

Systematic Study of Criconematoidea from Korea*

2. Three Unrecorded and Five Recorded Species Criconematidae from Korea

韓國產 環線蟲 上科의 系統分類學的 研究

2. Criconematidae科의 3 韓國未記錄種 및 5 既知種의 검토

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ABSTRACT Three species of Criconematidae, *Criconema longulum*, *C. orientale* and *C. psammophilum* are newly reported from Korea. Some morphological data and host plants of *Discocriconemella hengsungica*, *Hemicriconemoides brachyurus*, *H. mangiferae*, *H. varionodus*, and *Xenocriconemella macrodora* were reported.

KEY WORDS Morphology, taxonomy, criconematidae, host plants, Korea

초 록 韓國產 環線蟲上科를 연구하는중 Criconemateidae科에 속하는 *Criconema longulum*, *C. orientale*, *C. psammophilum* 등 韓國 3 未記錄種이 발견되었고, *Discocriconemella hengsungica*, *Hemicriconemoides brachyurus*, *H. mangiferae*, *H. varionodus* 및 *Xenocriconemella macrodora* 등 5 既知種에 대한 형태적인 검토, 기주식물 및 분포지역을 발표한다

검색어 分類, 形態. Criconematidae科, 寄主植物, 韓國

Criconema longulum Gunhold, 1953

긴꼬리주름선충(신칭)

(Fig. 1. A-C)

Measurements. Female(n=9): L=404.3 μm±23.4(381-451); a=9.8±0.8(9-11.6); b=4±0.2(3.7-4.3); c=9.2±1.1(7.2-11); c'=1.9±0.1(1.7-2.2); V=81.6%±3.1(74.4-86); Stylet=68.4 μm±2 (65.5-72.7); R=73.3±1.4(70-75); RV=13.3±0.7(12-14); RVan=4.7±0.7(4-6); Ran=8.8±0.4(8-9); Rex=21.1±2.8(16-24).

The specimens correspond with the description in the literature.

Localities and host plants. Kyongsangnam-do: Chirisan (*Pinus koraiensis* S.et Z.); Kang-won-do: Odesan Wolchongsa (*Acer ukurunduense* Trautv et

Mey); Kyonggi-do: Puk'ansan (*Alnus japonica* Steud).

Criconema orientale (Andrassy,1979)

Raski & Luc, 1984

동양주름선충(신칭)

(Fig. 2)

Measurements. Female(n=10): L=393.4 μm±17.2(372-428); a=11.3±0.6(10.3-12); b=4.2±0.2(3.8-4.5); c=10.8±1.1(8.8-12.7); Stylet=53.8 μm±1.7(50.5-56); R=80.1±2.4(77-86); Rex=24.1±0.5(23-25); RV=12.8±1(11-14); RVan=4.1±0.5(3-5); Ran=9.3±0.5(9-10); V=85.2±1.5(83.2-87.5)%; G=51±4.7(44.7-61.6)%; Head to excretory pore=103.1 μm±7.7(92-113); Oesophagus length=92.7

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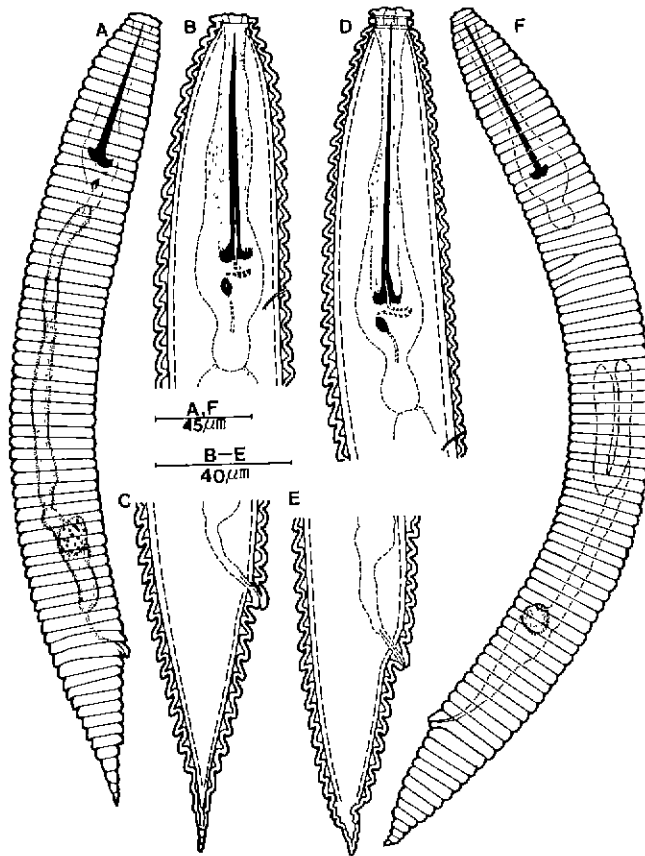


