

New Record of the Genus *Oncholaimus* Nematode Species (Nematoda: Oncholaimidae) from the East Sea of Korea

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Abstract - Oncholaimid nematode, *Oncholaimus secundicollis* Shimada, Kajihara and Mawatari, 2009, is firstly reported based on a comparative morphological study. The present specimens of *O. secundicollis* are collected from rocky intertidal seagrass on the eastern coast of Korea. *Oncholaimus secundicollis* is distinguished from all of its congeners by the following combination of morphological characteristics: buccal cavity large with thick cuticular wall and three teeth, left subventral tooth larger than right subventral or dorsal teeth, and the presence of two remarkable preloacal papillae with nine pairs of cloacal setae and single ventral tail papilla with two pairs of short setae. In this study, we provide taxonomic description and illustration of unrecorded species of the genus *Oncholaimus*.

Key words : taxonomy, marine nematodes, *Oncholaimus*, East Sea, Korea

INTRODUCTION

The family Oncholaimidae Filipjev, 1916 consists of seven subfamily, 30 genera and 327 species (Belogurov and Belogurova 1989; Schmidt-Rhaesa 2014). The family Oncholaimidae is classified into the genus according to structure of the tooth and female reproductive structure of the demanian system (Smol and Coomans 2006). The genus *Oncholaimus* Dujardin, 1845 have been described approximately one hundred species in the world, most of which were discovered in marine or blackish water (Gerlach and Riemann 1974; Huang and Zhang 2006). They are distinguished from the other genera in the family by having the largest left ventro-sublateral tooth, relatively short spicules, and monodelphic-prodelphic reproductive system in female (Schmidt-Rhaesa 2014). Until now, nine *Oncholaimus* species, *O. compositus*

Belogurov, Belogurova and Pavlyuk, 1980, *O. dujardinii* de Man, 1876, *O. minor* Chen and Guo, 2014, *O. multisetosus* Huang and Zhang, 2006, *O. paraolium* Belogurov and Fadeeva, 1980, *O. qingdaosis* Zhang and Platt, 1983, *O. secundicollis* Shimada, Kajihara and Mawatari, 2009, *O. sinensis* Zhang and Platt, 1983, *O. xiamensis* Chen and Guo, 2014, have been reported in China and Japan (Wieser 1955; Belogurov *et al.* 1980; Belogurov and Fadeeva 1980; Zhang and Platt 1983; Huang and Zhang 2006; Shimada *et al.* 2009; Chen and Guo 2014). However, the morphological taxonomic study on the genus *Oncholaimus* from Korea has been entirely lacking.

Currently, free-living marine nematode has been described about 40 species in Korea. This species are almost limited in the family Draconematidae, Comesomatidae and Enchelidiidae (Rho and Min 2011; Barnes *et al.* 2012; Hong and Lee 2014). The purpose of this study is to describe unrecorded species belonging to the genus *Oncholaimus* collected from rocky intertidal seagrass on the eastern coast of Korea. This is the first taxonomic report on the genus

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Oncholaimus from Korea.

MATERIALS AND METHODS

The materials were collected from rocky intertidal sea-grass on the eastern coast of Korea. The samples were filtered through a 67 μm mesh sieve in the field after freshwater rinsing for less than a minute to reduce osmotic shock (Kristensen 1989), and then fixed in 5% buffered formalin in sea water. The specimens were sorted from the mixed meiobenthos using a grid petri-dish under a high magnification of LEICA 205C stereomicroscope (Leica Microsystems GmbH, Wetzlar, Germany). The specimens for morphological observation were transferred to anhydrous glycerin between two cover slips on an H-S slide (Shirayama *et al.* 1993). Specimens were examined, photographed and drawn using

