pm 3.4$  (61.7~71.7); b=8.0  $\pm 0.3$  (7.6~8.6); c=120.9  $\pm 6.8$  (110.9~131.0); c'=0.7  $\pm 0.0$  (0.6~0.8); V=48.1%  $\pm 1.0$  (46.0~49.9); Odontostyle=112.4  $\mu\text{m} \pm 2.5$  (109.0~116.8); Ondontophore=66.5  $\mu\text{m} \pm 7.3$  (54.1~83.7); Anterior end to guide ring=37.7  $\mu\text{m} \pm 1.5$  (34.2~39.9).

**Female:** Body slightly ventral curved when relaxed by gentle heating. Body tapering anteriorly with rather narrow lip region. Lip region roundly conical and continuous with the body contour. Amphidial aperture distinct slit-like, about half as long as lips width. Amphidial pouches funnel-shaped in lateral view. Lateral body pores not obviously. Odontostyle attenuated, odontophore with a slightly swollen base, that is not flanged. Guide ring single, 34.2~40  $\mu\text{m}$  from anterior end. Oesophagus dorylaimid, posterior enlarged part cylindroid. Cardia rounded-conoid. Nerve ring just behind of the odontophore. Vulva a transverse slit with slightly raised lips. Gonads paired, opposed with reflexed ovaries, the oocytes in a single row. Rectum 14.4~18.0  $\mu\text{m}$  long. Tail rounded, slightly expanded, about anal body width long; cuticle at the terminus thickened appearing in two layers, the inner being radially striated. Two lateral pores are present on both sides of the tail.

