Two New Species of the Genus *Hemicriconemoides* from North India with an Amended Key to sp. of *Hemicriconemoides*

S. L. Misra

Department of Zoology, University of Allahabad, U. P.

AND

J. C. Edward

Department of Biology, Allahabad Agricultural Institute, Allahabad.

Reprinted from THE ALLAHABAD FARMER

Vol. XLVI, No. 3-4, May-July 1972, pp. 199—203

PRINTED AT

THE LUCKNOW PUBLISHING HOUSE, LUCKNOW

1972

Two New Species of the Genus *Hemicriconemoides* from North India with an Amended Key to sp. of *Hemicriconemoides*

S. L. Misra* and J. C. Edward**

SUMMARY

H. kusumi with 135-150 body annules, occasional anastomosis, first annule with rounded outer margin, spear 62-73 μ long, excretory pore on 36th-37th body annule, vulva and anus on 12th-15th and 7th-9th annules respectively from posterior end tail end annulated. *H. semhali* with 115-135 body annules, first annule with slightly angular margins, spear 62-72 μ long, exeretory pore on 36th-38th body annule and vulva and anus on 10th-12th and 7th-9th annules respectively from posterior end.

Hemicriconemoides kusumi n. sp. and *H. semhali* n. sp. found associated with the rhizosphere soils of *Schleichere trijuga* willd. and *Bambax malabaricum* DC. respectively are figured and described along with an amended key to species of *Hemicriconemoides*.

HEMICRICONEMOIDES KUSUMI N. Sp.

(*Figure* I, A-I)

Measurements:

4 females: L=0.41—0.60 mm; a=12—16; b=3—4.5; c=16—20; V=90=93; spear=62—73 μ; body annules=135—150.

8 Larvae: L=0.25—0.37 mm; a=13—17; b=2.5—4.5; c=15—22; body annules=140—155.

Female (Holotype): L=0.48 mm; a=13; b=4.4; c=17.5; V=91.5; body annule=140.

Body cylindrical, straight or slightly ventrally arcuate on death, tapering anteriorly to a truncate-conoid head end and posteriorly from the region of vulva to a truncate-conoid, annulated and not smooth tail end. Body annules 140, not retrorse, 3.5 μ apart in the the mid body. Annules broken at one or two places anteriorly and posteriorly below vulva. Head consisting of two annules, Ist annule 8.5 μ across with a rounded outer margin, and 2nd annule 11.0 μ across. Labial frame work fairly sclerotized. Sublateral lobes fairly prominent, situated above the Ist annule. Labial disc absent. *En face* view could not be taken because of the paucity of specimens. Stylet robust, 64.0 μ long with its prorhabdion measuring 58 μ long. Basal knobs massive, with its outer margin anteriorly arcuate, measuring 7×3.5 μ. Oesophagus typically criconematoid with median bulb 16 μ across, joined by short isthmus 7 μ long, to a pear-shaped basal bulb 9 μ across. Extretory pore located on 36th body annule (36th—37th in paratypes) and 115 μ from anterior end (110—130 μ in paratypes). Vulva a prominent transverse slit, 11 μ long, located on 14th body annule (12th—15th in paratypes) from posterior end. An oval spermatheca measuring 11 × 9 μ situated more towards the vulval side, filled with numerous sperms. Ovary prodelphic, monodelphic 78 μ long with oocytes arranged in a single row, except near the cap cell where the number of rows is more than one. Anus situated on 9th body annule (7th—9th in paratypes), rectum not

*Department of Zoology, University of Allahabad, U. P.
**Department of Biology, Allahabad Agricultural Institute, Allahabad.

visible. Tail end bluntly conical with annulated terminal region and not smoothly rounded.

Larvae: Body contour similar to that of the adult, except that the tail is sharply conical and the larval cuticle has 10—12 rows of scale bearing small setae. Gonad rudiment of the larvae very clearly seen consisting of rounded cells grouped in 2—3 rows.

Males : Not observed. Type Specimens: Holotype No. 1/H. Cri/67 and paratype Nos, 2-3/H. Cri/67; deposited in the Biology Deptt. Agricultural Institute Allahabad. Type host: Kusum (*Schleichera irijuga*, willd.)

Type locality : Rihand dam, Mirzapur district, Uttar Pradesh, India.