Nomarski differential interference contrast with an BX53 microscope (Olympus, Shinjuku, Tokyo) equipped with a drawing tube and a DIXI 3000 camera (DIXI Optics, Daejeon, Korea), and quality enhanced portable Photoshop software. Specimens for scanning electron microscopy were rinsed twice with distilled water to remove the buffered formalin. After rinsing for 5 minutes each, the specimens were freeze-dried in a cooling stage, mounted on aluminum stubs, sputter coated with gold-palladium in a high vacuum evaporator and examined with a SEC SNE-3200M Desktop Mini SEM. Measurements are in μm . Abbreviations are as follows: L, total body length; esol, esophagus length; a, body length/max. body diameter; hd, head diameter on cephalic setae; b, total body length/esophagus length; c, total body length/tail length; bd, body diameter at the base of esophagus; M, maximum body diameter; supl, supplement; cs, longer cephalic setae length; spil, spicule length as arc;

Table 1. Measurements of *Oncholaimus secundicollis*

	♂1	♂2	♂3	♂4	♂5	♀1	♀2
L	4196.4	4416.9	4328.3	4426.7	3897.5	4880.7	4790.3
esol	571.7	574.6	564	560	558.4	622.5	593.4
a	60.03	71.94	74.63	61.23	59.96	61.47	61.49
b	7.82	7.94	8.23	8.38	7.76	8.32	8.56
c	29.43	33.69	40.15	34.61	31.06	33.80	27.80
hd	30.2	32.1	30.3	30.5	32.3	34.3	34.5
bd	53.7	51.3	49.9	52.7	56.3	68	67.3
M	69.9	61.4	58	72.3	65	79.4	77.9
cs (longest)	9.2	7.7	7.8	7.7	8.4	8.9	7.9
cs/hd	3.28	4.17	3.88	3.96	3.85	3.85	4.37
amphide (wide)	9.2	8.9	5.3	6.7	9.3	8.2	7.9
amphide (long)	6.0	4.7	4.0	4.1	4.7	5.1	5.1
amphid width/head diameter	0.30	0.28	0.17	0.22	0.29	0.24	0.23
Buccal cavity width	16	16.8	15.8	15.9	17	17.7	18.1
Buccal cavity long	30.7	35.4	32.9	30	31.8	32.1	38.1
Anterior end to dorsal tooth	15.5	14.1	15.8	14.3	16.1	14.6	16.1
Anterior end to subventral tooth tip	8.2	8.3	7.3	7.5	8.8	8.6	8.6
Anterior end to amphid	15.9	16.4	16.6	15	15.2	17.7	15.4
Anterior end to excretory pore	132.2	139.7	121.1	123.9	121.6	133.1	124.6
Anterior end to nerve ring	284	266.8	270.7	264.8	256.3	274.5	275.7
abd	32.6	34.1	30.9	33.2	35.3	35.9	37.4
t	142.6	131.1	107.8	127.9	125.5	144.4	172.3
abd/tail	4.37	3.84	3.49	3.85	3.56	4.02	4.61
spil	35	35.5	35	36.1	35.7		
Longest cloacal setae length	10.1		14.8	13.4	12.2		
s'	1.08	1.04	1.13	1.09	1.01		
spicule length/tail length	0.25	0.27	0.32	0.28	0.28		
vulva						3338.7	3087.7
Body diameter at level of vulva						79.4	77.9
V (%)						68.41	64.46