Fig. 1. A-C: *Criconema longulum*; A: Entire body, B: Head region, C: Posterior region. D-F: *Criconema psammophilum*; D: Head region, E: Posterior region, F: Entire body.

$\mu\text{m} \pm 5.9(84.5-106)$; First head annule width = $10.5 \mu\text{m} \pm 0.5(9.5-11)$; Second head annule width = $11.6 \mu\text{m} \pm 0.4(11-12)$.

Discussion. There is a small neck between second head annulus and first body annulus (Fig. 2); this is not so in the original description.

Locality and host plant. Chungchōngbuk-do: Koesan-gun Toan-myon (*Oryza sativa* L.).

Criconema psammophilum (Krnjaic & Loof, 1973) Raski & Luc, 1984
오리나무주름선충(신칭)
(Fig. 1 D-F)

Measurements. Female (n=6): L = $446.2 \mu\text{m} \pm 30.3(392-486)$; a = $11.1 \pm 0.2(9.9-12.2)$; b = $3.6 \pm 0.2(3.3-4)$; V = $87.9 \pm 1.1(86-89.4)\%$; R = $88.7 \pm 1.9(87-$

$92)$; RV = $12.8 \pm 0.9(12-14)$; Rex = $27.8 \pm 1.1(27-30)$; Stylet = $82.5 \mu\text{m} \pm 1.8(79-84.5)$; Body annule width = $5.9 \mu\text{m} \pm 0.4(5.5-6.5)$.

Discussion. The second head annulus does not follow the first body annulus (Fig. 1.D). Stylet length shorter than in the original description ($81-101 \mu\text{m}$).

Locality and host plant. Kyōnggi-do: Puk'ansan (*Ainus japonica* Steud.).

Discocriconemella hengsunggica
Choi & Geraert, 1975

Measurements. Table 1.

Discussion. The nematodes were collected from six localities and three different host plants. Body length slightly longer than the original description except Ch'ōnyang population. Stylet length slightly

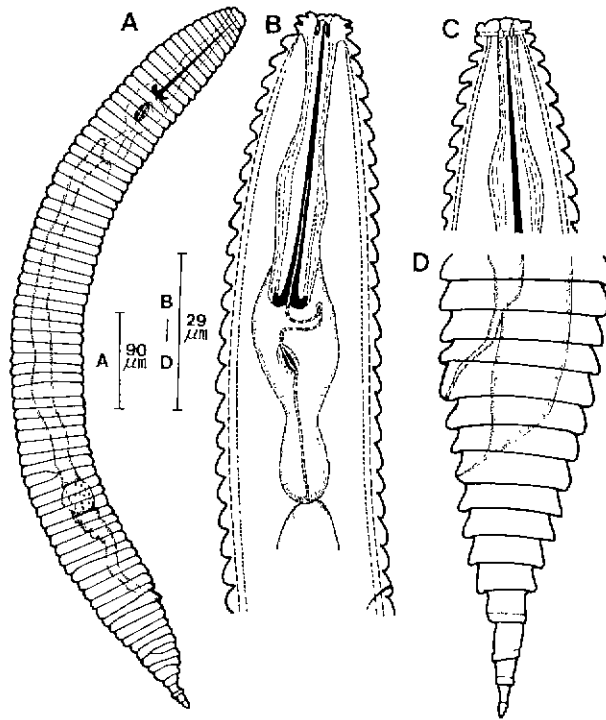


Fig. 2. *Criconema orientale*; A: Entire body, B: Head region, C: Head, D. Posterior region.

