

A New and An Unkwn Species of *Geocenamus* (Nematoda: Belonolaimidae) from Korea

韓國産 여섯줄萎縮線蟲屬 (*Geocenamus*)의 1新種 및 1未記錄種

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Abstract – A new species, *Geocenamus seonunensis* n. sp. and an unknown species, *Geocenamus processus* (Siddiqi, 1979) Brzeski, 1991 were newly reported from Korea. The Korean specimens closely related to *G. myungsugae* Choi & Geraert, 1993 but differ from *G. myungsugae* in having; Lip region set off by constriction and much longer stylet (Lip region is button-like, set off, stylet 22~27 μ m in *G. myungsugae*). It further differs from *G. tumensis* (Skwiercz, 1984) Brzeski, 1991 in having spermatheca rounded, stylet much longer, from *G. superbus* (Allen, 1955) Fortuner & Luc, 1990 in having tail terminus annulated, from *G. brevicaudatus* (Peng & Hunt, 1995) Brzeski, 1998 in having much longer stylet, from *G. longus* (Wu, 1969) Tarjan, 1973. in having smaller number of longitudinal striae. Another Korean specimens are well corresponded with *Geocenamus processus* (Siddiqi, 1979) Brzeski, 1991 except male tail tip which is not flagellum-like.

Key Words – Systematics, *Geocenamus seonunensis*, *Geocenamus processus*, Belonolaimidae, Korea

초 록 – 여섯줄 위축선충속에 1신종 *Geocenamus seonunensis* n. sp.과 1미기록종 *Geocenamus processus* (Siddiqi, 1979) Brzeski, 1991를 새로히 채집하였다; *Geocenamus seonunensis* n. sp.는 *G. myungsugae* Choi & Geraert, 1993와 비슷하나 구순부가 단추모양이 아니고, 구침 길이가 56~67 μ m으로 훨씬 긴 점이 다르다. *G. tumensis* (Skwiercz, 1984) Brzeski, 1991와는 둥근 수정낭을 가지고, 구침이 훨씬 긴 것이 다르고, *G. superbus* (Allen, 1955) Fortuner & Luc, 1990와는 꼬리 끝이 주름진 것이 다르고, *G. brevicaudatus* (Peng & Hunt, 1995) Brzeski, 1998와는 구침이 긴 것이 다르고, *G. longus* (Wu, 1969) Tarjan, 1973.와는 표피의 종주선의 수가 적은 것이 다르다.

검색어 – 분류, 선운萎縮線蟲, 뽕죽꼬리萎縮線蟲, 한국

Twenty three species in four different genera were reported hitherto during the systematic study of Belonolaimidae from Korea. *Geocenamus seonunensis* n. sp. and *Geocenamus processus* (Siddiqi, 1979) Brzeski, 1991 were newly collected from Korea. In this paper, morphological characteristics of the species were de-

scribed and illustrated in detail.

Materials and Methods

Soil samples were collected around the root of Korean Ash (*Fraxinus rhynchophylla* Hance) from Seonun-sa,

* 이 논문은 2000년 농촌진흥청 농업과학기술원 선충분류 용역사업에 의하여 수행된 결과의 일부임.

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Gochang-gun, Jeonrabuk-do and Korean pine tree (*Pinus koraiensis* Sieb et Zucc) from Hamyang-gun, Gyeongsangnam-do. The nematodes were fixed in 70°C F:G 4-1 fixative and dehydrated by a Seinhorst's rapid glycerin method. Measurements were made with a drawing tube attachment. Photographs was taken by using Nomarski differential interference attachment.

Description

Geocenamus seonunensis n. sp. 선운萎縮線蟲 (신칭) (Figs. 1, 2)

Measurements:

Holotype (Female). L = 1030 μ m; a = 32; b = 5.8; c = 25; c' = 1.4; V = 57%; m = 65%; Stylet = 59.4 μ m; Body width = 32 μ m; Oesophagus = 176 μ m; Anterior end to excretory pore = 151 μ m; Anus to phasmid = 16.2 μ m \pm 3.7 (11-19.7); Tail = 41.4 μ m;

Paratype (Female n = 6). L = 998 μ m \pm 92.4 (875-1112); a = 30.4 \pm 3.1 (25-33); b = 5.6 \pm 0.4 (5-6); c = 26.3 \pm 5.0 (21-37); c' = 1.3 \pm 0.2 (1.0-1.5); V = 56% \pm 1.6 (54.4-58.4); m = 64.1% \pm 2.2 (62-68); Stylet = 60 μ m \pm 4.1 (56-67); Body width = 33 μ m \pm 3 (29-38); Oesophagus = 178 μ m \pm 11.4 (162-196); Anterior end to excretory pore = 150 μ m \pm 11 (133-162); Anus to phasmid = 37 μ m \pm 7.2 (25.4-45.1); Tail = 39 μ m \pm 6.6 (29-47);