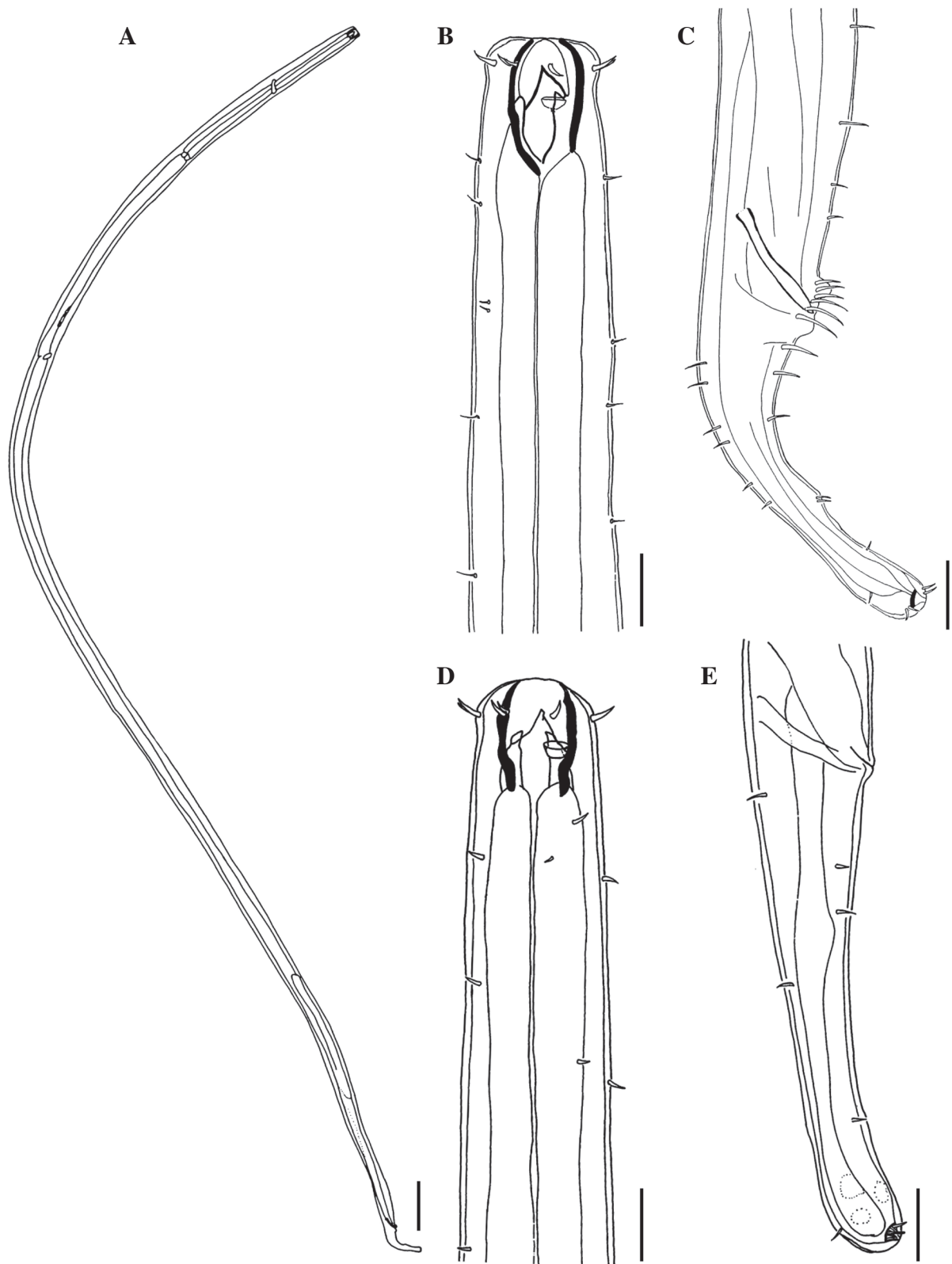


Fig. 1. *Oncholaimus secundicollis*, lateral view. Male (A-C) and female (D, E). A, habitus; B, head region; C, spicule and tail region; D, head region; E, tail region (Scale bars: A = 200 μ m; B-D = 20 μ m).