Table 1. Morphometric comparison of *Discocriconemella hengsungica* on different localities and hosts

Locality	Kyŏngsan	Sunch'ang	Naejangsan	Ch'ŏngyang	Chŏnju-shi	Taedunsan	
Host	Paratype <i>Celtis sinensis</i>	<i>Quercus acutissima</i>	<i>Ulmus davidiana</i>	<i>Pinus densiflora</i>	<i>Pinus banksiana</i>	<i>Pinus densiflora</i>	
Characters							
Female	n=5	n=28	n=37	n=3	n=7	n=38	n=40
L(μm)	(285-315)	313.9±15.8 (274-340.5)	323.6±17.6 (285-379.5)	288.3±21.3 (265.5-316.8)	284.6±19.5 (256.8-310)	351.8±32.8 (299.8-418)	309.1±27.8 (267.5-391.5)
a	(8.2-9.8)	9.5±0.6 (8.1-10.5)	9.8±0.7 (8.7-11.9)	9.5±0.7 (8.5-10.2)	9.2±0.9 (7.6-10.5)	10.0±0.7 (8.6-11.5)	9.9±0.9 (8.2-12)
b	(2.3-2.6)	2.6±0.1 (2.4-3.1)	2.6±0.1 (2.4-2.9)	2.5±0.1 (2.4-2.5)	2.5±0.1 (2.33-2.7)	2.7±0.2 (2.4-3.3)	2.4±0.3 (2.2-3.8)
V(%)	(87-90)	87.1±1.1 (84.4-89.5)	88.2±1.8 (81.7-91)	88±1.1 (86.8-89.5)	88.7±1.2 (87.4-91.2)	83.9±7.3 (61.3-90.9)	88±1.2 (85.8-92.2)
Stylet(μm)	(104-108)	97.7±5.1 (83.8-108)	99.7±3.3 (94.5-107.3)	99.2±4.1 (96.3-105)	93.1±5.6 (83.3-98.5)	103.8±9.6 (85.5-125)	103.2±5.3 (87.5-111.8)
R	(82-92)	100.6±2.6 (93-106)	102.6±3.5 (97-117)	100.3±0.5 (100-101)	98.4±3.0 (94-103)	97.9±3.9 (92-116)	99.4±2.8 (94-109)
RV	13	15.8±0.9 (14-18)	14.7±0.9 (13-17)	15.3±0.5 (15-16)	14.9±1.0 (13-16)	14.6±0.6 (13-16)	14.4±1.0 (13-14)

shorter and number of body annule are more than the original description. There are no differences be-

tween the localities.

Localities and host plants. Kyŏngsangbuk-do:

Table 2. Morphometric comparison of *Hemicriconemoides brachyurus* on different localities and hosts

Localities Host plants	Ch'iaksan <i>Maackia amurensis</i>	Köngju-1 <i>Quercus acutissima</i>	Köngju-2 <i>Pinus densiflora</i>
Characters			
Female	n=10	n=16	n=13
L(μ)	433.8 \pm 37.7(406.3-528.5)	518.2 \pm 32.3(462.5-572.5)	496.9 \pm 34.3(436-555)
a	13.5 \pm 1.0(12.3-15.5)	15.2 \pm 1.4(13.2-17.4)	15.2 \pm 1.2(12.6-17.3)
b	4.7 \pm 0.3(4.0-4.6)	4.6 \pm 0.2(3.6-4.5)	4.3 \pm 0.3(3.9-4.7)
c	16.7 \pm 2.2(15.0-22.5)	25.5 \pm 9.1(17.0-57.4)	20.6 \pm 2.1(16.4-24.9)
V(%)	92.2 \pm 0.7(91.2-93.3)	93.8 \pm 1.6(89.1-96.1)	93.2 \pm 1.4(89.6-95.8)
Stylet(μ m)	54.8 \pm 2.0(52-58.3)	59.2 \pm 1.4(56.8-61.7)	58.9 \pm 2.1(54.7-62.3)
R	90.8 \pm 4.1(85-97)	97.4 \pm 1.9(95-102)	96.6 \pm 1.7(92-99)
RV	9.9 \pm 0.6(9-11)	8.9 \pm 0.4(8-10)	9.8 \pm 0.6(9-11)
Ran	7.9 \pm 0.6(7-9)	6.9 \pm 0.4(6-8)	8.2 \pm 0.4(8-9)
RVan	1.0 \pm 0.0(1.0)	1.0 \pm 0.0(1.0)	0.8 \pm 0.3(0.5-1)
Rex	24.5 \pm 1.5(23-27)	26.3 \pm 0.9(25-28)	25.7 \pm 0.9(24-27)

