

STUDIES ON THE ENCHYTRAEIDAE OF CHINA  
I. ON NEW SPECIES AND NEW RECORDS OF THE GENUS  
*HEMIENCHYTRAEUS\**

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**Abstract** This paper embodies 4 species belonging to *Hemienchytraeus* (Enchytraeidae). *H. planisetosus* and *H. brachytheucus* are described as new to science, while *H. stephensoni* and *H. loksai* are recorded from China for the first time.

**Key words** Enchytraeidae, *Hemienchytraeus*, New species, New records

Enchytraeidae is the largest family of microdrile oligochaetes and nearly 700 species were recorded from various localities of the world (Nielsen *et al.*, 1959, 1961, 1963; Dózsa-Farkas *et al.*, 1985; 1992). In China, owing to the influence of the opinion that enchytraeids are rare in the Oriental (Stephenson, 1923), less attention has been paid to Enchytraeidae for decades and only 21 species, 10 terrestrial and 11 marine, were recorded so far (Cernosvitov, 1941; Chen, 1959; Liang *et al.*, 1979, 1992; Xu *et al.*, 1989; Erséus, 1990, 1992a, 1992b; Erséus *et al.*, 1990). However, recent extensive surveys revealed that enchytraeids were more common than expected.

The genus *Hemienchytraeus* was erected by Cernosvitov in 1934 and divided into two subgenera (*Hemienchytraeus* and *Cotinchytraeus*) by Righi in 1974. Up to 1992, more than 12 species of the genus were reported, among which only two species, *H. bifurcatus* Nielsen & Christensen and *H. theae* Prabhoo, were found in China (Liang & Xie, 1992). This paper describes 4 species of *Hemienchytraeus* from the country, of which two species are considered to be new to science and the rest are recorded from China for the first time.

## 1 Materials and methods

Field collections were carried out in Hunan and Henan provinces. Worms were extracted from soil samples by the wet-funnel method (O'Conner, 1962) and preserved in 10% formalin. Observations were based on living materials and

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whole-mounted specimens (stained with alum cochineal or borax carmine and mounted in Canada balsam). Types of *H. planisetosus* sp. nov. and *H. brachytheucus* sp. nov. are deposited in the Specimen Room of Invertebrates, Institute of Hydrobiology, The Chinese Academy of Sciences.

## 2 Systematic descriptions

### 2.1 *Hemienchytraeus (Hemienchytraeus) planisetosus* sp. nov. (Fig. 1 A-I)

**Description** Body length 3.0—6.2 mm (holotype: 4.5 mm) (preserved), 7—8 mm (living). Segments 32—45 (holotype: 39). Head pore conspicuous in 0. Dorsal pores absent. Setae 2 per bundle throughout, straight with ental hook, distal end flattened and concave in anterior segments (approximately before XVIII) but simple-pointed posteriorly (Tab. 1.). Epidermal gland cells much developed in anterior few segments and arranged transversely. Clitellum in XII-1/2XIII, with gland cells irregularly arranged.

Tab. 1 Measurements of setae of *H. planisetosus* sp. nov. ( $\mu\text{m}$ ).

Segment	II	III	X	XV	XXIII	XXXVIII
Length	26.0—29.4	28.0—32.0	24.0	24.0	26.0	26.4
Max. width	3.0—4.0	3.8—4.0	4.0	3.6	2.2	2.4
Max. thickness	—	—	3.0	3.0	2.0	2.0

Brain concave anteriorly and truncated posteriorly, length ca.  $94\mu\text{m}$  and width  $62\mu\text{m}$ . 3 pairs of primary septal glands in IV—VI, all united dorsally; the first pair small. 2 pairs of secondary septal glands in V and VI. Peptonephridium unpaired, with short and stout stem, bifurcated twice. Dorsal vessel originating from XIII—XIV. Nephridia from 6/7 onwards, with 5 pairs in front of clitellum; anteseptale large and postseptale long; efferent duct originating from mid-ventral of postseptale anteriorly, and postero-ventral posteriorly. Coelomocytes abundant, spindle-shaped.

