Description of *Quinisulcius solani* n.sp. (Nematoda: Tylenchorhynchidae) with a Key to the Species and Data on *Scutylenchus koreanus* from Pakistan[1]

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Abstract: A new species, *Quinisulcius solani*, is described and illustrated from specimens on *Solanum tuberosum* from Murree Hills, Pakistan. *Q. solani* n.sp. differs from its closest relative, *Q. acutus* (Allen, 1955) *Siddiqi*, 1971, by its spiral to open 'C' shaped body and stylet length of 19 μm, vs. 17 μm in *Q. acutus*. In *Q. acutus* the stylet knobs project anteriorly but slope posteriorly in *Q. solani* n.sp. Tail annules number 17 in *Q. acutus* but 38 in *Q. solani* n.sp.; also the phasmids in the former species are at mid-tail and in the latter are in anterior half of tail, at about 34%. *Q. solani* n.sp. is also closely related to *Q. capitatus* (Allen, 1955) Siddiqi, 1971 but differs in some characters. Head annules number eight and stylet length is 17 μm in *Q. capitatus*, but head annules are six and stylet length is 19 μm in *Q. solani* n.sp. In *Q. capitatus* T/ABW is 3 vs. 2.2 in *Q. solani* n.sp. Also, phasmids are located at mid-tail on *Q. capitatus* but at about one-third of the tail on *Q. solani* n.sp. A key to the 10 species of *Quinisulcius* is also presented. *Scutylenchus koreanus* (Choi & Geraert, 1971) Siddiqi, 1979 is recorded for the first time in Pakistan and morphometric data and illustrations given. *Key words:* taxonomy, new species, key.

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During a survey of the Potato Research Station at Murree, Rawalpindi, the following varieties of *Solanum tuberosum* L. were found heavily infested by various parasitic nematodes: Cardinal, Cosima, Atica, Spenta, Patrone, Jose. Examination of the different specimens collected from soil around the roots of these six varieties of potato revealed, besides other tylenchid nematodes, a new species of *Quinisulcius* Siddiqi, 1971 in very high numbers.

In 1913 Cobb (2) proposed the genus *Tylenchorhynchus* when he described *T. cylindricus* from specimens collected in Southern California. Forty years later the genus *Tylenchorhynchus* contained 34 valid species (1) and in 1964 Tarjan (8) listed 68 species. There are wide morphological differences in the various species described from various parts of the world. Because of this marked variation in characters, several new genera have been proposed which are closely related to *Tylenchorhynchus* (4,5,6, 7,10). An important character used in distinguishing these various genera is the number of lines in the lateral field, ranging from three to six. *Tylenchorhynchus* is now limited to those species having four lines in the lateral field. The genus *Quinisulcius* contains only species with five incisures and a nonareolated lateral field. If males are known, distal flanges of the spicula are small sized, and the proximal end of the gubernaculum is directed dorsally.

Jairajpuri (3) proposed the genus *Scutylenchus* (in an abstract of a paper), to accommodate the type and only species, *Scutylenchus mamillatus* (Tobar-Jimenez, 1966) Jairajpuri, 1971. It was characterized by scutellum-like phasmids, subdigitate female tail, and areolated lateral field.

Siddiqi (7) rediagnosed the subfamily Merliniinae and its genera *Merlinius, Geocenamus, Nagelus,* and *Scutylenchus.* He recognized two important characteristics of the genus *Scutylenchus*—i.e., cuticle marked by longitudinal grooves or indentations, which, together with transverse striae, divide its surface into small blocks, and the absence of deirids—and transferred 10 species of *Merlinius* to the genus *Scutylenchus* Jairajpuri, 1971.

The species described herein has only five lines in the lateral field and therefore is placed in the genus *Quinisulcius.*

MATERIALS AND METHODS

Specimens were recovered from the soil by means of a modified Baermann funnel method. The nematodes, still in water, were picked out under a binocular microscope, killed by gentle heat, and fixed in TAF for

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24 h. Later on specimens were processed by slow method to glycerine and mounted in dehydrated glycerine. Measurements were taken by means of ocular disc micrometer in a compound microscope and illustrations were made with the aid of a camera lucida. Curved nematodes were measured with the help of a plastic roller calibrated with an ocular head as recommended by Thorne (9).

Quinisulcius solani n. sp.
(Figs. 1–5)

Measurements: Female (holotype): L = 0.636 mm; a = 33; b = 7; b′ = 5; c = 4.8; T/ABW = 2.2; V = 55.7%; stylet = 19 μm.

Females (paratypes) (5): L = 0.61–0.73 (0.66) mm; a = 30–33 (32); b = 6.8–7.4 (7.2); b′ = 4.8–5.6 (5.2); c = 3.8–4.9 (4.4); T/ABW = 2.2; V = 53–56% (54.5); stylet = 18.4–19.5 (18.9) μm.