Diagnosis

Based on the key to species of *Hemicriconemoides* by Edward, Misra and Singh (1965) *H. Kusumi* n. sp. comes close to *H. litchi* Edward and Misra, 1963; *H. squamosus* (Cobb, 1913) Siddiqi and Goodey, 1963, *H. birchfieldi*, Edward, Misra and Singh, 1965 and *H. kanayaensis* Nakasono and Ichinoe, 1961.

It differs from *H. litchi* in having Ist annule with rounded outer margin (Ist annule angular and outwardly directed in *H. litchi*) prominent sub-lateral lobes (Sub-lateral lobes absent in *H. litchi*.), more posteriorly located excretory pore (34th—35th in *H. litchi*), annulated caudal end (smoothly rounded in *H. litchi*) smaller 'c' value (c=19—23 in *H. litchi*), 2—3 annules showing annullar anastomosis near the anterior and posterior end (no annular anastomosis in *H. litchi*) and in the absence of males.

It differs from *H. squamosus* in having Ist annule with rounded outer margin (Ist annule angular with pointed outer margin in *H. squamosus*), smaller spear (70—80μ in *H. squamosus*), smaller 'a' and 'c' values (a=19—23 and c=18—24 in *H. squamosus*), well developed pre-oral lobes (preoral lobes absent in *H. squamosus*), annulated caudal and without any dimorphism (smoothly rounded to conical tail end in *H. squamosus*), anastomosis near the anterior end posterior ends (annular anastomosis absent in *H. squamosus*).

In differs from *H. birchfieldi* in having Ist annule with rounded outer margin (Ist annule angular in *H. birchfieldi*), well developed (pre-oral lobe absent in *H. birchfieldi*), relatively longer spear (61—67 μ in *H. birchfieldi*), relatively anteriorly located vulva and anus (vulva on 15th—16th annule and anus on 10th—11th annule respectively in *H. birchfieldi*), 2—3 annules showing annular anastomosis near the anterior and posterior ends (annular anastomosis absent in *H. birchfieldi*), annulated caudal end (smoothly rounded in *A. birchfieldi*) and in the absence of males.

It differs from *H. kanayaensis* in having a shorter body length (L=500=631 μ in *H. kanayaensis*), smaller number of body annules (142=164 in *H. kanayaensis*), pre-oral lobes (pre-oral lobes absent in *H. kanayaensis*), more posteriorly located vulva and anus (vulva located on 16—21st annule and anus on 11—15th annule from anterior end), relatively shorter spear (66—78.7 μ in *H. kanayaensis*), 2—3 annules showing annular anastomosis near the anterior and posterior ends (annular anastomosis absent in *H. kanayaensis*), annulated caudal end (elongate conoid caudal end with smoothly rounded tail tip in *H. kanayaensis*), lower 'a' value (a=19.2=25.8 in *H. kanayaensis*) higher 'c' value (c=11.4—18.6 in *H. kanayaensis*) and in the absence of males.

It differs from *H. semhali* n. sp in having relatively larger number of body annules