kyöngsan-gun Namsan-myön (*Celitis sinensis*); Chö llabuk-do: Sunch'ang-gun In-gye-myön (*Quercus acutissima*), Naejangsan (*Ulmus davidiana*); Chölla-nam-do: Naju-gun sanpo-myön (*Quercus acutoid*); Ch'ungch'öngnam-do: Ch'öng-yang-gun namyang-myön, Taedunsan (*Pinus densiflora*).

***Hemicriconemoides brachyurus* (Lood, 1949)
Chitwood & Birchfield, 1957
=*Hemicriconemoides intermedius***

Measurements. Table 2.

Discussion. *H. intermedius* reported from Sangju-shi, Korea(rice) by Choi, 1971 and synonymized with *H. brachyurus* by Germani and Anderson, 1991. The specimens correspond with the description in the literature.

Localities and host plants. Kang-won-do: Ch'iaksan (*Maackia amurensis*); Ch'ungch'öngnam-do: Kyeryongsan (*Quercus acutissima*, *Rhododendron mucronulatum*, *Pinus densiflora*).

***Hemicriconemoides mangiferae* Siddiqi, 1961**

Measurements. Chinju-shi (*Pinus densiflora*). Female (n=5): L=457 μ m \pm 13.1(441.3-477.5), a=16.7 \pm 0.3(16.26-17.16); b=3.9 \pm 0.2(3.7-4.3); c=16.2 \pm 1.1(15.0-17.6); V=90% \pm (88.8-91); Stylet=70.2 μ m \pm 1.4(68-71.5); R=110.2 \pm (4.2)(103-116);

RV=13.2 \pm 0.7(12-14); Ran=8 \pm 0.6(7-9); RVan=4 \pm 0.9(3-5); Rex=30.4 \pm 0.5(30-31).

Sangju-shi Kyesan-dong (*Salix subfragilis*): Female (n=13): L=423.8 μ m \pm 22.8(383.5-455); a=15.8 \pm 0.9(14.1-17.4); b=3.3 \pm 0.1(3.4-3.9); c=17.3 \pm 2.4(14-22.4); V=90.2% \pm 0.6(89-91); Stylet=69.5 μ m \pm 3.4(63-75); R=108.2 \pm 4.6(99-115); RV=13.1 \pm 0.7(12-14); Ran=8.5 \pm 0.8(7-10); RVan=3.7 \pm 0.6(3-5); Rex=30 \pm 1.0(27-31).

The specimens correspond with the description in the literature.

Localities and host plants. Kyöngsangbuk-do: Sobaeksan (*Ilex macropoda*), Sangju-shi Kyesan-dong (*Salix subfragilis*); Kyöngsangnam-do: Chinju-shi Kajwa-dong (*Pinus densiflora*).

***Hemicriconemoides varionodus*
Choi & Geraert, 1972**

Measurements. Table 3.

The specimens well correspond with the original description.

Localities and host plants. Puk'ansan, Kyeryongsan, Sudöksa, Wanju-gun soyang-myön, Ch'önggy-angsan, Tosansöwon, P'akyesa, Köch'ang-gun Kabuk-myön, Haman-gun Anui-myön (*Pinus densiflora*); Ch'ungch'öngnam-do: Kyeryongsan (*Quercus acutissima*, *Rhododendron mucronulatum*), Sudöksa (*Quercus acutissima*); Ch'ungch'öngbuk-do: Worak-

Table 3. Morphometric comparison of *Hemicriconemoides varionodus* on different localities and hosts