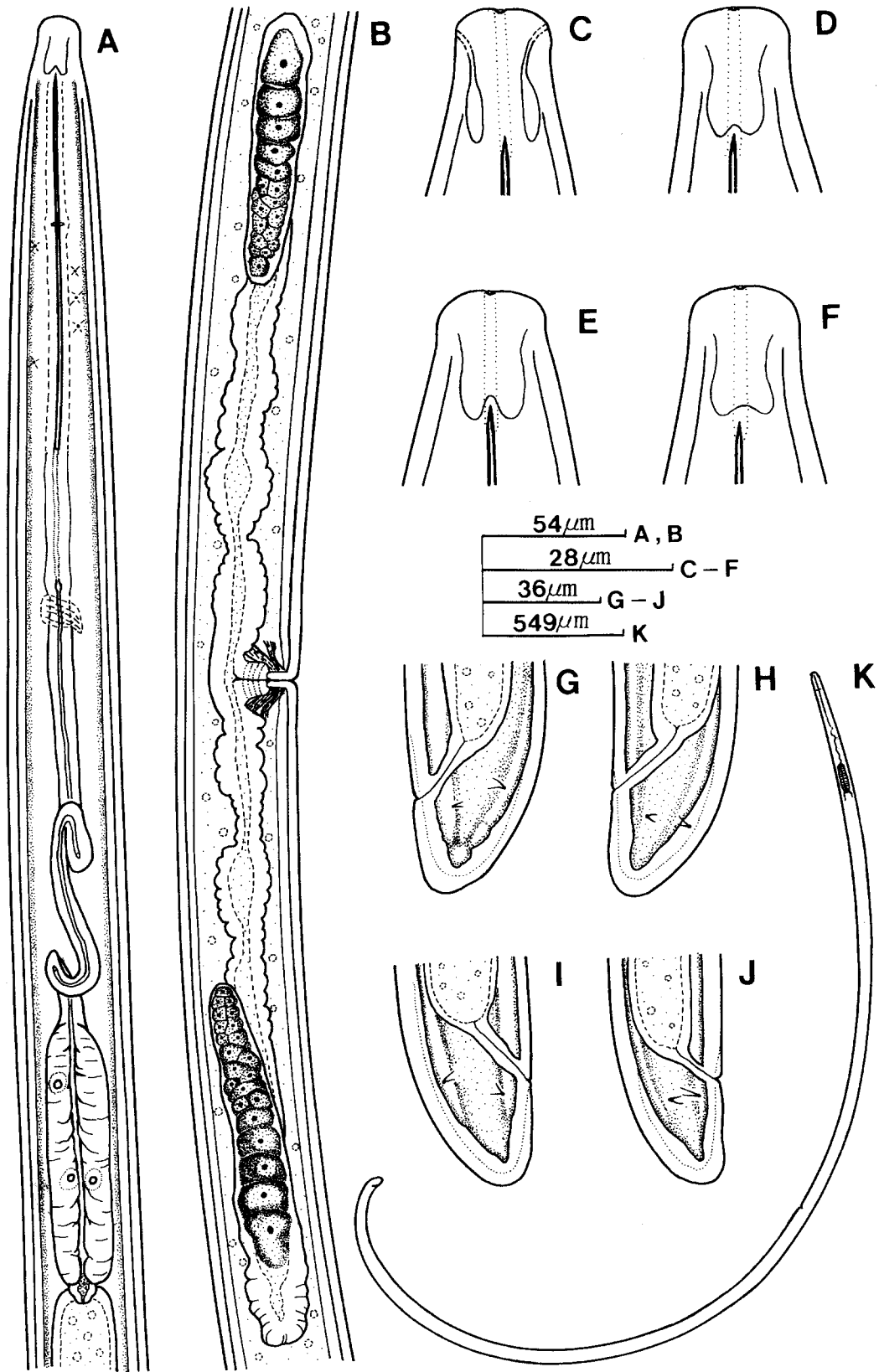


Fig. 1. *Longidorus himalayensis*. A: Anterior part of body, B: Female gonad, C-F: Anterior end showing amphidial pouch, C ventral view, D-F lateral view, G-J: Female Tail, K: Entire female.

Table 1. Morphometric comparison of *Longidorus litchii* from different localities in Korea