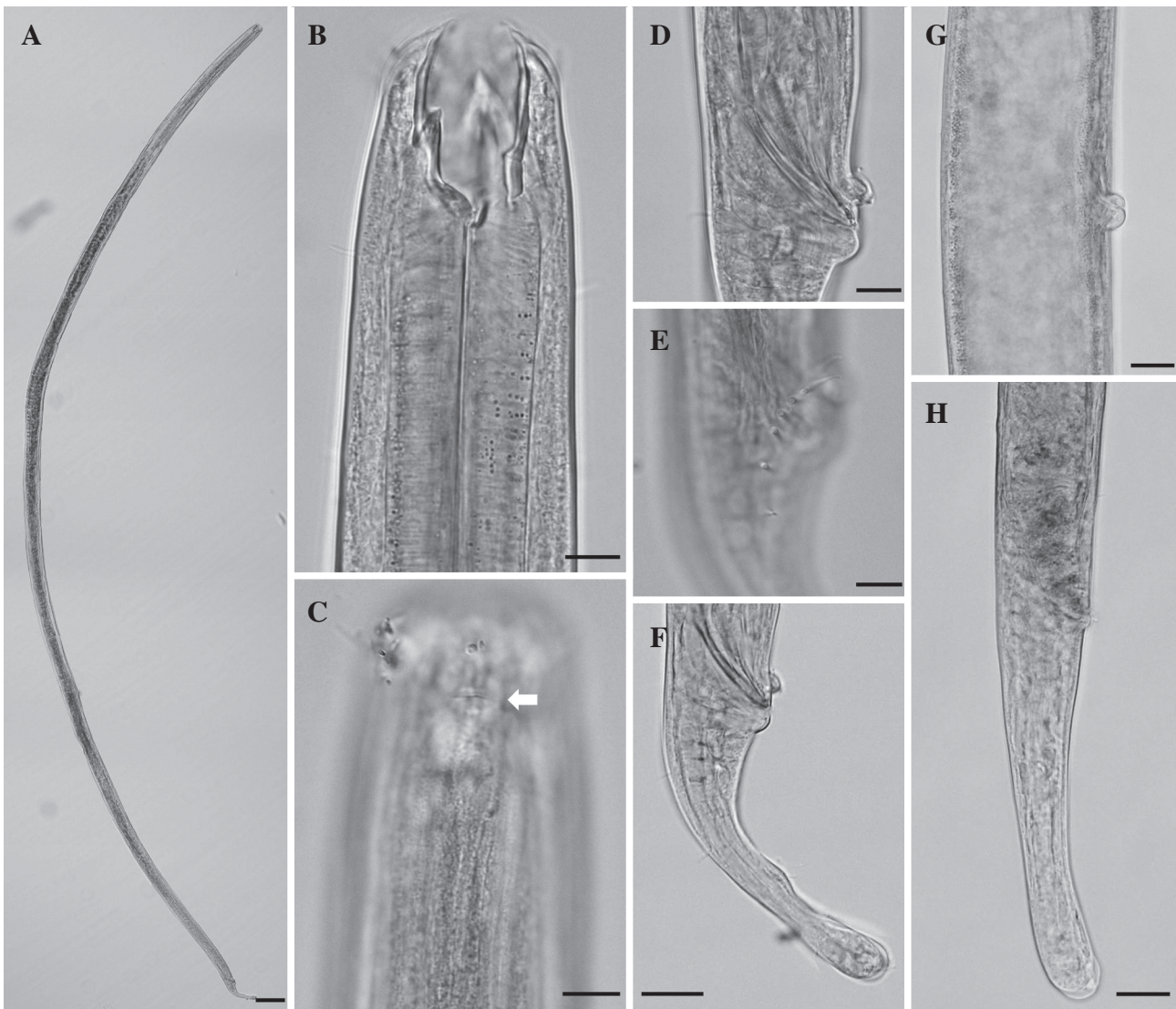


Fig. 2. *Oncholaimus secundicollis*, DIC photomicrographs, lateral view. Male (A-F) and female (G, H). A, habitus; B, head region; C, amphidial fovea; D, spicules and subventral region; E, precloacal setae; F, tail region; G, vulva region; H, tail region (Scale bars: A = 100 μ m; B-E = 10 μ m; F-H = 20 μ m).

abd, anal body diameter; s', spil/abd; t, tail length; t/abd, tail length/anal body diameter; V(%), V/L.

SYSTEMATIC ACCOUNTS

Class Enoplea Inglis, 1983

Order Enoplida Filipjev, 1929

Family Oncholaimidae Filipjev, 1916

Genus *Oncholaimus* Dujardin, 1845 큰이빨선충속 (신칭)

1. *Oncholaimus secundicollis* Shimada, Kajihara and Mawatari, 2009 향문돌기큰이빨선충 (신칭)

Synonym: *Oncholaimus secundicollis* Shimada, Kajihara and Mawatari, 2009, p. 144, Figs. 6-7.

Material examined: 5♂♂ and 2♀♀, Bugu-ri, Uljin-gun, Gyeongsangbuk-do, Korea (37°06'21.39"N, 129°22'37.42"E), collected on 14 July 2014. Two male specimens are deposited in the nematode collection of the National Institute of Biological Resources, Incheon, Korea. Other specimens are kept in the collection of the authors. All are mounted in anhydrous glycerin between two coverslips on H-S slides, sealed with nail polish.