Paratype (Male n = 8). L = 841 μ m \pm 70.2 (752-940); a = 30 \pm 1.2 (28-32); b = 5 \pm 0.4 (4.6-5.7); c = 17 \pm 1.8 (14-20); c' = 2 \pm 0.3 (1.6-2.4); m = 64% \pm 2.5 (62-69); Stylet = 59 μ m \pm 2.7 (55-63); Body width = 28 μ m \pm 2.2 (25-31); Oesophagus = 169 μ m \pm 11.4 (151-180); Anterior end to excretory pore = 134 μ m \pm 7.4 (123-145); Tail = 50 μ m \pm 5.8 (44-59); Cloaca to phasmid = 23.5 μ m \pm 2.2 (21-28); Spicule = 30 μ m \pm 1.6 (27-32); Gubernaculum = 8.2 μ m \pm 0.8 (7.3-9.5).

Female: Body cylindrical, tapering anterior. Lip region hemispherical, set off by constriction, with 6-7 annuli. divided into six equal sectors separated by longitudinal grooves. Labial disc distinct. Cephalic skeleton inconspicuous. Cuticle coarsely annulated with 28-32 longitudinal striation at mid-body. Cuticle 2.2-2.8 μ m thick on mid-body and 3.1-5.5 μ m thick on tail terminus. Lateral field with six incisures, out bands of lateral field areolated. Stylet well developed, 56-67 μ m long, cone longer than shaft (m = 62-68%). Dorsal esophageal gland orifice 3-5 μ m behind stylet base. Median bulb elongate-oval,

isthmus thin, basal bulb elongated. Cardia rounded. Excretory pore at the level anterior part of basal bulb, 133.4-162.2 μ m from anterior end. Female reproductive system amphidelphic, ovary well developed (G1 = 32.5%, G2 = 36.4%), anterior gonad often refrexed; posterior gonad reaching to anus level. Vulva sunken, transvers slit, with double epiptigma. Vagina wall thickened. Spermatheca small, rounded, filled with rounded sperm. Tail short, cylindrical, with 18-24 annuli, terminus bluntly rounded, striated. Phasmids large, at slightly anterior to middle of tail length (25-45%). Terminal hyaline part of tail 7-11 μ m long.

Male: Spicule slightly bent. Bursa narrow, envelops tail tip. Gubernaculum simple, ventrally curved. Hypoptygma double. Tail tip process with 6-8 annuli, hyaline 10-18 μ m. Phasmids at about middle of tail length (40-54%).

Diagnosis: *Geocenamus seonunensis* n. sp. closely related to *G. myungsugae* Choi & Geraert, 1993 but differs from *G. myungsugae* in having; Lip region set off by constriction and much longer stylet (Lip region is button-like, set off, stylet 22-27 μ m in *G. myungsugae*). It further differs from *G. tumensis* (Skwiercz, 1984) Brzeski, 1991 in having spermatheca rounded, stylet much longer (spermatheca bilobed, stylet 25-30 μ m in *G. tumensis*). From *G. superbus* (Allen, 1955) Fortuner & Luc, 1990 in having tail terminus annulated, phasmid slightly anterior to middle of tail and male tail tip rounded, annulated (Tail terminus not annulated, phasmids slightly posterior to middle of tail and male tail tip sharply conical in *G. superbus*). From *G. brevicaudatus* (Peng & Hunt, 1995) Brzeski, 1998 in having stylet much longer, lip with 6-7 annuli (stylet 22-25 μ m, lip with 5-6 annuli in *G. brevicaudatus*). From *G. longus* (Wu, 1969) Tarjan, 1973. in having smaller number of longitudinal striae 28-32, tail shorter 29-47 μ m, cylindrical, c = 21-37 (Number of longitudinal striae 56-68, tail longer 57-92 μ m, conical, c = 14-20 in *G. longus*).

Type locality and habitat: Soil around the roots of Korean Ash (*Fraxinus rhynchophylla* Hance). Seonun-sa, Gochang-gun, Jeonrabuk-do.

Type specimens: Holotype and paratype female on slides D-450 deposited at the laboratory of nematology, Department of Agricultural Biology, College of Agriculture, Kyungpook National University. Taegu, Korea.