Locality	Paratype	Kyŏngsan	Chinan	Wŏraksan-1	Wŏraksan-2	P'akyesa	Muju
Host	<i>Pinus densiflora</i>	<i>Rhododendron mucronulatum</i>	<i>Quercus acutissima</i>	<i>Betula schmidtii</i>	<i>Lespedeza bicolor</i>	<i>Pinus densiflora</i>	<i>Ilex macropoda</i>
Characters							
Female	n=25	n=7	n=15	n=7	n=12	n=8	n=6
L(μm)	430-540	493.8±24.2 (447.5-523.8)	451.3±19.4 (425-491.3)	490.5±35.7 (425-540)	487.1±32.9 (415-530)	474.9±33.0 (430.8-531.3)	469.3±53.0 (376-526.3)
a	14-18	17.0±1.1 (15.1-18.4)	16.5±0.8 (13.8-16.7)	16.6±1.1 (14.7-17.7)	16.8±1.4 (14.2-18.6)	16.5±0.8 (14.9-17.7)	15.4±0.9 (13.9-16.3)
b	3.6-4.4	3.7±0.3 (3.4-4.2)	3.6±0.3 (3.2-4.4)	3.8±0.3 (3.2-4.4)	3.8±0.4 (3.2-4.6)	3.6±0.4 (3.0-4.3)	3.9±0.5 (3.0-4.4)
c	13-20	17.7±2.0 (14.8-21.0)	17.1±2.5 (12.1-21.6)	18.48±2.1 (15.3-22.2)	18.5±2.7 (13.4-23.7)	18.9±1.8 (16.8-22.3)	17.4±2.1 (14.3-21.2)
V(%)	90-93	90.4±0.7 (89.3-91.6)	89.5±0.8 (88.1-90.6)	90.1±0.8 (89.2-91.9)	90.1±0.6 (89.1-90.9)	90.8±0.9 (90.0-92.8)	90.3±2.2 (85.9-93.0)
Sty(μm)	84-94	86.4±2.5 (82.5-90)	88.7±2.3 (83-91)	88.9±4.3 (81-95)	87.9±5.4 (74.5-94)	87.6±1.9 (84-90)	85.5±1.5 (83-87)
R	102-112	108.9±3.2 (104-114)	103.2±4.0 (97-110)	111±5.8 (104-122)	109.3±4.0 (102-117)	108±2.7 (102-111)	108.3±3.3 (105-114)
RV	11-15	12.3±0.5 (12-13)	14.1±1.5 (11-17)	13.2±0.7 (12-14)	13.5±0.8 (12-15)	13.4±0.9 (12-14)	12.8±0.4 (12-13)
Ran	6-8	7.9±0.6 (7-9)	8.4±1.0 (7-10)	8.3±0.8 (7-9)	8.4±0.8 (6-9)	8.5±0.5 (8-9)	8.2±0.4 (8-9)
RVan	4-7	3.9±0.4 (3-4)	4.5±1.0 (3-6)	3.8±0.4 (3-4)	4.1±0.5 (3-5)	3.8±0.7 (3-5)	3.7±0.5 (3-4)
Rex	31-33	31.3±0.9 (30-33)	31.2±1.7 (28-33)	31.2±0.7 (30-32)	31.4±1.0 (30-33)	29.5±1.5 (27-31)	32.3±0.8 (31-33)

san (*Styrax obassia*, *Lespedeza bicolor*, *Betula schmidtii*); Chŏllabuk-do: Jinan-gun Maryŏng-myŏn (*Quercus acutissima*); Mujukuch'ŏn-dong (*Ilex macropoda*); Kyŏngsangbuk-do: Sangju-shi kyesan-dong (*Salix subfragilis*); Kyŏngsangnam-do: Chinju-shi Kajwa-dong (*Pinus banksiana*); Kang-won-do: Chiaksan (*Maackia amurensis*).

***Xenocriconemella macrodora* (Taylor, 1936)
De Grisse & Loof, 1965**

Measurements. Table 4.

Discussion. The specimens correspond with the description in the literature.

Localities and host plants. Kyŏngsangbuk-do: Andong-gun Hahoe (*Quercus acutissima*), Kyŏngsan-gun Namsan-myŏn (*Celitis sinensis*); Kyŏngsangnam-do: Chirsan (*Pinus koratensis*, *Lindera ery-*

throcarpa), Chinju-shi Kajwa-dong (*Platanus orientalis*, *Quercus acutissima*); Ch'ungch'ŏngnam-do: Kyeryongsan (*Quercus acutissima*), Ch'ŏngyang-gun Namyang-myŏn (*Castanea crenata*, *Pinus densiflora*); Ch'ungch'ŏngbuk-do: Poŏngun naebuk-myŏn (*Oryza sativa*); Chŏllabuk-do: Naejangsan (*Platycarya strobilacea*), Sonch'ang-gun Ingye-myŏn (*Quercus aliena*), Muju kuch'ŏn-dong (*Ilex macropoda*); Chŏllanam-do: Damyang-gun kumsŏng-myŏn (*Quercus aliena*)

