

Two New and Two First Recorded Species of Predatory Soil Nematodes (Nematoda : Mononchida) from Korea

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한국산 포식선충(Nematoda : Mononchida)의 2신종 및 2미기록종기재

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ABSTRACT

Two new and two known species of mononchid nematodes from Korea are described and illustrated. *Iotonchus cucumis* sp. n. is characterized by 2.9-3.2 mm long body, presence of 3 each pre- and post-vulval papillae, vagina with cuticularized pieces, a long tail with terminal spinneret. *Mylonchulus unicus* sp. n. has 1.1-1.2 mm long body, and is characterized by having 2 pairs of teeth on subventral walls of buccal cavity; submedian denticles arranged in 2-3 rows, very short post-vulval sac and terminal spinneret. *Mononchus sinensis* Soni and Nama (1983) and *Mononchus aquaticus* Coetzee (1968) are reported for the first time from Korea.

Key words : Mononchida, systematics, *Iotonchus*, *Mylonchulus*, *Mononchus*

INTRODUCTION

The Mononchids are a group of free-living nematodes that inhabit soil and fresh water. They are important predators in the soil ecosystem Cobb (1917), and have possibility as a biocontrol agent against plant parasitic nematodes Christie (1960). Mononchid nematodes in Korea have scarcely been studied so far, although a few reports on the occurrence of mononchids in Korea had been made, but the recorded species are quite few including the present species. Choi and Choi (1987) have reported the species of *Calrkus papillatus*, *Coomansus parvus*, *Iotonchus (Coomansus) zschokkei*, *Mononchus truncatus*, *Mylonchulus apapillatus*, *M. brachyurus*, *M. bravicaudatus*, *M. incurvus*, *M. sigmaturus*, *Prionchulus muscorum* and *P. punctatus*. Very recently Choi *et al.* (1999) have described *Iotonchus obtusus*, *Miconchus vulvapapillatus*, *Clarkus koreanus*, *Coomansus ulsani*. Khan *et al.* (2000) added descriptions of *Mylonchulus jenuensis*, *M. taeguensis*, *M. polonicus*, *Prionchulus pachydermis*, *P. koriensis*. Choi and Khan (2000) have described *Iotonchus uisongensis* and *I.*

damsaensis. Jairajpuri *et al.* (2001a, b) enumerated *Parkellus parkus*, *Miconchus koreanus* and *Miconchus reversus*. Authors are intended to do intensive study on species diversity of soil nematodes in the agricultural fields, and have started activities to clarify the nematode fauna of Korea. During the course of the study soil samples were collected from oriental melon fields at Seonju Fruit Vegetable Experiment Station, Gyongbuk Province, Korea. Nematodes extracted from these samples bore two new and two known species of predatory nematodes belonging to the order Mononchida, which are described and illustrated in this paper.

MATERIALS AND METHODS

The nematodes were extracted from soil samples by Cobb's sieving methods and centrifugal sugar-flotation technique. Nematodes obtained in clear water were heat killed at 70°C, fixed in TAF, dehydrated and mounted in anhydrous glycerin (Seinhorst 1959). Measurements and drawings were made us-