Male: Not known.

Description: Specimens open 'C' to spiral shaped after killing by gentle heat; body cylindroid, tapering at both ends. Head region broadly rounded, set off from body by constriction, and bears six annules which are not well demarcated. Labial framework moderately sclerotized; stylet 19 μm in length with well-developed stylet knobs, sloping posteriorly. Median bulb oval 12.15 μm; excretory pore located a distance of 121 μm from head region and opens at a level with the middle of the basal esophageal bulb. Orifice of the dorsal oesophageal gland (DGO) located 1.4 μm behind stylet base. Oesophago-intestinal valve inconspicuous, cardia distinct. Lateral field more than one-third of the body diameter wide and bearing five incisures; the outer most incisures crenate, partly nonareolated at the tail. Female reproductive system double, opposed; spermatheca nonfunctional; vagina less than one-half of the body width deep. Vulva post median. Phasmid located at 34% of the tail length. Tail short, ventrally curved, conoid, with about 38 annules; terminus bluntly pointed, without annules or striations.

Diagnosis and relationship: *Q. Solani* n. sp., is closely related to *Q. acutus* (Allen, 1955) Siddiqi, 1971 but can be identified by its open 'C' to spiral shaped body, length of stylet, shape of stylet knobs, and number of annules on the tail. The stylet length in *Q. solani* n.sp. is 19 μm but 17 μm in *Q. acutus*. Stylet knobs are inclined anteriorly in *Q. acutus* but sloping posteriorly in *Q. solani* n.sp. The number of tail annules are 17 in *Q. acutus* with phasmids midway on tail and 38 in *Q. solani* n.sp. with phasmids at about one-third on tail. *Q. solani* n.sp. is also closely related to *Q. capitatus* (Allen, 1955) Siddiqi, 1971 in general appearance but differs as follows: stylet length in *Q. capitatus* is 17 μm but 19 μm long in *Q. solani* n.sp.; T/ABW value in *Q. capitatus* is about 3 while it is 2.2 in *Q. solani* n.sp.; *Q. capitatus* has eight head annules; *Q. solani* n.sp. has six head annules; and phasmids in *Q. capitatus* are at mid-tail but are at one-third tail in *Q. solani* n.sp.

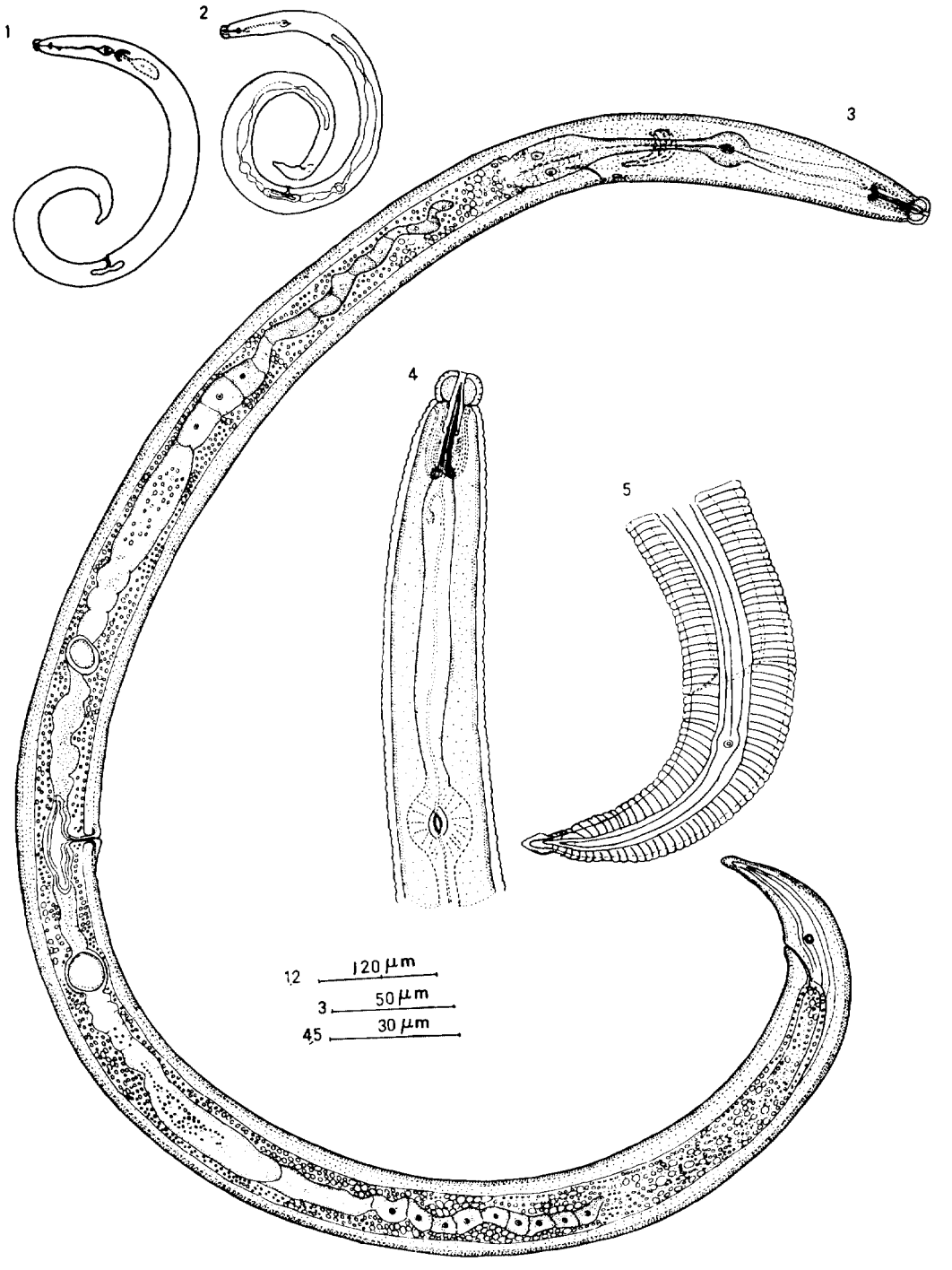
Type locality: Potato Research Station, Sunnibank, Murree, Rawalpindi, Pakistan.