Geocenamus processus (Siddiqi, 1979) Brzeski, 1991 뽕족꼬리萎縮線蟲 (신칭) (Figs. 3, 4)

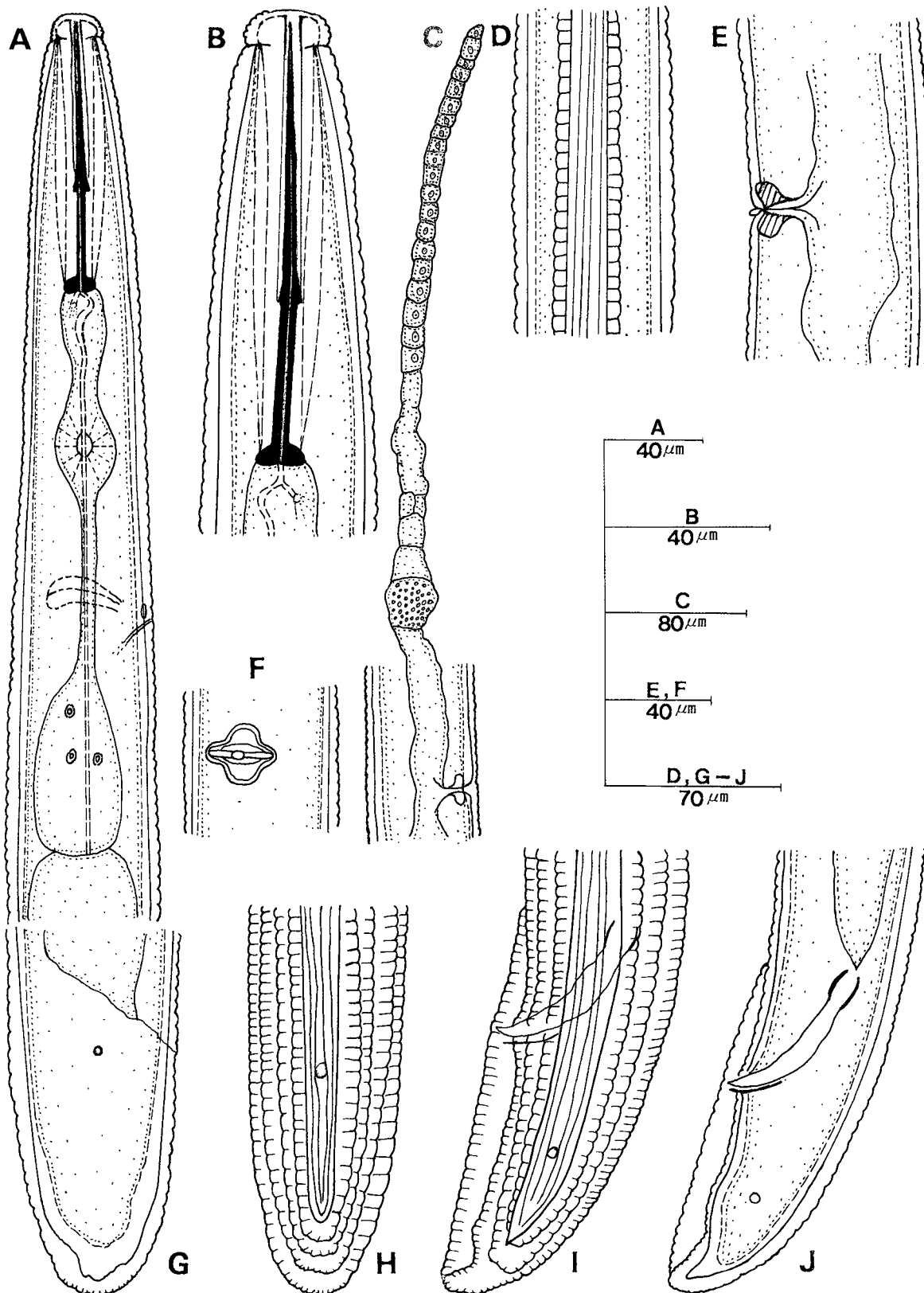


Fig. 1. *Geocenamus seonunensis*: A. female anterior region; B. head; C. female gonad; D. lateral field; E. vulva; F. vulva ventral view; G, H. female tail; I, J. male tail.



Fig. 2. *Geocenamus seonunensis*: A. female head; B. female tail; C. male tail; D. female oesophageal region; E. male tail surface view; F. lateral field; G. vulva lateral view; H. vulva ventral view.