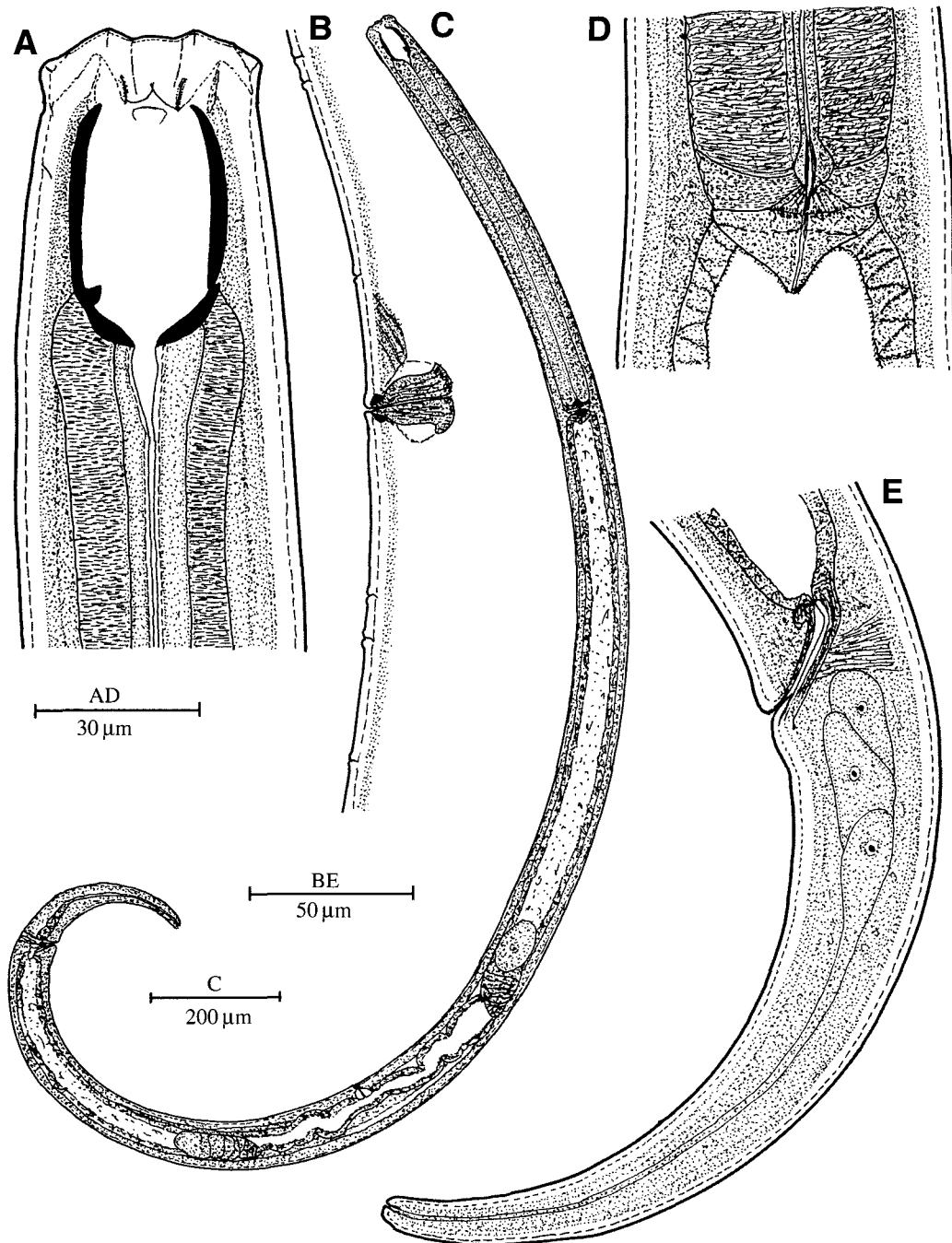


Fig. 1. *Iotonchus cucumis* sp. n., A: Anterior region; B: Vulval region; C: Female entire body; D: Oesophago-intestinal junction; E: Posterior region.

ing a drawing tube attached with Olympus BX50 microscope.

DESCRIPTIONS

Iotonchus cucumis sp. n. (Fig. 1)

Measurements

Holotype (Female): L = 3.1 mm; a = 39.4; b = 4.2; c = 11.2;

c' = 4.9; V = 64%.

Paratype (Females, n = 4): L = 3.1 ± 0.1 (2.9-3.2) mm; a = 41.0 ± 1.8 (39.3-43.7); b = 4.3 ± 0.1 (4.2-4.3); c = 11.4 ± 0.5 (10.7-12.2); c' = 5.0 ± 0.5 (4.7-5.2); V = 65% ± 0.7 (64-66).