Sperm funnel cylindrical,  $80—140\mu\text{m}$  in length,  $20—30\mu\text{m}$  in width, collar inconspicuous. Vasa deferentia confined to XII, long and irregularly coiled. Penial bulbs large. No seminal vesicle. No egg sac. Usually 2 mature eggs present at a time.

Spermathecae free, extending to VII—IX, without accessory glands in the base of spermathecal pores. Ectal duct  $200—380\mu\text{m}$  long and  $6—12\mu\text{m}$  wide, opening at 4/5. Ampulla club-shaped,  $30—120\mu\text{m}$  in length and  $6—20\mu\text{m}$  in width.

**Holotype** Fully mature specimen, whole-mounted, collected from Cangjingdian, Mt. Hengshan ( $27.3^{\circ}\text{N}$ ,  $112.7^{\circ}\text{E}$ , ca.  $1000\text{m}$  above sea level), Hunan Province (April 25, 1991).

**Paratypes** 11 specimens, collected from type locality; 4 whole-mounts, the rest

in 10% formalin.

**Etymology** Named *planisetosus* for the flattened distal end of setae in anterior segments.

**Remarks** The new species is easily distinguished from all known species of *Hemienchytraeus* by the characteristic shape of the setae in anterior segments. For other characters, the new species is closer to *H. bifurcatus* Nielsen & Christensen and *H. csuzdii* Dózsa-Farkas in the shape of peptonephridium. But it differs from the latter by the presence of two pairs of secondary septal glands, and of the spermathecal ampulla extending to VII-IX (Tab.2).

Tab.2 Comparison of *H. planisetosus* sp. nov. and allied species

species	<i>H. planisetosus</i>	<i>H. bifurcatus</i>	<i>H. csuzdii</i>
	sp. nov.	Nielsen & Christensen	Dózsa-Farkas
Length(mm)	3.0—6.0	ca. 10	2.5—3.9
Segments	32—45	28—32	20—28
Setae (the shape of distal end)	plat	point	point
Posterior of brain	truncated	incised	incised
Bifurcations of peptonephridia	twice	twice	twice
Secondary septal glands	2 pairs	?	absent
Efferent duct of nephridia	middle to posterior	anterior to posterior	posterior
Sperm funnel (length: width)	4—8:1	2—3:1	4:1
Spermathecae	VII-IX	VI-VII	V
Distribution	China	Denmark, China	Ecuador, China

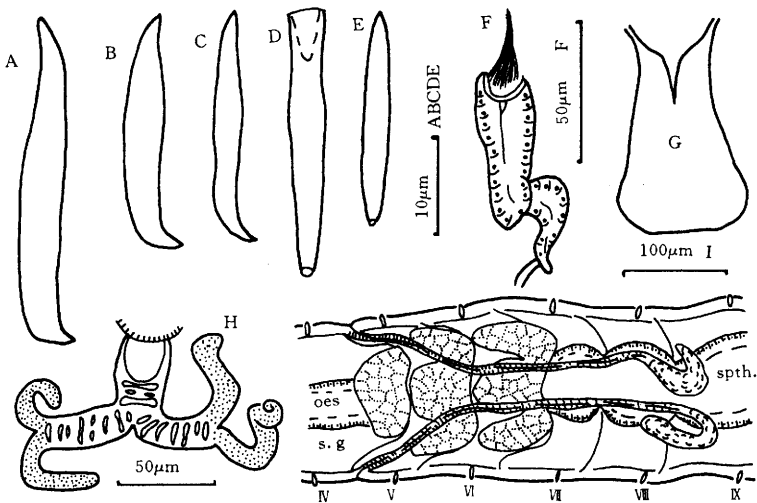


Fig.1 *Hemienchytraeus planisetosus* sp. nov.