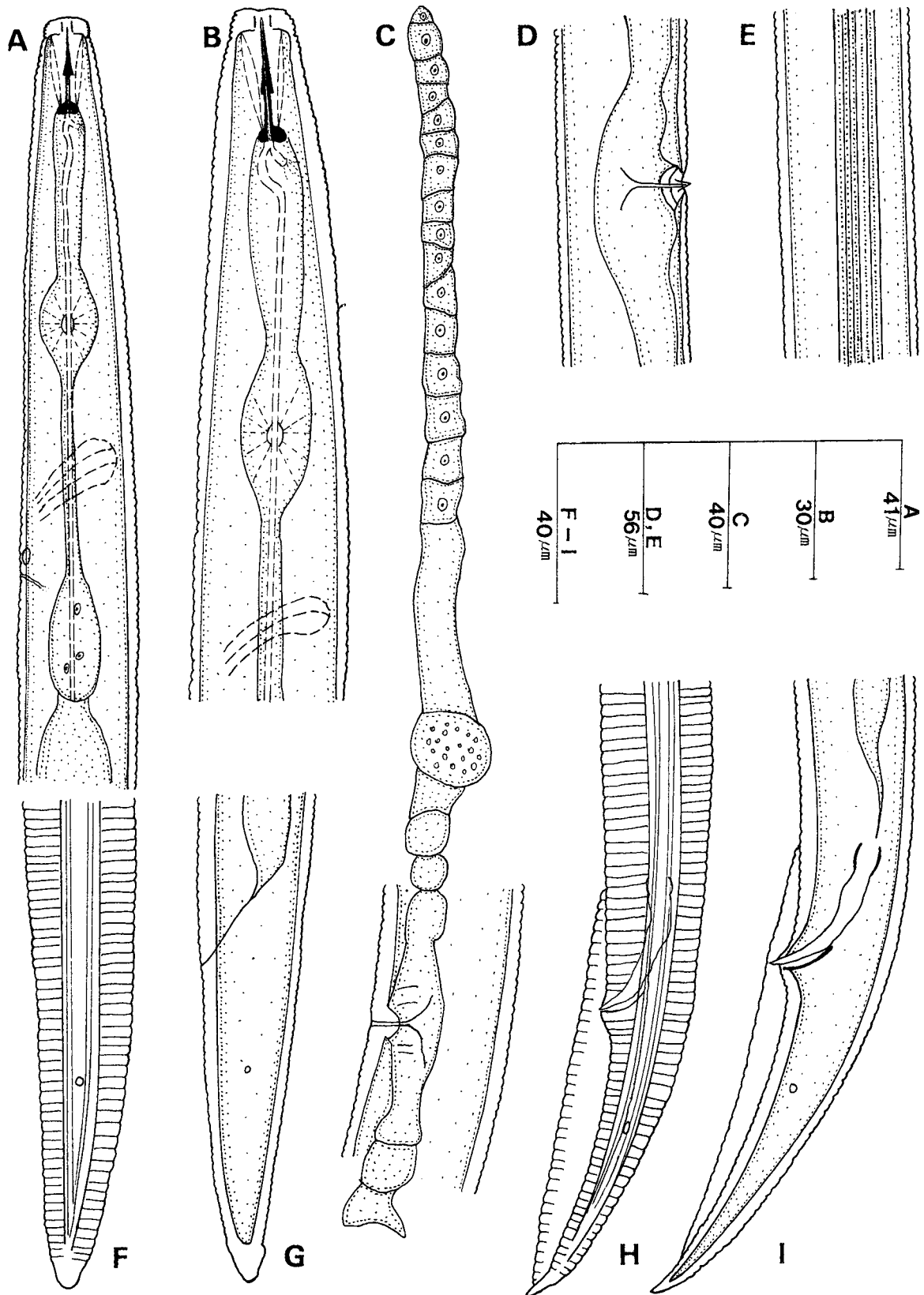


Fig. 3. *Geocenamus processus*: A. female anterior region; B. male head; C. female gonad; D. vulva region; E. lateral field; F. G. female tail; H, I. male tail.



Fig. 4. *Geocenamus processus*: A. female anterior region; B, C, D. female posterior region; E. male anterior region; F. male posterior region; G. vulva region; H. lateral field.

Measurements:

Female (n = 3). L = 553 $\mu\text{m} \pm 22.9$ (540~580); a = 29.3 ± 1.7 (27.3~30.5); b = 5.0 ± 0.3 (4.7~5.2); c = 14.0 ± 1.4 (13~15.6); c' = 3.1 ± 0.1 (3.0~3.2); V = 55.3% ± 2.7 (52.7~58.0); m = 55.2% ± 1.2 (54.2~56.5); Stylet = 16.5 $\mu\text{m} \pm 1.4$ (15.3~18.0); Oesophagus = 110.6 $\mu\text{m} \pm 5.4$ (104.4~115.4); Anterior end to excretory pore = 91.3 $\mu\text{m} \pm 2.8$ (88.2~93.6); Anus to phasmid = 14.1 $\mu\text{m} \pm 1.1$ (13.1~15.3); Tail = 50.3 $\mu\text{m} \pm 1.5$ (49~52).