Female: Body medium sized, ventrally curved upon fixation. Cuticle smooth, 2-3 µm thick throughout the body. Internal striations discernable. Lip region demarcated by slight

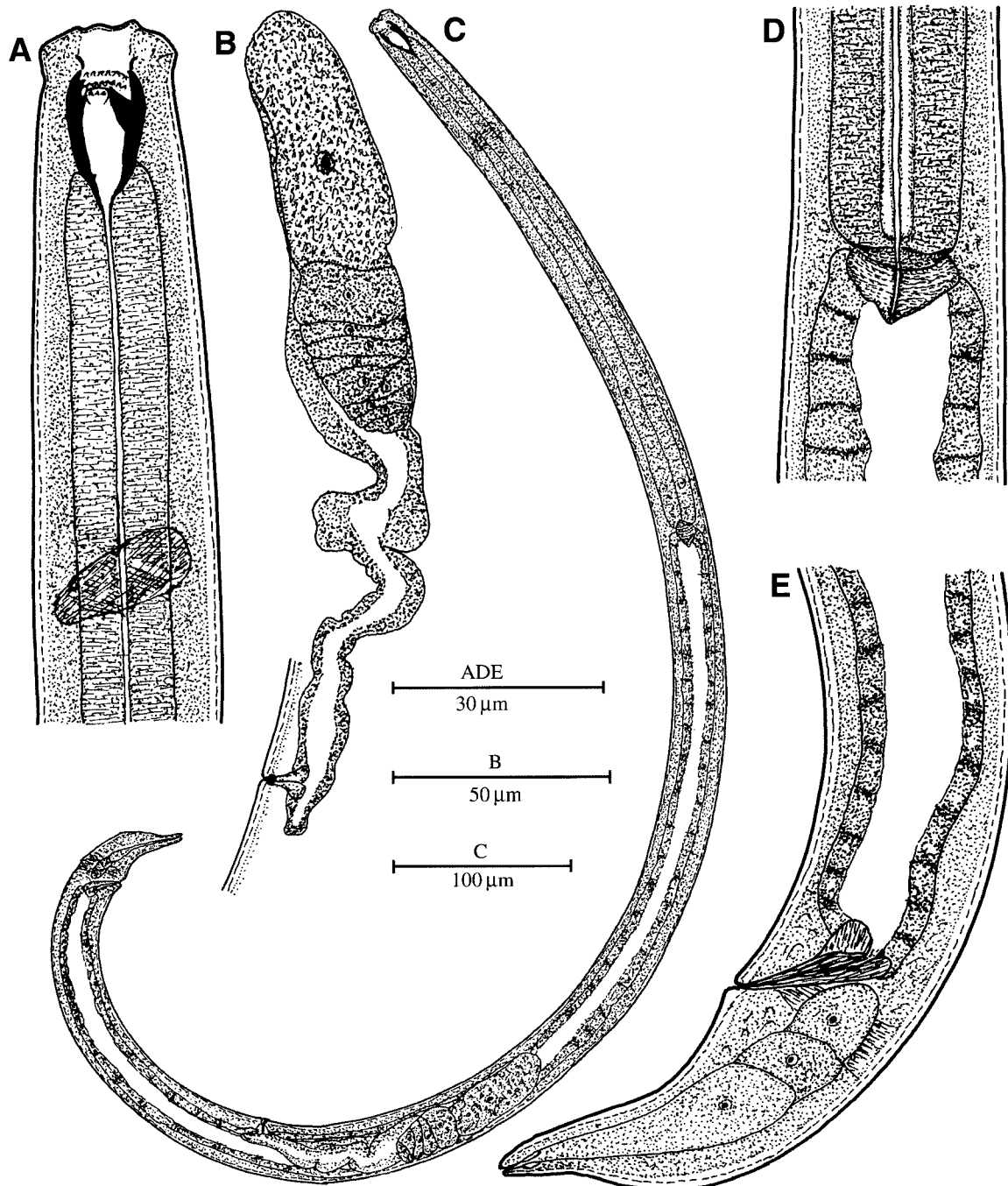


Fig. 2. *Mylonchulus unicus* sp. n., A: Anterior region; B: Gonad; C: Female entire body; D: Oesophago-intestinal junction; E: Posterior region.