A, B, C. Lateral view of setae (III, XIV, & XXI). D, E. Face view of setae (XIV & XXI). F. Sperm funnel. G. Brain. H. Peptonephridium. I. Dorsal view of IV-IX  
 oes. oesophagus; s.g. septal gland; sph. spermathecae

## 2.2 *Hemienchytraeus (Hemienchytraeus) brachythecus* sp. nov. (Fig.2 A–J)

**Description** Length 5.9–10mm (holotype: 7.8mm) (preserved). Segments 34–37 (holotype: 36). Head pore large. No dorsal pore. Epidermal gland cells scarce. Setae straight with ental hook, 2 per bundle throughout, 36–46 $\mu$ m in length and 2.4–4 $\mu$ m in width. Clitellum in XII–1/2XIII, much elevated with gland cells irregularly arranged.

Brain incised deeply posteriorly, ca. 46 $\mu$ m long and 32 $\mu$ m wide. 3 pairs of primary septal glands in IV–VI, all united dorsally. Two pairs of secondary septal glands in V and VI. Peptonephridium unpaired, with long stem, bifurcated twice, then each secondary branch branching into 3–4 third twigs. No oesophageal and intestinal appendages. Stomachal dilatation gradual. Chloragogen cells from VI onwards. Dorsal vessel originating from XIII. Nephridia from 6/7 onwards, with 5 pairs in front of clitellar region, anteseptale large, postseptale elongate and 2–3 times as long as anteseptale, efferent duct originating from mid-ventral of postseptal part anteriorly, the rest postero-ventral. Coelomocytes abundant, spindle or discoid, ca. 35–40 $\mu$ m in size.

Sperm funnel in XI, sub-spherical, 80–84 $\mu$ m in length and 40–50 $\mu$ m in width. Collar distinct, as wide as the body of sperm funnel. Vasa deferentia confined to XII, long and irregularly coiled. Penial bulbs well developed, opening ventro-laterally in XII. No seminal vesicle. No egg sac. Usually 1–2 mature eggs present at a time.

Spermathecae one pair, confined to V; no special gland cell at the base of spermathecae pores. Ectal duct 84–108 $\mu$ m in length and 8–15 $\mu$ m in width, swollen in the middle. Ampulla sub-spherical and 22–26 $\mu$ m in size.

**Holotype** Fully mature specimen, whole-mounted, collected from Fengqiu (35.1°N,

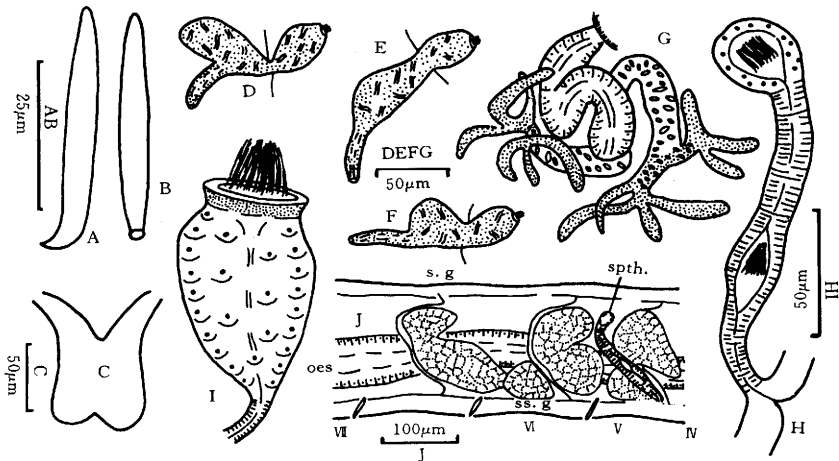


Fig.2 *Hemienchytraeus brachythecus* sp. nov.

A. Lateral view of seta. B. Face view of seta. C. Brain. D, E, F. Nephridia (8/9, 13/14 & 27/28).

G. Peptonephridium. H. Spermatheca. I. Sperm funnel. J. Lateral view of IV–VII  
oes. oesophagus; s.g. septal gland; s.s.g. secondaryseptal gland. spth. spermatheca

114.4°E), Henan Province (September 13—24, 1991).