Characters	Xu & Cheng n=25	K1 n=20	K2 n=10	K3 n=10	K4 n=10	K5 n=5	K6 n=8	K7 n=8	K8 n=7	K9 n=3	K10 n=7
L (μm)	4560 ± 350 (4140~5290)	3824 ± 252 (3035~3748)	3785 ± 478 (3249~4788)	3356 ± 252 (3034~3748)	3480 ± 232 (3152~3848)	4003 ± 228 (3728~4292)	3689 ± 305 (3326~4212)	3962 ± 341 (3654~4275)	4135 ± 407 (3363~4645)	3919 ± 284 (3579~4275)	3837 ± 423.0 (3470~4440)
a	78 ± 3.3 (72~84)	71.3 ± 5.8 (63.3~86.1)	66.4 ± 4.8 (58.9~73.0)	68.6 ± 5.4 (60.5~79.3)	62.2 ± 4.3 (61.1~75.7)	66.4 ± 4.3 (60.0~72.5)	65.9 ± 3.9 (61.5~73.1)	65.5 ± 3.8 (58.1~71.2)	75.8 ± 9.1 (64.1~85.3)	75.6 ± 2.8 (72.1~79.0)	67.6 ± 2.1 (65.5~70.5)
b	8.5 ± 1.0 (7.2~11.3)	8.0 ± 0.9 (6.3~9.4)	7.9 ± 1.0 (6.5~9.4)	8.0 ± 0.8 (6.1~8.8)	7.5 ± 0.9 (6.5~9.5)	9.2 ± 0.6 (8.7~10.1)	8.9 ± 1.1 (6.8~10.7)	9.0 ± 0.8 (8.0~10.7)	9.8 ± 1.1 (8.4~11.3)	8.3 ± 0.1 (8.2~8.4)	8.6 ± 0.9 (7.7~9.9)
c	163 ± 15.0 (139~197)	118.3 ± 20.2 (91.6~163.4)	116.3 ± 4.8 (89.8~157.8)	113.2 ± 8.0 (98.8~121.7)	108.2 ± 9.6 (87.2~121.3)	118.2 ± 8.5 (108.3~127.8)	119.7 ± 11.3 (106.4~138.8)	118.8 ± 16.3 (97.3~144.0)	128.2 ± 17.6 (98.3~156)	124.6 ± 10.5 (114.3~139.0)	123.6 ± 10.8 (108.6~133.5)
c'	0.7 ± 0.05 (0.61~0.79)	0.7 ± 0.1 (0.6~0.8)	0.7 ± 0.1 (0.6~0.8)	0.8 ± 0.1 (0.7~0.9)	0.8 ± 0.05 (0.7~0.8)	0.7 ± 0.0 (0.7~0.8)	0.8 ± 0.2 (0.6~1.3)	0.7 ± 0.1 (0.6~0.8)	0.7 ± 0.1 (0.6~0.8)	0.7 ± 0.0 (0.6~0.7)	0.7 ± 0.0 (0.6~0.7)
V(%)	52.0 ± 1.3 (49~54)	51.5 ± 1.1 (49.7~53.8)	52.3 ± 2.0 (50.4~57.4)	49.8 ± 0.8 (47.8~50.7)	51.0 ± 1.1 (49.0~52.0)	50.1 ± 0.8 (49.2~51.4)	50.0 ± 1.8 (47.8~53.8)	49.3 ± 1.3 (46.4~51.5)	48.5 ± 2.1 (45.7~51.4)	48.8 ± 1.3 (47.0~50.0)	51.9 ± 0.8 (51.1~53.0)
Odontostyle (μm)	155 ± 8.1 (138~171)	134 ± 5.4 (122.5~141.8)	137.4 ± 4.1 (131.6~142.1)	135.3 ± 4.6 (128.8~144.8)	137.0 ± 3.3 (132.0~141.0)	141.7 ± 7.6 (135.6~155.8)	133.4 ± 4.5 (122.4~137.9)	140.5 ± 4.6 (132.8~148.0)	136.9 ± 5.3 (127.1~143.6)	140.3 ± 1.7 (138.0~142.0)	140.7 ± 2.6 (137.0~143.0)
Odontophore (μm)	95 ± 4.5 (88~107)	75.7 ± 7.6 (52.5~85.8)	67.0 ± 2.2 (64.1~77.7)	69.0 ± 5.6 (61.3~80.5)	73.0 ± 3.7 (68.0~78.0)	79.4 ± 11.0 (71.2~71.8)	77.9 ± 15.7 (55.8~100.8)	88.1 ± 10.8 (75.2~107)	72.3 ± 11.2 (63.2~98.0)	71.5 ± 1.1 (70.0~72.3)	72.0 ± 2.2 (70.0~75.0)
Guiding Ring (μm)	90.0 ± 3.8 (82.5~96.5)	74.5 ± 2.8 (69.0~79.8)	67.3 ± 2.2 (65.1~71.4)	72.7 ± 2.5 (69.6~77.1)	74.5 ± 3.6 (69.3~81.9)	73.2 ± 2.7 (70.6~78.0)	69.9 ± 1.7 (66.6~72.3)	76.6 ± 3.0 (70.1~80.0)	74.0 ± 3.6 (68.4~77.5)	77.7 ± 3.0 (73.5~79.8)	71.7 ± 3.3 (68.0~76.0)
Tail Length (μm)	28.0 ± 1.66 (25.5~32.0)	30.5 ± 4.5 (23.1~38.5)	30.3 ± 2.9 (23.8~33.6)	28.2 ± 2.0 (25.2~32.2)	28.7 ± 1.3 (26.6~30.8)	---	---	---	---	---	---
Oesophagus (μm)	---	480.3 ± 39.2 (421.8~574.6)	486.9 ± 58.9 (414.4~584.6)	421.8 ± 42.3 (355.2~518.0)	463.2 ± 29.2 (407.0~503.2)	---	---	---	---	---	---

K1=Kyeryong mountain (*Lindera erythrocarpa* Makino), K2=Sobaek mountain (*Euonymus macropterus* Rupr.), K3=Mich'ŏn, Chinyang (*Castanea crenata* S. et. Z.), K4=Chuwang mountain (*Quercus variabilis* Blume), K5=Youngdam, Chinan (*Taxodium distichum* Rich), K6=Jiri mountain (*Pinus korensis* et. Z.), K7=Mai mountain, Chinan (*Quercus acutissima* Carri), K8=Sobaek mountain (*Euonymus macropterus* Rupr.), K9=Ingye, Sunch ang (*Quercus serrata* Thunb), K10=Jiri mountain (*Carpinus laxiflora* Blume).