expansion, 52-55 µm wide and 15-19 µm high. Labial papillae well developed, protruded. Amphids cup-shaped, 6-7 µm wide, situated at 12-15 µm from anterior end of body. Buccal cavity roomy, begins at 12-14 µm from anterior end of body, 57-60 µm long and 34-39 µm wide, vertical plates parallel, oblique plates flattened basally. Dorsal vertical wall bearing a tooth, with apex pointing forward, located at 12-14 µm or 20-

23% of buccal cavity length from base of buccal cavity. The tooth comprising of two parts- a broad globose base attached to dorsal wall and on top of it a sharply pointed, 3-4 µm long, hardened projection (tip). Oesophagus cylindrical, 684-737 µm long. Nerve ring located at 190-207 µm from anterior end of body. Excretory pore obscured. Oesophago-intestinal junction tuberculate. Intestine with wide lumen, filled with dark

granules. Reproductive system didelphic, amphidelphic. Both sexual branches almost equally developed. Ovaries reflexed, oviduct with narrow distal and dilated proximal parts. Sphincter present between uterus and oviduct. Vulva a transverse slit, provided with sclerotized lips. Three each pre- and post-vulval papillae present. Vagina muscular, extending about one-third of corresponding body width deep. Rectum muscular, 46-52 μm or less than anal body width long. Tail 238-285 μm long, uniformly tapering to a narrow rounded terminus. Caudal glands present, arranged in tandem. Spinneret terminal.

Male: Not found.

Diagnosis: The new species resembles to *Iotonchus parabasidontus* Mulvey and Jenson, 1967; *I. risoceiae* Carvalho 1955, and *I. sagaensis* Khan *et al.* 2000. But differs from *I. Parabasidontus* in having larger body, in the shape of buccal cavity, lesser c and c value ($L = 2.2\text{-}2.7\text{ mm}$; buccal cavity narrow, about twice as long as wide; $c = 6\text{-}10$; $c = 6\text{-}8$ in *I. parabasidontus*). From *I. risoceiae* differs in having slender body, presence of vulval papillae, smaller tail and lesser c index (vulval papillae absent; $a = 30\text{-}37$; tail = 300-400 μm and $c = 6\text{-}8$ in *I. risoceiae*). From *I. sagaensis* differs in the shape of lip region, presence of vulval papillae and absence of male (labial papillae not protruded, lip region marked off by constriction, vulval papillae absent and male present in *I. sagaensis*).

Type material: Holotype and paratype females on slides *Iotonchus cucumis* sp. n. deposited in the nematode collection of Seongju Fruit Vegetable Experiment Station, Gyongbuk Provincial Agricultural and Technology Administration, Korea.

Type habitat and locality: Soil samples collected from around rhizosphere of oriental melon (*Cucumis melo* L.) from Seongju, Gyongbuk province, Korea. Collected in July 2002.

Mylonchulus unicus sp. n. (Fig. 2)

Measurements

Holotype (Female): $L = 1.1\text{ mm}$; $a = 38$; $b = 3.2$; $c = 21$; $c' = 2.3$; $V = 75\%$.

Paratype (Females, $n = 4$): $L = 1.16 \pm 0.5$ (1.1-1.2) mm; $a = 39 \pm 0.9$ (38-40); $b = 3.2 \pm 0.1$ (3.1-3.2); $c = 23.1 \pm 1.6$ (21-25); $c' = 2.2 \pm 0.2$ (2.0-2.3); $V = 74.6\% \pm 1.5$ (73-77).