Male (n = 5). L = 500 $\mu\text{m} \pm 42.2$ (446.4~543.6); a = 34 ± 2.4 (31~37); b = 5 ± 0.2 (4.8~5.3); c = 12.3 ± 0.4 (12~12.8); c' = 3.0 ± 0.4 (2.5~3.3); m = 72.5% ± 4.1 (66.7~76.2); Stylet = 16.6 $\mu\text{m} \pm 1.5$ (14.4~18.0); Body width = 14.8 $\mu\text{m} \pm 0.8$ (14.4~16.2); Oesophagus = 99.4 ± 10.3 (90.0~113.4); Anterior end to excretory pore = 84.6 $\mu\text{m} \pm 8.7$ (77.4~99.0); Tail = 41.5 $\mu\text{m} \pm 5.3$ (35~48.2); Cloaca to phasmid = 11.3 $\mu\text{m} \pm 2.5$ (8.8~15.3); Spicule = 17 $\mu\text{m} \pm 1.1$ (15.3~18.3); Gubernaculum = 5.7 $\mu\text{m} \pm 0.8$ (4.4~6.6).

Female: Body cylindrical, tapering anterior. Lip region set off by constriction with 5~6 annuli. Cephalic framework weakly refractive. Head usually narrower than adjacent body. Lateral field with six incisures, often additional faint lines may appear between these, sometimes all lines look alike making the total number of incisures 6, 8 or 10. Stylet 15~18 μm long, cone longer than shaft (m = 54~57%). Dorsal esophageal gland orifice 3~6 μm behind stylet base. Median bulb elongate-oval, isthmus thin, basal bulb elongated. Deirids present at level of excretory pore. Excretory pore at the level anterior part of basal bulb, 88~94 μm from anterior end. Female reproductive system amphidelphic. Vulva transverse slit, with small epiptygma. Vagina wall thickened, spermatheca small, rounded, filled with rounded sperm. Tail conical, with bluntly pointed terminus, tail tip smooth. Phasmid at 14 μm from anus, slightly anterior to middle of tail length.

Male: Spicule slightly bent. Bursa narrow, not envelops

tail tip. Gubernaculum simple, ventrally curved. Phasmids slightly anterior to middle of tail length.

Discussion: Korean specimens well correspond to *Geocenamus processus* (Siddiqi, 1979) Brzeski, 1991 except male tail tip which is not flagellum-like.

Locality and habitat: Soil around the roots of Korean pine tree (*Pinus koraiensis* Sieb et Zucc) at Hamyang-gun, Gyeongsangnam-do, Korea.

Literature Cited

- Allen, M.W. 1955. A review of the nematode genus *Tylenchorhynchus*. University of California Publications in Zoology 61: 129~166.
- Brzeski, M.W. 1991. Taxonomy of *Geocenamus* Thorne & Malek, 1968 (Nematoda: Belonolaimidae). Nematologica 37: 125~173.
- Choi, Y.E. and E. Geraert 1993. Nematodes associated with forest trees in Korea. II. Three new and one described species of *Geocenamus* with a note on the en face view in the genus. Nematologica 39: 431~449.
- Peng, D.L. and D.J. Hunt. 1995. *Scutylenchus brevicaudatus* sp. nov. from China and *Scutellonema poludosum* sp. nov. (Nematoda: Tylenchida) from the Falkland Islands. Afro-Asian J. Nematol. 5: 55~60.
- Siddiqi, M.R. 1979. Taxonomy of the plant nematode subfamily Merlininae Siddiqi, 1870, with descriptions of *Merlinius processus* n. sp., *M. loofi* n. sp. and *Amplimerlinius globigerus* n. sp. from Europe. Systematic Parasitology. 1: 43~60.
- Skwiercz, A.T. 1984. Two new species of the genus *Scutylenchus* Jairajpuri, 1971 (Tylenchoidea: Nematoda) from Poland with a key to the species. Revue de Nematologie 7: 87~93.
- Wu, L.Y. 1969. Three new species of the genus *Tylenchorhynchus* Cobb, 1913 (Tylenchida: Nematoda) from Canada. Can. J. Zool. 47: 563~567.

(2000년 1월 3일 접수; 2001년 2월 20일 수리)