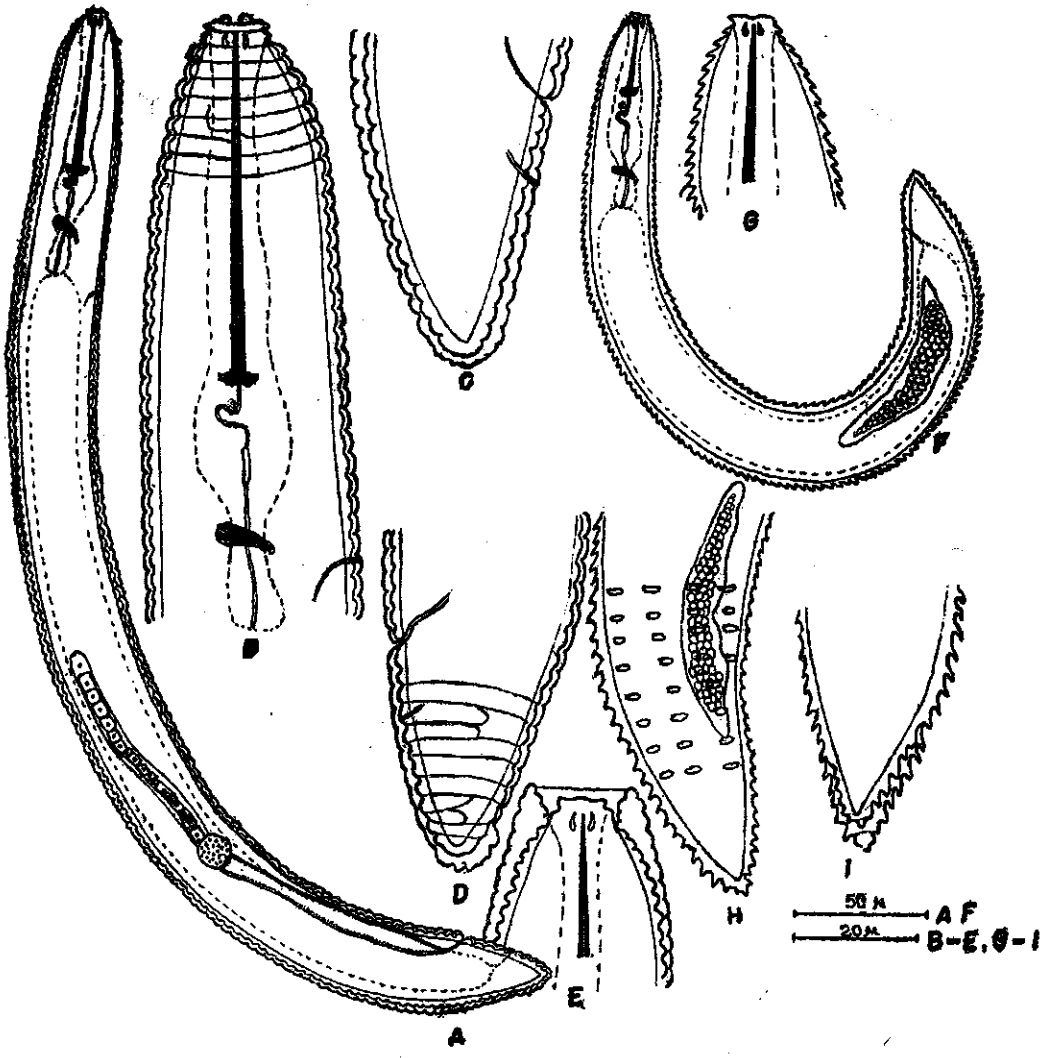

Fig. 1

A—Female in relaxed position.

B—Enlarged anterior end of female.

C—Enlarged posterior end of female.

D—Posterior end of female showing annular anastomosis and tail variation.

E—Female head withdraw within the outer cuticle.

F—3rd stage large.

G—Enlarged anterior end of 3rd stage larvae.

H—Enlarged posterior end of 3rd stage larvae.

I—Posterior end of 3rd stage larva showing an additional cuticle attached at the posterior end.