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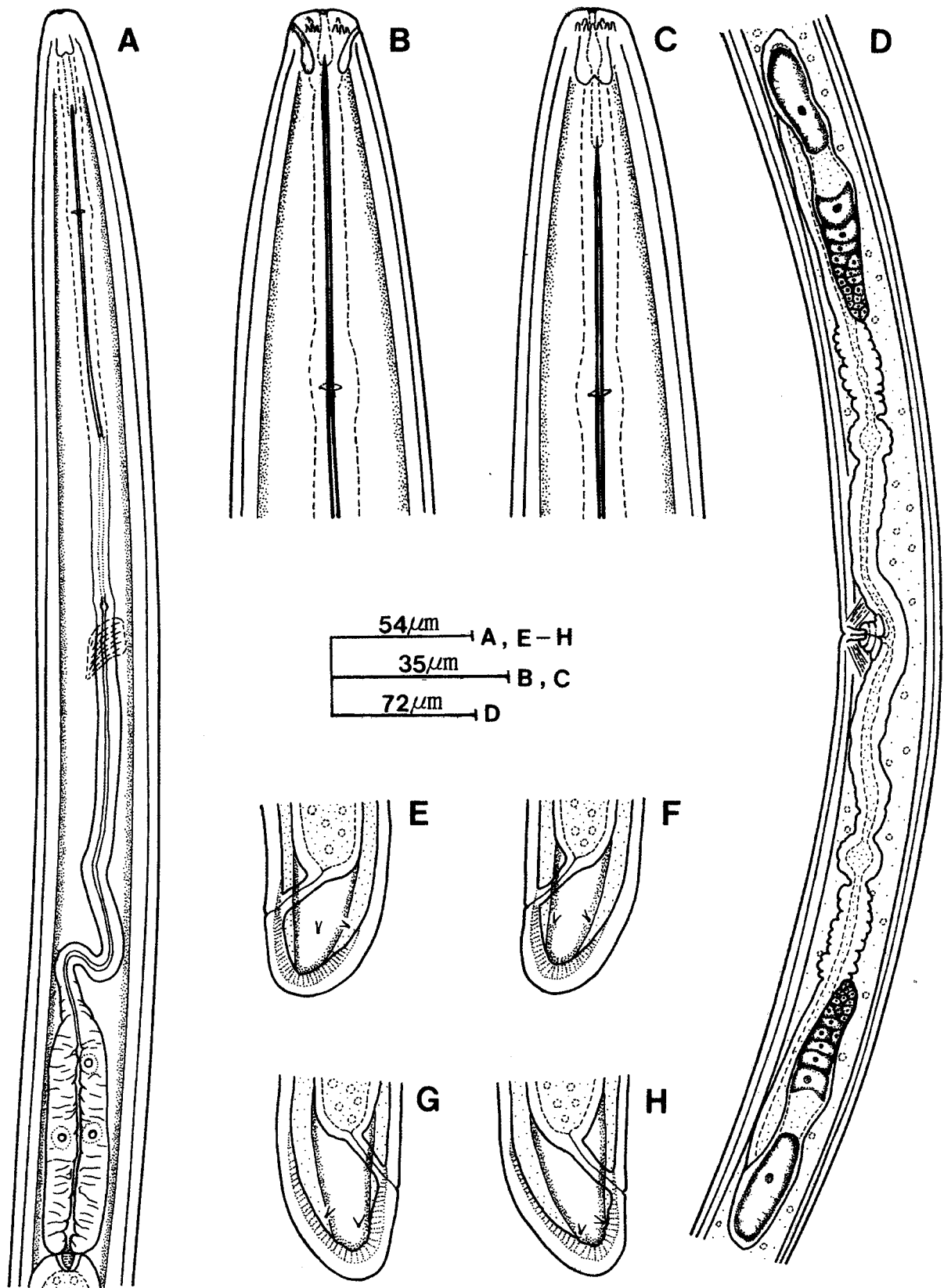


Fig. 2. *Longidorus litchii*. A: Anterior part of body, B, C: Anterior end showing amphidial pouch, B in ventral view, C, in lateral view, D: Female gonad, E-H: Female Tail.