Type host: *Solanum tuberosum* L.

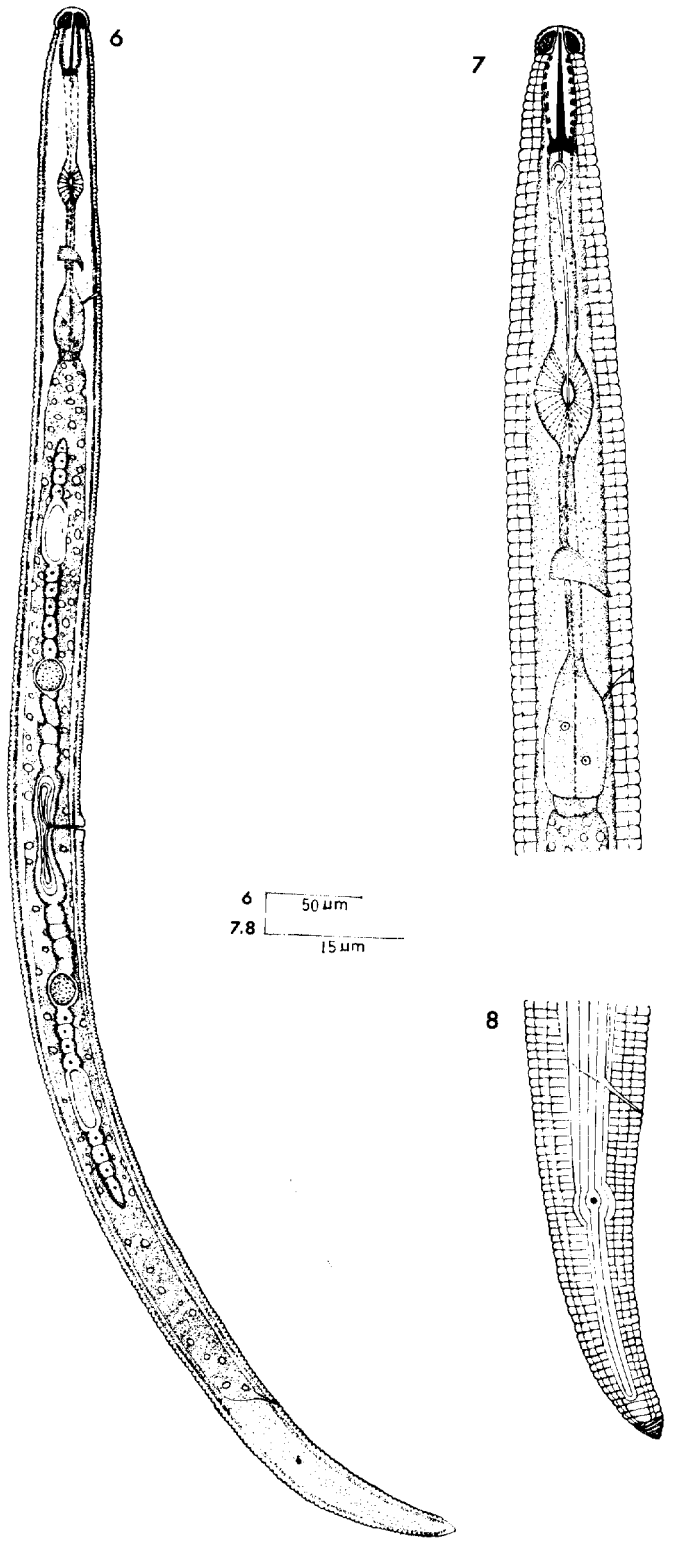
Type slides: NRS/201 holotype. Paratypes NRS/202-204 in Nematological Research Centre, University of Karachi, and NRS/205 deposited in United States Department of Agriculture Nematode Collection, Beltsville, Maryland, USA.