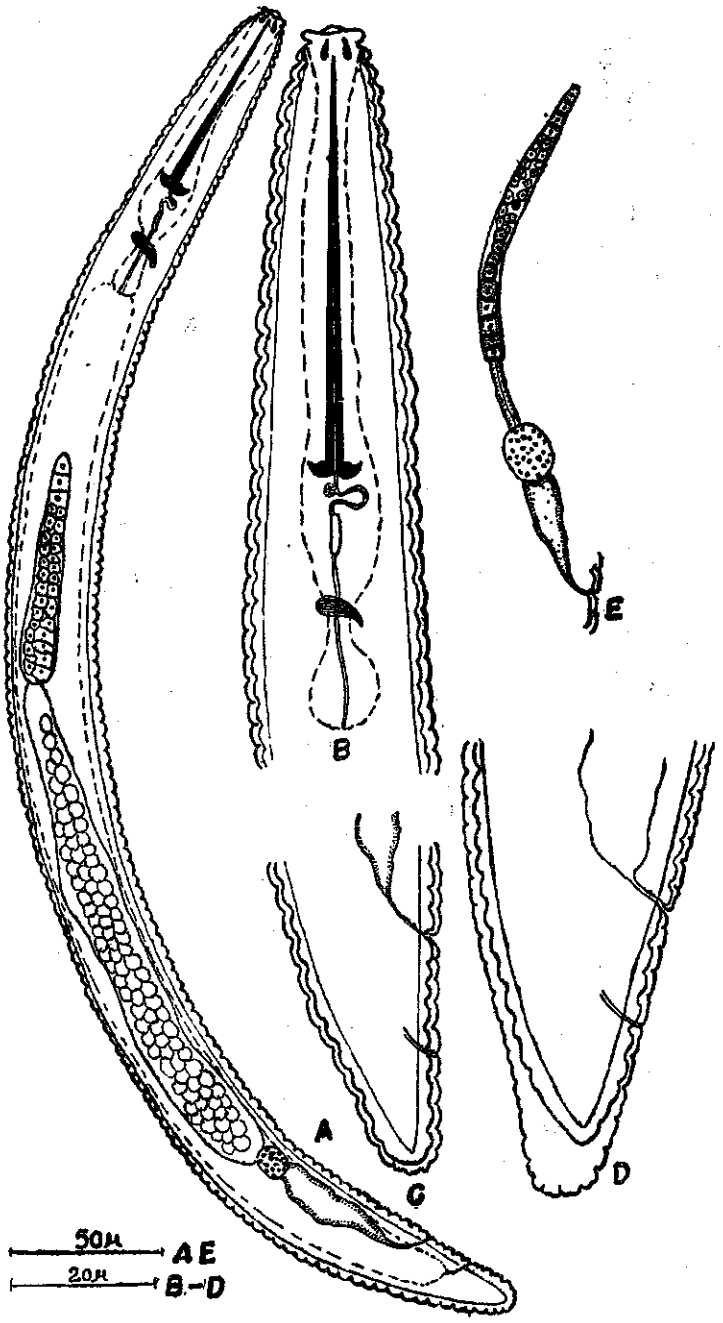

Fig. 2

A—Female in relaxed position.
B—Enlarged anterior end of female.
C—Enlarged posterior end of female.
D—Posterior end of female showing outer cuticle extending 3—4 segments beyond the inter cuticle.
E—Female Gonad showing variation.

115—135 in H. semhli), anteriorly located vulva (vulva on 10th—12 in *H. semhali*), preoral lobes (lobes absent in *H. semhali*), lower 'c' value (c=18—25 in *H. semhali*) and annular anastomosis (annular anastomosis absent in *H. semhali*).

HEMICRICONEMOIDES SEMHALI N. SP.

Figure II, A-E

Measurements:

10 Females : L=0.38—0.55 mm; a=13—20; b=3.5—5, c=18—25, v=91—95; spear=62—72 μ; body annules=115—135.

5 larvae : L=0.21—0.35 mm; a=9—14; b=3—4.5; c=8—13; spear=35—42 μ; body annules=120—130.

Female (Holotype) : L=0.50 mm; a=17; b=4.9; c=18.6; V=92.64. spear=65 μ.

Body cylindrical, straight to slightly ventrally arcuate on death, tapering anteriorly to a truncate conoid head and posteriorly from the region of vulva to a truncate conoid, annulated and not smooth tail end. Body consisting of 126 non-retrorse annules, 3.5 μ apart in the mid body region. Head consisting of two annules, Ist annule 9 μ across with its outer margin slightly angular, 2nd annule rounded 10.5 μ across. Labial frame work heavily sclerotized. An oval area (labial disc) situated above the Ist annule, sublateral lobe absent.

Stylet robust 68 μ long with prorhabdion measuring 56 μ. Basal knobs massive, with anteriorly arcuate outer margins, mersuring 7×3.5 μ. Oesophagus typical of the genus with median bulb 10.5 μ across, isthmus 10 μ long and basal bulb 9 μ across. Excretory pore located on 38th annule (36th—38th in paratypes) and 120 μ from anterior end (105—130 μ in paratypes), 7th annule below the junction of oesophagus with intestine.

Vulva a prominent transverse slit, located between 11th and 12th segment (10th-12th in paratypes) from posterior end. Vagina 8 μ long. An oval spermatheca 13×8 μ present, more towards the vulval side, above the uterus measuring 43 μ long. Ovary prodelphic, monodelphic 320 μ long with oocytes arranged from one to two rows. Anus located on 8th annule (7th-9th in paratypes) from tail terminus. Tail end bluntly conical with annulated terminus and not smoothly rounded. Body sheath closely adpressed but in few paratypes extending 2-5 segments beyond inner cuticle at the tail end.