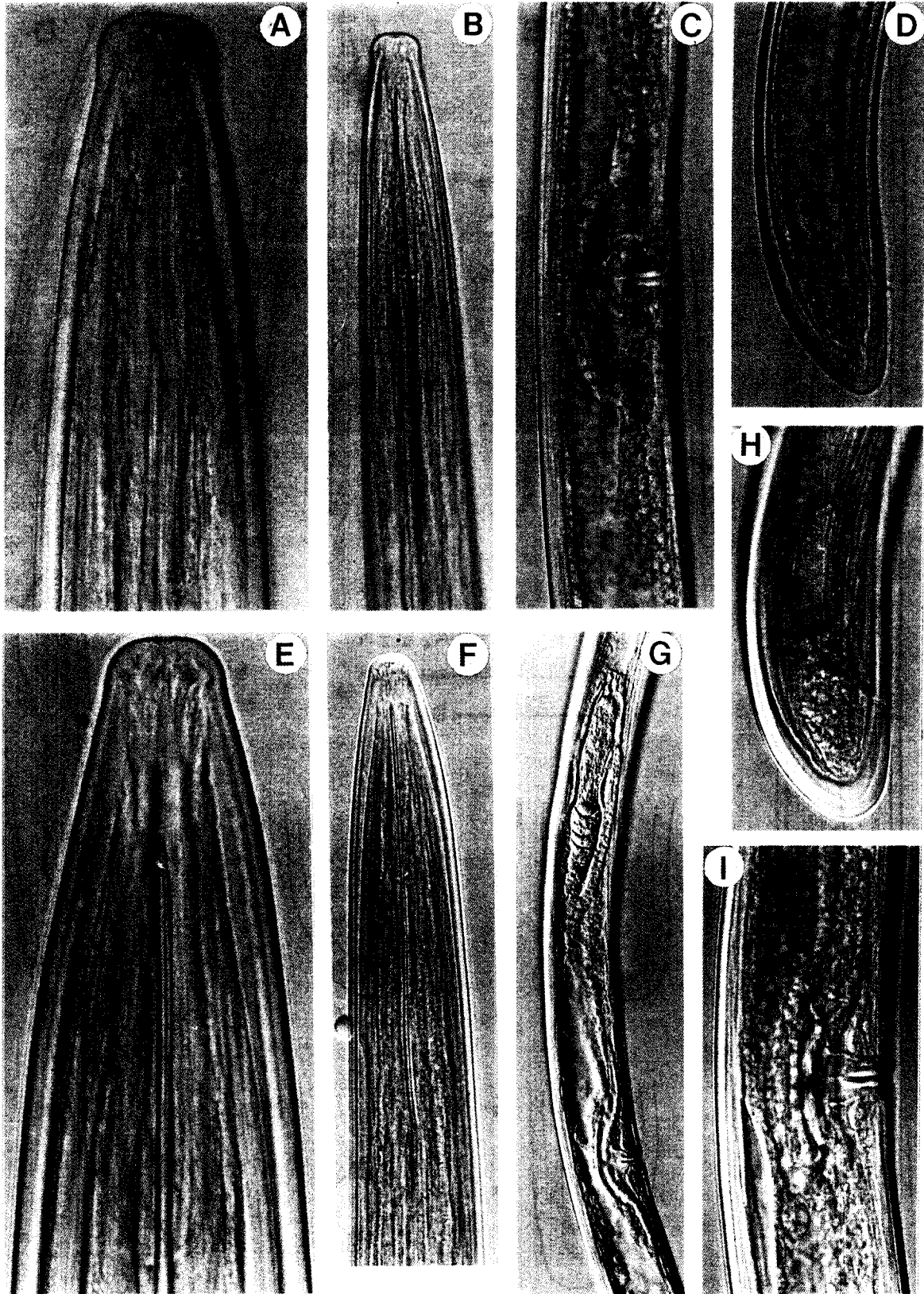


Fig. 3. A-D: *Longidorus himalayensis*. A: Head part, B: Anterior part, C: Vulva region, D: Posterior part. E-I: *Longidorus litchii*. E: Head part, F: Anterior part, G: Female anterior gonad, H: Posterior part, I: Vulva region.