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Tylenchida from Korea with a list of other nematodes

Table 4. Morphometric comparison of *Xenocriconemella macrodora* on different localities and hosts

Locality	Andong	Muju	Ch'öngyangsan	Ch'öngyang	Chirisan	Sunch'ang	Naejangsan	Chinjju-shi	Pöin
Host	<i>Quercus acutissima</i>	<i>Ilex macrospoda</i>	<i>Pinus densiflora</i>	<i>Castanea crenata</i>	<i>Pinus koratensis</i>	<i>Quercus aliena</i>	<i>Platycaarya strobilacea</i>	<i>Quercus acutissima</i>	<i>Oryza sativa</i>
Characters	n=10	n=12	n=8	n=7	n=6	n=6	n=10	n=5	n=10
Female	225.8±17	263.6±18	263.3±21	244±12	296.7±15	206±12.7	259±19	240±12	262±8
L(µm)	(195-261)	(243-306)	(230-293)	(233-269)	(273-313)	(186-228)	(233-303)	(225-258)	(251-271)
a	9.4±0.6	10.8±0.7	10.6±0.5	10.1±0.4	10.8±0.5	8.5±0.4	9.7±0.5	9.6±0.4	9.3±0.3
	(8.5-10.2)	(10-12)	(10-12)	(9.3-10.8)	(10-11)	(8-9)	(8.9-10.5)	(9.0-10.0)	(9.0-9.7)
b	2.3±0.1	2.4±0.2	2.6±0.2	2.4±0.1	2.2±0.1	2.1±0.1	2.4±0.2	2.3±0.1	2.2±0.1
	(2-2.5)	(2-2.5)	(2-2.9)	(2.3-2.5)	(2.2-2.3)	(1.9-2.3)	(2.0-2.7)	(2.1-2.4)	(2.1-2.2)
c	17.6±2.4	15.6±1.2	-	-	19.1±0.6	-	-	-	-
	(14.1-21.7)	(14.9-17.6)	-	-	(18.5-19.9)	-	-	-	-
V(%)	89±0.8	89.7±1.0	90.2±2.5	88.5±0.8	90.3±0.5	89±3.9	89.4±1.3	90.1±0.8	91.4±0.5
	(88-90)	(88-92)	(89-97)	(87.2-89.5)	(90-91)	(86-98)	(88-93)	(89-91)	(91-92)
Sty(µm)	86.2±1.8	84.5±3.7	79.9±2.5	83±4.0	107±2.2	85±1.3	84.5±2.5	85.5±3.6	100±3.2
	(83-89)	(79-92)	(75-83)	(77.5-89.0)	(104-110)	(84-87)	(82-90)	(81-88)	(95-105)
R	107±2.7	104±4.1	110±3.7	105±3.1	105±4.1	109±3.6	101±3.2	112±3.2	101±2.6
	(101-110)	(99-113)	(104-113)	(100-110)	(99-111)	(104-115)	(95-106)	(109-116)	(98-105)
RV	13±1.0	13.4±0.8	14.4±0.9	14.0±0.9	13±0.0	15±0.9	13.2±1.2	14.7±0.5	11.7±0.5
	(12-15)	(12-15)	(13-15)	(13-15)	(13)	(13-16)	(12-15)	(14-15)	(11-12)
Ran	8.6±0.9	9±0.5	-	-	8±0.0	-	-	-	8±0.0
	(7.0-10.0)	(9-10)	-	-	(8)	-	-	-	(18)
RVan	3.6±0.5	3.7±0.5	-	-	4±0.0	-	-	-	3±0.0
	(3-4)	(3-4)	-	-	(4)	-	-	-	(3)
Rex	-	35.7±0.8	-	-	40.7±2.5	36.5±0.5	34±0.0	37±0.0	34±0.0
	-	(34-36)	-	-	(38-44)	(36-37)	(34)	(37)	(34)

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