Female: Body medium sized, stout, ventrally arcuate when relaxed. Cuticle smooth, about 1.5-2.0 μm thick throughout the body. Internal striations faintly visible. Lip region angular, offset by slight constriction, 18-22 μm wide and 6-8 μm high. Labial papillae prominent, protruded. Amphids with oval aperture, 4-5 μm wide, situated at 13-15 μm or at the level of dorsal tooth apex. Buccal cavity goblet-shaped, thick walled,

uniformly tapering to its base, 18-20 μm long and 11-15 μm wide. Dorsal tooth very large, claw-like, obliquely forward directed with sharply pointed apex; located at 81-83% of stoma length from its base. Subventral walls of buccal cavity bearing two pairs of teeth, situated at the level of dorsal tooth apex. Submedian denticles fairly large, almost equal in size, arranged in 2-3 rows. Submedian teeth absent. Two minute foramina present at base of buccal cavity. Posterior fourth of stoma embedded in anterior portion of oesophagus. Excretory pore inconspicuous. Oesophagus 347-370 μm long. Nerve ring at 105-112 μm from anterior end. Oesophago-intestinal junction simple, non-tuberculate. Intestine with wide lumen and filled with numerous refractive granules. Reproductive system mono-prodelphic. Post vulval-sac present, 9-12 μm or less than half of corresponding body width long. Ovary reflexed, sphincter present between oviduct and uterus. Vagina muscular with sclerotization. Vulva a transverse slit. Rectum straight, muscular less than anal body width long. Tail 47-54 μm long, conoid-digitate, ventrally arcuate. Caudal glands present, arranged in tandem, duct opening (spinneret) terminal.

Male: Not found.

Diagnosis: The new species is unique in having 2 pairs of teeth on subventral walls of buccal cavity, submedian denticles in 2-3 rows and very short post-vulval sac. However, because of the mono-prodelphic gonad and absence of submedian teeth new species comes close to *Mylonchulus californicus* Jairajpuri, 1970; *M. mulvei* Jairajpuri, 1970; *M. mashhoodi* Khan and Jairajpuri, 1979 and *M. orientalis* Andrassy, 1992. The new species differs from its entire related species in above-mentioned characteristics. It further differs from *M. californicus* in having shorter post-vulval sac, longer tail and sclerotized vulval lips (post-uterine sac about 2 body diameter long, $c = 32\text{-}47$ and vulval lips not sclerotized in *M. californicus*). From *M. mashhoodi* and *M. mulvei* differs in having post-vulval sac (post-vulval sac absent in *M. mashhoodi* and *M. mulvei*). From *M. orientalis* differs in the arrangement of submedian denticles, shorter tail and terminal spinneret (submedian denticles arranged in 5-6 rows, $c = 49$ and spinneret subterminal in *M. orientalis*).

Type material: Holotype and paratype females on slides *Mylonchulus unicus* sp. n. Deposited in the nematode collection of Seongju Fruit Vegetable Experiment Station, Gyongbuk Provincial Agricultural and Technology Administration, Korea.

Type habitat and locality: Soil samples collected from around rhizosphere of oriental melon (*Cucumis melo* L.) from Seongju, Gyongbuk province, Korea. Collected in July 2002.

