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The morphology of the odontophore of *Longidorus litchii* Xu & Cheng, 1992 (Nematoda: Longidoridae)

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Summary. The morphology of the odontophore of *Longidorus litchii* Xu & Cheng, 1992, is described and depicted in photomicrographs from specimens collected from the locality of the type habitat *i.e.* clay soil around roots of litchi trees (*Litchi chienesis* Sonn) in Zhangzhou, Fujian province, eastern China. The odontophore is swollen and has a tri-radiate base containing well developed flanges.These taxonomically important characteristics were not reported in the original description of the species.

Key words: basal flanges, China, *Litchi chienesis*, Longidoridae, plant nematode.

Longidorus litchii Xu & Cheng, 1992, was described from specimens recovered from the rhizosphere of litchi fruit trees growing at Zhangzhou, Fujian province, China, but was not identified during a subsequent survey of fruit orhards and vineyards in China (Wang *et al.*, 1996). When describing the species Xu & Cheng (1992) referred to *L. litchii* as having "odontophore base well swollen and provided with weakly developed flanges", but the authors did not provide photographs of specimens. In a drawing of the oesophageal region of a female specimen in lateral view two narrow, elongated lobes are shown at presumably the base of the odontophore followed by a large triangular area with an apparently bilobed base. The length of the odontophore, including the two 12 µm long elongated lobes, calculated from the drawing is 88 µm. The triangular area is 77 µm in length, with the width at the anterior and posterior ends being 8 µm and 31 µm, respectively. The authors give the odontophore length in females as 88-107 µm, therefore the triangular area would appear not to be the "swollen base with flanges". Consequently, the drawing of the odontophore base with two narrow, elongated lobes and the large bilobed triangular feature, does not correspond with the authors assertion that the odontophore base is swollen and with flanges.

The nature of the elongated lobes is unclear, and these, and the large triangular region, are not referred to in the text, or in the diagnosis and relationships section, of the description of the species. However, if present these would have importance as discriminatory characters useful for distinguishing *L. litchii* from several morphologically similar species.

During 2000, specimens of *L. litchii* were recovered from soil samples collected from the locality of the type habitat (Pan *et al.*, 2000), *i.e.* clay soil around roots of litchi trees (*Litchi chienesis* Sonn) in Zhangzhou, Fujian province, eastern China. The exact type locality is not known as the authors in the description of the species refer only to "clay soil around roots of *L. chienesis* in Zhangzhou", and litchi trees are grown in abundance in this area with *L. litchii* frequently present in the rhizosphere of the trees.

Fresh specimens of *L. litchii*, and specimens processed to glycerol and mounted on slides, were examined to clarify the structure of the base of the odontophore and the results from this study are reported here.

MATERIAL AND METHODS

Specimens of *L. litchii* were extracted from soil samples collected from the rhizospere of a litchi tree by using a decanting and sieving method (Brown & Boag, 1988). Specimens were examined when alive, when heat killed, when fixed in hot FG fixative, and finally when processed to anhydrous glycerine and mounted on slides. All observations, measurements, and photomicrographs were made using an optical microscope.

OBSERVATIONS

Measurements: see Table 1.

Female. The morphology, with the exception of the structure of the odontophore, and morphometrics of the specimens examined in our study were similar to those reported in the original description. Body adopting a "J" to open "C" habitus in heat-killed specimens. Anterior end rounded with lip region slightly flattened (as shown in drawings "B" and "C" in original description), and not broadly rounded as reported in the original description. Anterior set-off from body by a shallow depression. No feature was present in any of the specimens examined (Fig. 1A-C) that resembled the large, extended triangular area posterior to the base of the odontophore as depicted in drawing 'A' in the original description of the species. It may be surmised that this 'structure' possibly resulted from a fixation artefact.

Junction between odontostyle and odontophore simple, not bifurcated. In all female and juvenile specimens examined, including the J1, the odontophore appeared slightly expanded (Fig. 1A), and not as in most other *Longidorus* species parallel with the odontostyle. Odontophore with a tri-radiate base (Fig. 1C, D) with three well developed flanges, resembling the odontophore base in species in the genus *Xiphinema*, and the shape varying depending on the oerientation of the flanges (Fig. 1E-G). This feature was most apparent in live specimens, becoming less obvious progressively in specimens that had been heat killed, then fixed, and finally processed to anhydrous glycerol.

Guiding ring single, far posterior from the anterior end [(Fig. 1A); 87±2.7 (84-90) µm (90±3.1 (83-97) µm, in original description].

Male. None found. Two males were reported as part of the original description

Juveniles. Four distinct juvenile development stages were found, the tail of the J1 being elongate, conoid with a long digitate tip, as originally reported.