KEY TO FEMALES OF QUINISULCIUS SIDDIQUI, 1971

1. Tail terminus smooth, without annulation 3
   Tail terminus annulated 2
2. Stylet averaging 18 μm, spematheca and males present, post anal extension of intestine absent ..... *tarjani* Knobloch, 1975
   Stylet averaging 21 μm, functional spermatheca and males absent, post anal extension of intestine present (about two anal body widths in length) ..... *himalayae* Mahajan, 1974
3. Males and functional spermatheca present 4
   Males and functional spermatheca absent 5
4. Body 0.47–0.57 mm long, stylet 13 μm in length ..... *obregonus* Knobloch & Laughlin, 1973
   Body 0.80 mm long, stylet 18 μm in length ..... *acutoides*



Figs. 1–5. *Quinisulcius solani* n.sp. 1) Female in open 'C' shape. 2) Female in spiral shape. 3) Whole female. 4) Female head. 5) Female tail.



Figs. 6–8. *Scutylenchus koreanus* (Choi & Geraert, 1971) Siddiqi, 1979. 6) Entire female. 7) Female head. 8) Female tail.

(Thorne & Malek, 1968) Siddiqi, 1971
5. Number of tail annules 35 or more 6
Number of tail annules 30 or less 8
6. Stylet knobs sloping posteriorly, tail conoid, terminus pointed 7
Stylet knobs with anterior surface inclined laterally, tail terminus hemispherical ..... *acti* (Hopper, 1959) Siddiqi, 1971 (Syn. *nilgiriensis* Seshadri et al., 1967)
7. Head with eight annules, stylet 17 μm, T/ABW 3, phasmids at mid-tail ..... *capitatus* (Allen, 1955) Siddiqi, 1971
Head with six annules, stylet 19 μm, T/ABW 2.2, phasmids at 1/3 of tail ..... *solani* n.sp.
8. Stylet knobs projecting anteriorly, head with six annules 9
Stylet knobs sloping posteriorly, head with 4–5 annules ..... *curvus* (Williams, 1960) Siddiqi, 1971
9. Tail annules 17, T/ABW 2.1 ..... *acutus* (Allen, 1955) Siddiqi, 1971
Tail annules 23, T/ABW 3 ..... *cacti* (Chawla et al., 1968) Siddiqi, 1971

Scutylenchus koreanus (Choi & Geraert, 1971) Siddiqi, 1979
(Figs. 6–8)

Measurements: Females (10): L = 0.87–0.96 (0.92) mm; a = 37.2–39.3 (38.4); b = 7.2–8.5 (7.3); c = 12.4–13.7 (12.8); T/ABW = 3.4–3.92 (3.2); V = 67.5–69.2% (66.8); stylet = 24.6–26.2 (25) μm.

Male: Not found.

Description: Body long and cylindrical, curved ventrally after killing by gentle heat; cuticle annulated, forming small blocks and annules 4 μm. Head slightly set off with six incisures. Cephalic framework lightly sclerotized; amphidal aperture porelike, 2.4 μm in length. Mouth aperture is encircled by hexaradiate sclerotizations. Stylet 25 μm in length; stylet knobs flattened anteriorly and 4.8 μm across. Oesophagus about 143 μm long from head region. Dorsal oesophageal gland opening about 2.1 μm from the base of stylet knobs. Median oesophageal bulb oval and 12 μm in diameter. Excretory pore located opposite the end of terminal bulb; hemizonid inconspicuous. Rectum short, about half the anal body width long. Vulva a transverse slit. Reproductive system double, outstretched in opposite directions; ovaries symmetrical; spermathecae conspicuous but sperm not seen. Anterior end of the intestine with wide lumen. Rectum short, less than half the anal body diameter. Tail coarsely annulated toward tip, subcylindrical; tail terminus blunt. Phasmid located in anterior third of the tail. The species is recorded herein for the first time in Pakistan.

Locality and host: Collected from soil around roots of wheat, *Triticum vulgare*, from Malakandh, N.W.F. Province. Slide NRS/316 in the collection of Nematological Research Centre, University of Karachi, Karachi, Pakistan.

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