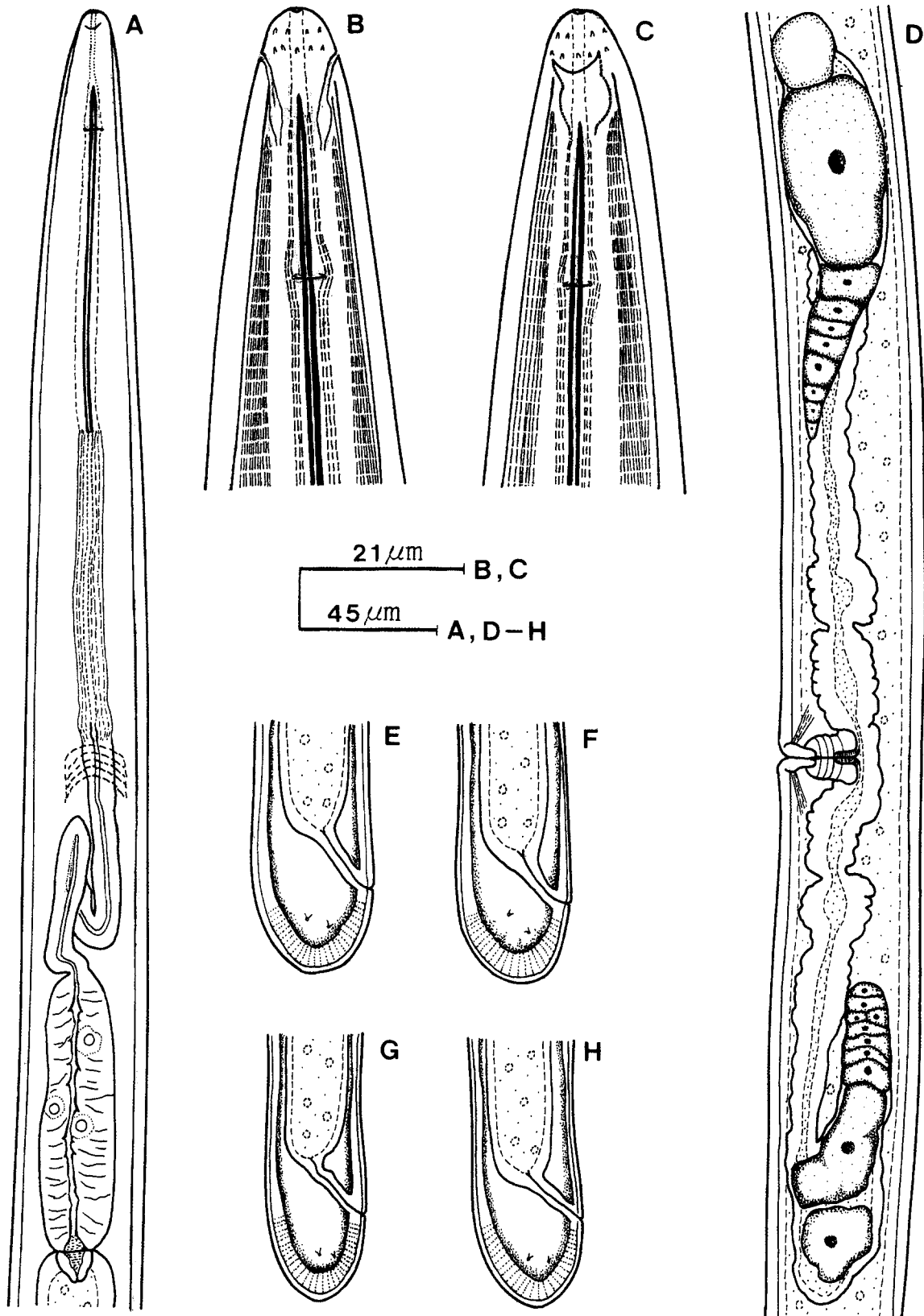


Fig. 4. *Paralongidorus sali*. A: Anterior part of body, B, C: Anterior end showing amphidial pouch, B ventral view, C, lateral view, D: Female gonad, G-H: Female Tail.