Diagnosis. *Longidorus litchii* is characterized by having a medium sized body length (4-5 mm); anterior end set of from body by a shallow depression, rounded, but with lip region slightly flattened. Long odontostyle with simple base; odontophore swollen and base tri-radiate with distinct flanges. Guiding ring situated well posterior to the anterior end, in the fore-part of the odontostyle. Tail short, bluntly rounded, usually less than one anal body width long; and the tail of the first stage juvenile elongate, conoid with a long digitate tip.

The identification codes for *L. litchii* in the polytomous identification key for *Longidorus* species by Chen *et al.* (1997) are A57, B2, C5, D2, E2, F23, G1(2), H1, I2. Combining our observations with those reported in the original description necessitates only minor changes to the codes. The odontostyle length for most specimens is in the range 140-160 µm, with only a few specimens in the range of 120-140 µm, or exceeding 160 µm. A similar situation exists with body length with specimens in the range 4.0-5.3 mm, and guide ring 82-97 µm. The revised codes are A(5)6(7), B2, C5, D2, E2, F2(3), G12, H1, I12.

Taxonomic notes. Choi & Duan (1998) reported *Longidorus litchii* as being widespread, associated with numerous host plant species, in Korea. However, these authors noted that the populations occurring in Korea had slightly shorter lengths of body (3.03-3.75 mm *vs* 4.14-5.29 mm) and odontostyle [134±5.4 (122.5-141.8) µm *vs* 155±8.1 (138-171) µm], and that the guide ring was situated more anteriorly than reported in the original description [74.5±2.8 (69.0-79.8) µm *vs* 90.0±3.08 (82.5-96.5) µm]. Specimens received from Professor Y.E. Choi, Korea (Table 1), originally reported as *L. litchii*, were examined and found to represnt a different *Longidorus* species in which the odontophore is simple, as in the majority of *Longidorus* species, not swollen, the base is not tri-radiate, and flanges are not present. These specimens are the subect of a seperate taxonomic study.

The swollen odontophore with tri-radiate base and flanges is not unique to *L. litchii*, as these features have been observed in several other *Longidorus* species *i.e.*, (Swart & Heyns, 1987; Cho & Robbins, 1990). These species almost invariably have the guiding ring located far posteriorly fom the anterior end. Coomans (1996) considers the presence of this arrangement a plesiomorphy that has strong functionality *i.e.*, the ionger the chei-