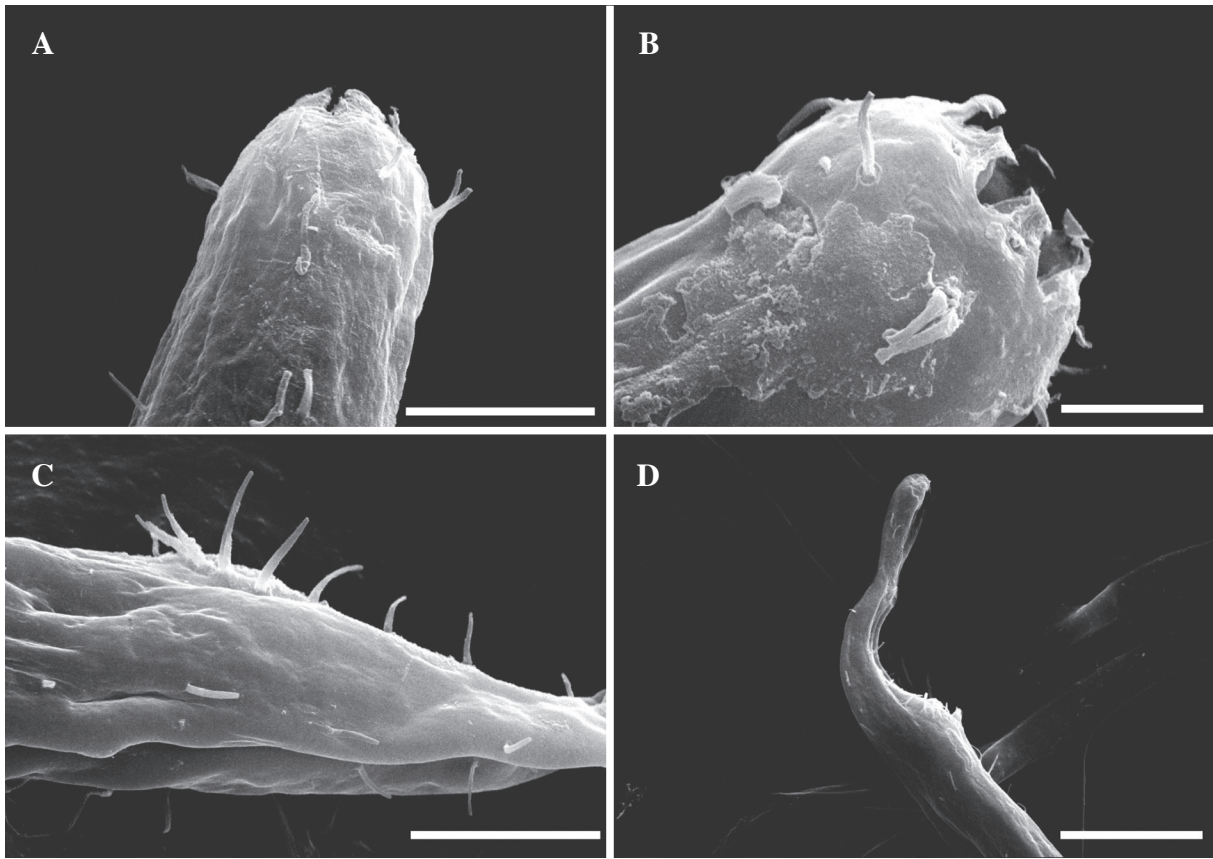


Fig. 3. *Oncholaimus secundicollis*, SEM photomicrographs, Male. A, head region; B, six low lips and cephalic setae region; C, subventral setae on the cloacal region; D, tail region (Scale bars: A, C = 20 µm; B = 10 µm; D = 50 µm).

Measurements: See Table 1.