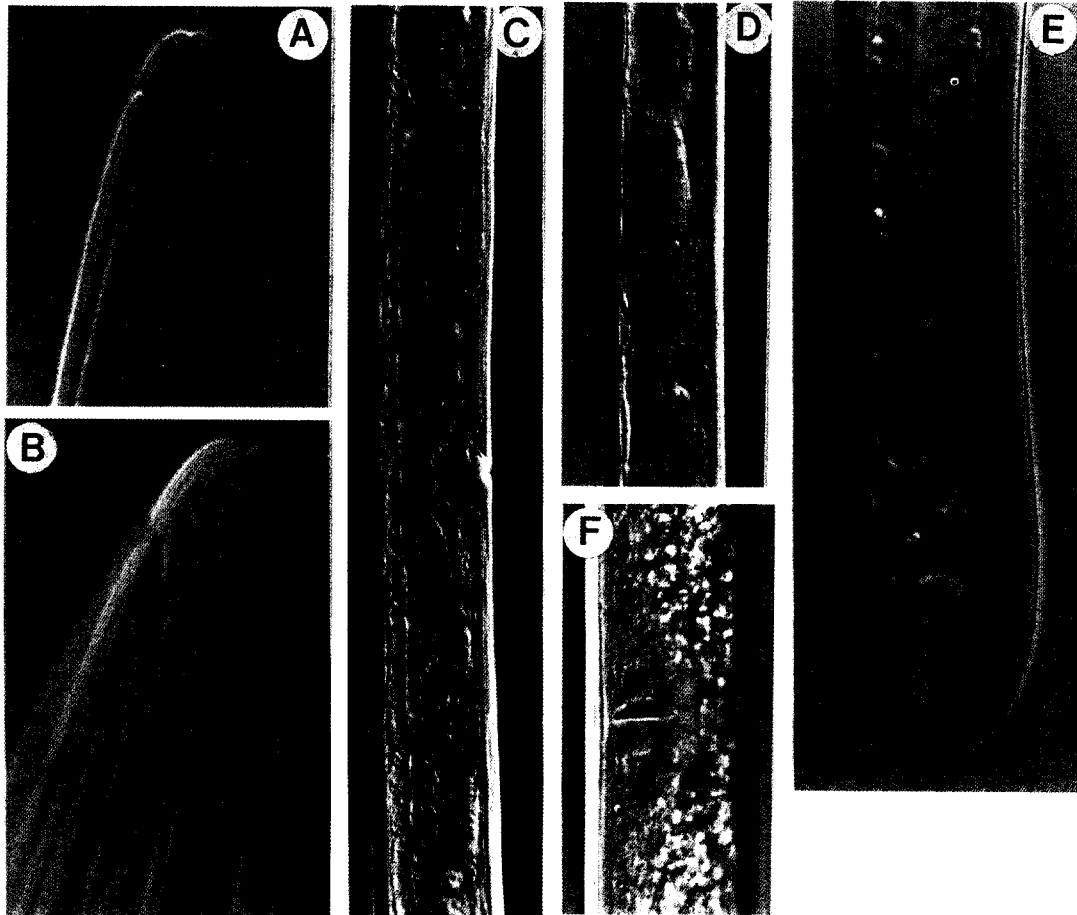


Fig. 5. *Paralongidorus sali*. A, B: Ventral view of head, C: Vulva region, D: Posterior part of oesophagus, E: Female posterior part, F: Vulva ventral view.

**Male:** Not found.

**Discussion:** Korean specimens had a longer body length (3.0~3.6 mm vs. 2.2~2.8 mm); guide ring more posterior (34.2~39.9  $\mu\text{m}$  vs. 30~32  $\mu\text{m}$ ); the odontostyle slightly longer (109.0~116.8  $\mu\text{m}$  vs. 98~107  $\mu\text{m}$ ) and vulval position slightly anterior (46.0~49.9% vs. 50~54%) than original description.

**Locality and habitat:** Daebongri, Ch'ŏngyang (*Pinus densiflora* L.).

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