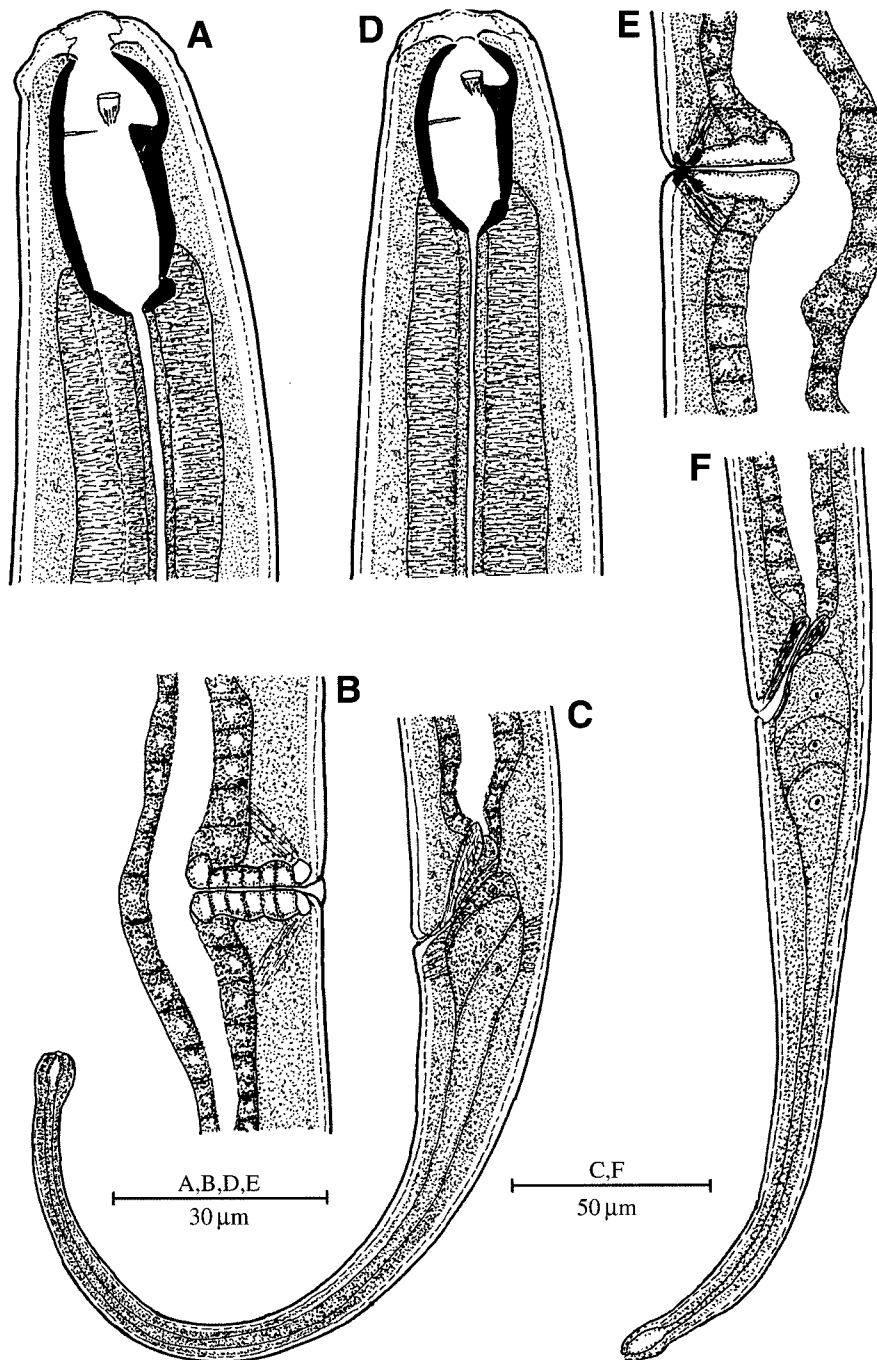


Fig. 3. A-C. *Mononchus sinensis*, A: Anterior region; B: Vulval region; C: Posterior region; D-F. *Mononchus aquaticus*, D: Anterior region; E: Vulval region; F: Posterior region.

***Mononchus sinensis* Soni and Nama 1983 (Fig. 3, A-C)**

Measurements

Female (n = 6): L = 1.47 ± 0.15 (1.3-1.7); a = 38.1 ± 1.5 (36-40); b = 4.3 ± 0.1 (4.2-4.4); c = 8.4 ± 0.4 (7.9-8.9); c = 5.8 ± 0.6 (5.5-6.6); V = $50.8\% \pm 1.5$ (49-51); ABD = 27.8 ± 3.3 (26-33) μm.