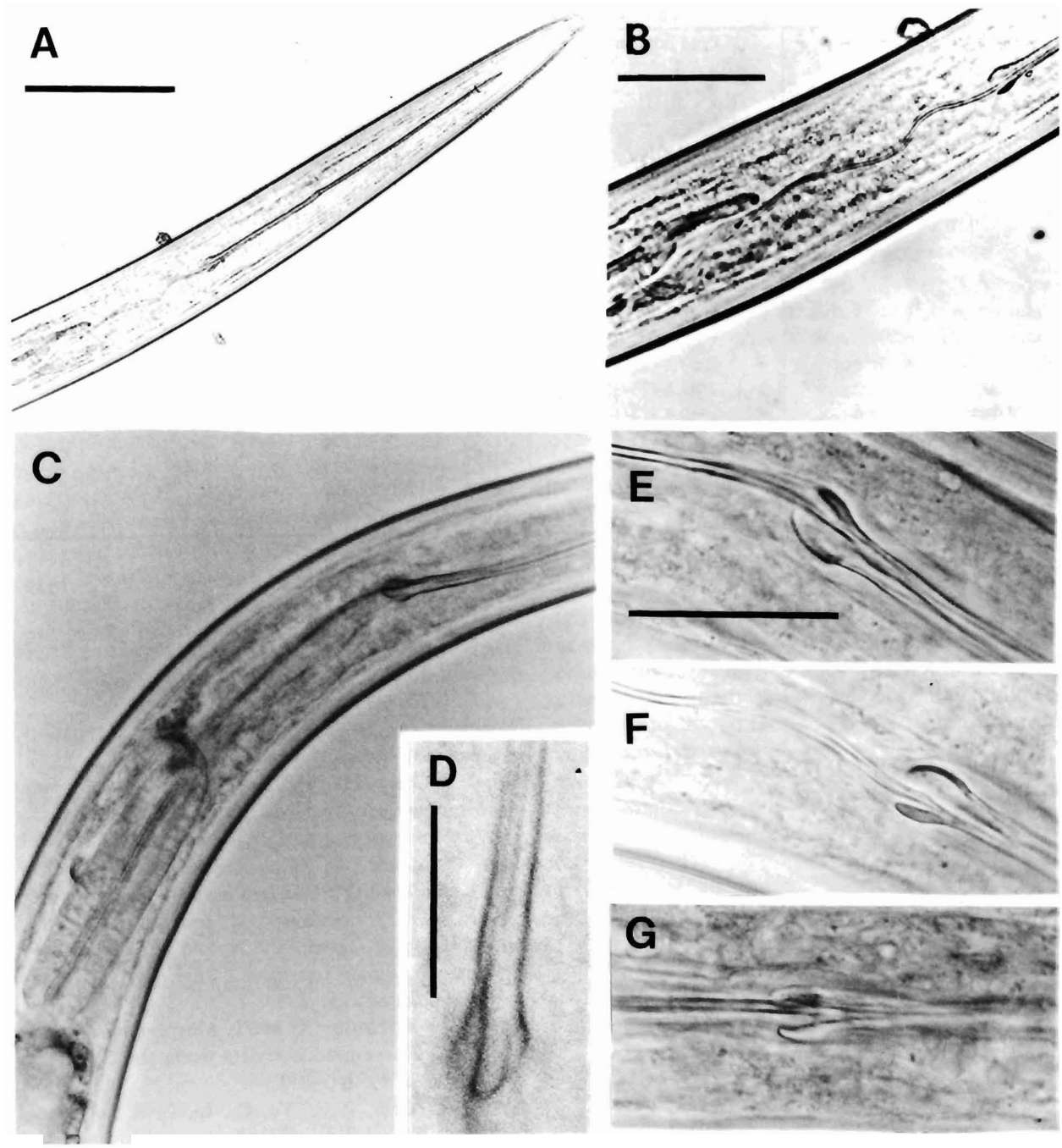

Fig. 1. Photomicrographs of live female *Longidorus litchii*. A: Anterior region; B, C: Region between base of odontophore and oesophageal bulb; D: Enlargement of posterior end of odontophore in C: Showing tri-radiate base; E-G: Variation in shape of posterior end of odontophore resulting from differences in orientiation of the tri-radiate base. Scale bars: A – 100 µm; B, C, – 50 µm; D, 20 µm; E, F, G – 20 µm.

lostome, the greater the force required for stylet protraction. Thus, the flanges represent a larger surface area for the insertion of radial muscles that trasmit the traction exerted by the stylet protractor muscles to the cuticular odontophore.

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Table 1. Morphometrics of *Longidorus litchii* populations (all measurement in µm, except for L in mm).

Population Origin Host	Type population (Xu & Cheng, 1992) Zhangzhou Litchii tree	Present study Zhangzhou Litchii tree	K1* Kyeryong mountin *Lindera erythrocarpa*
n	25	10	20
L (mm)	4.56±0.35 (4.14-5.29)	4.31±0.15 (4.08-4.42)	3.82±0.25 (3.03-3.75)
a	78±3.3 (72-84)	88±6.1 (80-93)	71±5.8 (63-86)
b	8.5±1.0 (7.2-11.3)	9.0±1.2 (8.0-10.0)	8.0±0.9 (6.3-9.4)
c	163±15.0 (139-197)	166±9.3 (159-179)	118±20.2 (92-163)
c'	0.70±0.05 (0.61-0.79)	0.70±0.06 (0.70-0.80)	0.70±0.10 (0.60-0.80)
V%	52±1.3 (49-54)	52±1.8 (50-54)	51±1.1 (50-54)
Odontostyle	155±8.1 (138-171)	146±5.3 (141-152)	134±5.4 (123-142)
Odontophore	95±4.5 (88-107)	75±6.8 (70-85)	76±7.6 (53-86)
Oral aperture to guide ring	90±3.1 (83-97)	87±2.7 (84-90)	75±2.8 (69-80)
Tail	28±1.7 (26-32)	26±1.6 (25-28)	31±4.5 (23-39)
Body diam. at lip rigion	13±0.4 (13-14)	12±0.5 (12-13)	–
Body diam at guide ring	37±1.3 (35-41)	32±1.7 (30-33)	–
Body diam. at base of pharynx	53±3.1 (49-61)	46±2.3 (44-49)	–
Body diam. at mid-body	58±3.6 (53-64)	49±1.8 (48-55)	–
Body diam. at anus	40±2.1 (36-44)	36±1.6 (34-38)	–

*One of the many populations collected and measured by Choi & Duan (1998).

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Zheng J., Pan C., Furlanetto C., Neilson R., Brown D. J. F. Морфология одонтофора *Longidorus litchi* Xu & Cheng, 1992 (Nematoda: Longidoridae).

Резюме. Дано описание морфологии одонтофора *Longidorus litchi* Xu & Cheng, 1992 иллюстрированное микрофотографиями особей выделенных из глинистой почвы ризосферы личжи (*Litchi chinensis* Sonn.) – в типовом биотопе этого вида в Чжанжоу, провинция Фуцзянь, Восточный Китай. Одонтофор утолщенный, с трехлучевым основанием и хорошо выраженными краями. Эти таксономически важные особенности не были отмечены в первоописании.