Description: Body length 3,898~4,417 µm long in male, 4,790~4,881 µm in female, typically cylindrical (Figs. 1A, 2A). Maximum body diameter 58~72 µm in male and 77 µm in female. Cuticle smooth. Head diameter 31~36 µm wide, typically with rounded six lips, slightly attenuated toward the end (Figs. 1B, 1D, 2B). Well developed six lips each with small rounded labial papilla (Fig. 1B, 1D). Head with ten (6+4) short cephalic setae, arranged in single circle (Fig. 3A, 3B). Buccal cavity large, 16~18 µm wide, about 52~53% of the head diameter, with thick cuticular wall and well developed three teeth. Left subventral tooth 6~8 µm long, larger than right subventral or dorsal teeth; tip stretched up to cephalic setae. Amphids pocket-like, 7~9 µm wide, located tips of right subventral and dorsal teeth (Fig. 2C). Esophagus cylindrical, 502~570 µm long, about 12~14% length of the total body size. Nerve ring situated at 42~44% of esophagus from anterior end. Cervical setae short, 2~3

µm long, rarely distributed throughout body surface of anterior region. Tail 108~144 µm long, about 3.5~4.4 times of anal body diameter. Tail shape different in both sexes (Fig. 1C, 1E).

Male: Spicules short and straight, 35~36 µm long, about 1.0 times of cloacal body diameter. Gubernaculum absent. Conspicuous precloacal papilla present just anterior to cloaca, and smaller postcloacal papilla just posterior to cloaca (Figs. 1C, 2D, 2F). Nine pairs of long and stout circumcloacal setae located at cloacal papilla region (Figs. 1C, 2E, 3C). Tail conico-cylindrical, anterior two-thirds conical and posterior one-third cylindrical, curved ventrally (Figs. 1C, 3D). Single ventral tail papilla with two pairs of short setae situated at about 60~70% of tail length (Fig. 2F).

Female: Similar to male in anterior region; tail straight and posterior end blunt, with two pairs of short terminal setae (Fig. 2H). Tail 144~172 µm long, about 4.0~4.6 times of anal body diameter. Reproductive system monodelphic.

Vulva situated at 78~79% of total body length (Fig. 2G).

Remarks: *Oncholaimus secundicollis* Shimada, Kajihara and Mawatari, 2009 was firstly described from the surface layer of intertidal zone of Hokkaido, Japan. *Oncholaimus secundicollis* has been previously reported from only type locality. *Oncholaimus secundicollis* is easily distinguished from its congeners in having the following character combination: (1) presence of a precloacal papilla, a postcloacal papilla, and a tail papilla in male, (2) tail conico-cylindrical, longer in the female than in the male, and (3) presence of nine pairs of long and stout setae around cloacal region in the male. So far, only six species of the genus *Oncholaimus*, that is, *O. appendiculatus* Cobb, 1930, *O. campylocercoides* De Coninck and Stekhoven, 1933, *O. domesticus* Chitwood and Chitwood, 1938, *O. moanae* Leduc, 2008, *O. sinensis* Zhang and Platt, 1983 and *O. secundicollis* Shimada, Kajihara and Mawatari, 2009, are described to have both a pre-cloacal papilla and a postcloacal papilla. *Oncholaimus secundicollis* is clearly distinguished from *O. appendiculatus* and *O. moanae* by shorter spicules length (1.0 times of cloacal diameter in *O. secundicollis* vs 2.0 times of cloacal diameter in *O. appendiculatus* and *O. moanae*). *Oncholaimus campylocercoides* and *O. domesticus* have two ventral post-cloacal papillae in the tail, whereas *O. secundicollis* has single ventral postcloacal papilla. *Oncholaimus secundicollis* is also similar to *O. sinensis* Zhang and Platt, 1983 by the presence of a precloacal papilla and a tail papilla in the male, but differs from the *O. sinensis* by the presence of 11 pairs of cloacal setae (nine pairs in *O. secundicollis*). The present Korean specimens fit very well with Shimada *et al.*'s (2009) original description of *O. secundicollis* by the taxonomic characteristics. This is the first report of the genus *Oncholaimus* from Korea.

Habitat: The nematodes were obtained from the sediments of rocky intertidal seagrass bed on the eastern coast of Korea collected at a depth of 1 m by hands with scoop. Sediments include tiny shell gravels and coarse detritus.

Distribution: Japan, Korea.

Deposition: NIBR No. KOSPIV0000206596.

Identifiers: Hyo Jin Lee.

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