Larvae: Body contour similar to that of the adult except that the measurement in general are smaller as compared to the adult and body bears 10-14 rows of rows of scales which of ten bears small setae.

Males: Not observed. Type Specimens: Holotype No. 4/H Cri/67 and paratype Nos 5-7 deposited in the Biology Deptt. Agricultural Institute Allahabed. Type host: Rhizosphere of Semhal (*Bombax malabaricum* DC.)

Type locality: Pantnagar, District Nainital, Uttar Pradesh, India.

Diagnosis

Based on the key, given by Edward and Misra (1965) *H. semhali* n. sp comes close to *H. litchi* Edward and Misra, 1963; *H. squamosus* (Cobb, 1913) Siddiqi and Goodey, 1963; *H. birchfieldi* Edward, Misra and Singh, 1965, *H. kanayaensis* Nakasono and Ichinoe, 1961 and *H. kusmi* n. sp.

It differs from the Ist in having relatively smaller number of body annules (128-133 in *H. litchi*), spear (60-65 μ in *H. litchi*), posteriorly located excretory pore (35th - 36th in *H. litchi*) an oval disc-like structure over the Ist annule (labial disc absent in *H. litchi*), annulated caudal end (smoothly rounded

caubal and in *H. litchi*) and in the absence of males.

It differs from the 2nd in having smaller number of body annules (133-148 in *H. squamosus*), spear length (70-81 μ in *H. squamosus*), labial-disc like structure over the Ist annule (labial disc absent in *H. squamosus*), annulated caudal end (smoothly rounded in *H. squamosus*), more posteriorly located vulva (13th in *H. squamosus*), females without any dimorphic tail end (tail dimorphic in *H. squamosus*), and in the absence of males.

It differs fron the 3rd in having smaller number of body annules (138-160 in *H. birchfieldi*), relatlvely longer spear (61-67 μ in *H. birchfieldi*), labial disc like structure over the Ist annule (labial disc absent in *H. birchfieldi*), annulated caudal end (smoothly rounded in *H. birchfieldi*), more posteriorly located vulva and anus (vulva on 15th-16th and anus on 10th-11th annule respectively from posterior end in *H. birchfieldi*), and in the absence of males.

It differs from the 4th in having shorter body length (L=500—631 μ in *H. kunayaensis*), smaller number of body annules (142-164 in *H. kanayaensis*), labial disc-like structure over the Ist annule (labial disc absent in *H. kanayaensis*), posteriorly located vulva and anus (vulva located on 16th-21st and anus on 11th—15th annule in *H. kanayaensis*), lower 'a' value (a=19. 2=25.8 in *H. kanayaensis*), higher 'c' value (c=11·4 —18.6 in *H. kanayaensis*), annulated caudal end (elongated conoid caudal end with smoothly rounded tail tip in *H. kanayaensis*) and in the absence of males.

It differs from *H. kusumi* in having smaller number of body annules (body annules 135—150 in *H. kusumi*), pesteriorly located vulva (vulva located on 12th—15th annule from posterior end in *H. kusumi*). Labial disc—like structure over the Ist annule (Labial disc absent in *H. kusumi*), higher 'c' value ('c'=16—20 in *H. kusumi*), no annular anastomosis (annular anastomosis present in *H. kusumi*), and in the absence of pre-oral lobes (pre-oral present in *H. kusumi*).

Key to species of Hsmicriconemoides.

H. biformis Chitwood and Birchfield, 1957 and *H. floridensis*, Chitwood and Birchfield, 1957 have not been listed in this key as they have been placed in the genus *Hemicycliophora* by Goodey, 1963.

1. Tail of female bluntly rounded, 100 body annules, head not set-off, stylet 53-56 μ, vulva 8th-9th annule from terminus, anus ? *brachyurus* (Loos, 1947) Chitwood and Birchfield, 1957.

Tail of female conoid, conically rounded to rather bluntly attenuated....2

2. Sheath annules of female 75-110..3
Sheath annules of female 111-165..4

3. Sheath annules of female 75-83, head set-off, stylet 50-60 μ, vulva on 9th annule, anus on 5th from terminus.----*wessoni*, Chitwood and Birchfield, 1957.