Female. Body slender, 35-46 μm wide at mid body. Cuticle

smooth and thin, about 2 μm. Lip region 22-27 μm wide and not offset, lips and papillae moderately protruding. Amphid caliciform with oval opening, located between the anterior end of the sclerotized stoma and the tooth apex. Buccal cavity moderately sclerotized, 26-37 μm long and 14-17 μm broad at middle. Proximal end of stoma funnel-shaped. Dorsal tooth well developed, its anterior slightly oblique, its apex located

in 16-18% of buccal cavity. Transverse ribs at subventral walls well developed at the level of dorsal tooth apex. Nerve ring at 107-117 μm from anterior end. Oesophagus cylindrical, 285-403 μm long. Oesophago-intestinal junction non-tuberculate. Reproductive system amphidelphic. Vulval lips not sclerotized, vagina about 2/5 of corresponding body width deep. Rectum almost equal to anal body diameter long. Tail 152-218 μm long, gradually tapering in its anterior half then becoming almost cylindrical. Tip of tail rounded. Caudal glands well developed, all three nuclei located close to anal opening. Terminal orifice prominent.

Remarks. This is the first record of *Mononchus sinensis* from Korea. The present specimens completely fit to the characterization by Soni and Nama (1983) as well as to those described by Andrassy (1992) both in morphological relations and in measurements.

Voucher specimens. Females on slides *Mononchus sinensis* deposited in the nematode collection of Seongju Fruit Vegetable Experiment Station, Gyongbuk Provincial Agricultural and Technology Administration, Korea

Mononchus aquaticus Coetzee, 1968 (Fig. 3, D-F)

Female ($n = 8$): $L = 1.2 \pm 0.1$ (1.1-1.4); $a = 32.8 \pm 4.8$ (28-40); $b = 4.2 \pm 0.2$ (4.0-4.5); $c = 7.6 \pm 0.8$ (6.7-8.9); $c = 5.7 \pm 0.3$ (5.4-6.3); $V = 49.4\% \pm 0.6$ (48.5-50.0); $ABD = 28.3 \pm 1.7$ (26-31) μm .

Female. Body slender, 35-46 μm wide at mid body. Cuticle smooth and thin, about 2 μm . Lip region 22-25 μm wide and not offset, lips and papillae hardly protruding. Amphid 3-4 μm wide with oval opening, located at 9-10 μm from anterior end of body. Buccal cavity moderately sclerotized, 26-30 μm long and 14-17 μm broad at middle. Proximal end of stoma funnel-shaped. Dorsal tooth of medium size situated in anterior half of buccal cavity, its apex located in 23-25% of buccal cavity. Transverse ribs on subventral walls well developed, posterior to dorsal tooth apex. Nerve ring at 84-107 μm from anterior end of body. Oesophagus cylindrical, 279-325 μm long. Oesophago-intestinal junction non-tuberculate. Reproductive system amphidelphic. Vulval lips sclerotized, vagina about 2/5 of corresponding body width deep. Rectum slightly less than anal body diameter long. Tail 152-173 μm long, elongate conoid and clavate at tip. Caudal glands well developed, all three nuclei located close to anal opening. spinneret terminal.

Remarks: This is the first record of *Mononchus aquaticus* from Korea. Morphology and measurements of present specimens completely fit to its original description by Coetzee (1968).

Voucher specimens. Females on slides *Mononchus aquaticus* deposited in the nematode collection of Seongju Fruit Vegetable Experiment Station, Gyongbuk Provincial Agricultural and Technology Administration, Korea.

적 요

포식선충목(Mononchida) 2 신종과 기록된 2 미기록종을 기재하였다.

Iotonchus cucumis sp. n.는 체장이 2.0-3.2 mm이며, 음문 전후방에 각각 3개의 돌기가 있으며, 각질화 된 조각의 자궁, 긴꼬리에 미선구를 가졌다. *Mylonchulus* sp. n.은 체장이 1.1-1.2 mm이며 구강의 아복부벽에 2쌍의 치아를 가지고 있고, 아중부소치가 2-3열로 정리되어 있고, 매우 짧은 후부자궁낭과 미선구가 있다. *Mononchus sinensis*와 *M. aquaticus*는 한국에서 처음으로 기록된다.

검색어 : 분류, 포식선충목, *Iotonchus*, *Mylonchulus*, *Mononchus*

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