Sheath annules of female 86-94, head not set-off, stylet 72-76 μ, vulva on 8th-9th annule from terminus, anus ?----*minutus*, Esser, 1960.

Sheath annules of females 91-103, head not set-off, stylet 52-59 μ, vulva between 7th and 8th and anus between 6th and 7th ---*pseudobrachyurum* De Grisse, 1964.

Sheath annules of female 100, head not set-off, stylet 48-56 μ, vulva on 10th-11th annule from terminus with vulval sheath, anus ?----*cocophillus* (Loos, 1949) Chitwood and Birchfield, 1957.

4. Sheath annules of female 120, head not set-off spear 72-80 μ, vulva on 13th annule, anus on 7th or 8th annule from terminus----*gaddi* (Loos, 1949) Chitwood and Birchfield, 1957.

Sheath annules of female 110-130, head slightly set-off, stylet 51-58 μ, vulva on 8th-9th annule with a vulval sheath, anus on 7th-8th from terminus—*communis* Edward and Misra, 1963.

Sheath annules of female 116-133, head set-off, stylet 58-95 μ, vulva on 12th-15th annule, anus on 9th from terminus—*chitwoodi* Esser, 1960.

Sheath annules of female 128-133, head set-off, stylet 60-65 μ, vulva on 11th and 12th annule and anus on 7th—8th from terminus—*litchi* Edward a and Misra, 1963.

Sheath annules of female 115-135, head continuous, stylet 62-72 μ, vulva on 10th-12th annule, anus on 7th-9th from terminus, last annule annulated and not rounded—*semhali* Misra and Edward, 1971.

Sheath annules of female 133-148, head slightly set-off, stylet 7—681 μ, vulva on 13th annule, anus on 9th from terminus—*squamosus* (Cobb, 1913) Siddiqi and Goodey 1963.

Sheath annule of female 138-150, head set-off, stylet 61-67 μ, vulva on 15th to 16th annule, anus 10th to 11th from terminus—*birchfieldi* Edward, Misra and Singh, 1964.

Sheath annules 135-150 head slightly set-off, stylet 62-73 μ, vulva on 12th-15th annule, anus on 7th-9th from terminus. Tail terminus annulated and not smooth—*kusumi* Misra and Edward, 1971.

Sheath annule 142-164, head set-off, stylet 66-78 μ, vulva on 16th-21st annule, anus on 11th-15th from terminus—*kanayaensis* Nakasona and Ichinohe, 1961.

REFERENCES

1. Chitwood, B. G. and Birchfied, W. (1957)—A new genus, *Hemicriconemoides* (Criconematidae : Tylenchina) *Proc. helm. Soc. Wash.* **24**(2): 80-86.
2. Cobb, N. A. (1913)—New nematode genera found inhabiting fresh-water and non-brackish soils. *Jour. Wash. Acad. Sci.* **3**: 432-444.
3. DeGrisse, A. (1964)—*Hemicriconemoides pseudobrachyurum* n. sp (Nematoda: Criconematidae). *Nematologica* **10**: 369-372.
4. Edward, J. C., and Misra S. L. (1963) —*Criconemoides nainitalense* n. sp Nematoda: Criconematidae). *Nematologica* **9**: 218-221.
5. ..... .(1965)—*Hemicriconemoides birchfieldi* n. sp (Nematoda : Criconematidae) from Allahabad, Uttar Pradesh, India, with a revision of the key to species of *Hemicriconemoides*. *Nematologica* **11**: 157-161.
6. Esser, R. P. (1960)—Three additional species in the genus *Hemicriconemoides* Chitwood and Birchfield, 1957. *Nematologica* **5**: 64-71.
7. Loos, C. A. (1948)—Note on free-living and plant-parasitic nematodes of Ceylon 3. *Ceylon. Jour. Sci.* **(B)** 119-124.
8. Nakasona, K. and Ichinohe, M. (1961) —*Hemicriconemoides kanayaensis* n. sp associated with tea root in Japan (Nematoda : Criconematidae). *Jap. J. App. Ent. Zool.* **5**: 273-276.
9. Siddiqi, M. R. and Goodey, J. B. (1963)—The status of the genera and sub-families of the Criconematidae (Nematoda), with a comment on the position of Fergusobia. *Nematologica* **9**: 363-377.