**Paratypes** 33 specimens (15 mature), collected from type locality; 3 whole-mounts, the rest in 10% formalin.

**Etymology** named *brachytheucus* for the short spermathecae (confined to V).

**Remarks** The new species resembles *H. csuzdii* Dózsa-Farkas in the shape of spermathecae. However, it differs from *H. csuzdii* by the presence of secondary septal glands, and the peptonephridium bifurcates triply.

The new species is also resembles *H. lokasai* Dózsa-Farkas in the structure of peptoniphridium, but it possesses 2 pairs of secondary septal glands and shorter spermathecae (Tab.3).

Tab.3 Comparison of *H. brachytheucus* sp. nov. and allied species

species	<i>H. brachytheucus</i>	<i>H. csuzdii</i>	<i>H. lokasai</i>
	sp. nov.	Dózsa-Farkas	Dózsa-Farkas
Length(mm)	5.9—10	2.5—3.9	8.9—12.4
Segments	34—37	20—28	48—55
Posterior of brain	incised	incised	incised
Bifurcations of peptonephridium	third	twice	third
Secondary septal glands	2 pairs	absent	3 pairs
Efferent duct of nephridia	middle to posterior	posterior	posterior
Sperm funnels (length:width)	2:1	4—1	4—8:1
Spermathecae	V	V	IX—X
Distribution	China	China, Ecuador	China, Ecuador

### 2.3. *Hemienchytaeus (Hemienchytraeus) lokasai* Dózsa-Farkas, 1989 (Fig.3. A—C)

**Description** Length ca. 14 mm (preserved). Segments 51—55. Setae straight, 2 per bundle throughout; 36—44 $\mu$ m in length. Clitellum in XII-1/2XIII, with gland cells irregularly scattered. Brain incised deeply posteriorly, length ca. 2 times as width. Peptonephridium with stem stout and bifid twice; each secondary branch with 2 or 3 third twigs. Dorsl vessel originating from XII—XIII. Nephridia from 6/7 onwards, with well-developed interstitial tissue; efferent duct arising posteroventrally. Coelomocytes oval and abundant.

Sperm funnels conic, extending backwards to XV—XVI, ca. 940 $\mu$ m in length and 100 $\mu$ m in max. width. Collar conspicuous, ca. 110 $\mu$ m in width. Vasa deferentia long and extending to XVI. Seminal vesicle present, in XI—XVI. Spermathecae extending to XI—XII, not connected with oesophagus; ectal duct ca. 740 $\mu$ m long and 18 $\mu$ m wide. Ampulla cylindrical, ca. 1100 $\mu$ m in length and 38—117 $\mu$ m in width.

**Localities** Yiehoushuyuan, Mt. Hengshan, Hunan Province (April 28, 1991).

### 2.4. *Hemienchytraeus (Hemienchytraeus) stephensoni* (Cognetti) 1927 (Fig.3. D—F)

**Description** Length 4—5mm (preserved). Segments 37—43. Setae 2 per bundle,

straight with ental hook; length 36—44 $\mu\text{m}$ . Clitellum in XI—1/2XIII, gland cells oval and irregularly arranged. Brain concave posteriorly, length ca. 2 times as width. Peptonephridium in III—IV, with short and stout stem, then divided into two primary branches, each with three secondary tubes. 3 pairs of septal glands in IV—VI. No secondary septal gland. No abruption between oesophagus and intestine. Dorsal vessel originating from XII. Nephridia from 6/7 onwards, with 5 pairs in front of clitellum, anteseptale 1/2—1/3 as long as postseptale; efferent duct originating from mid-ventral of postseptale anteriorly; the rest postero-ventrally. Coelomocytes abundant and discoid, slightly smaller than the length of the setae; containing small refractile granules. Sperm funnel cylindrical, ca. 100 $\mu\text{m}$  long and 30 $\mu\text{m}$  wide; collar of sperm funnel distinct. Vasa deferentia confined to XII and irregularly coiled. Penial bulbs one pair, ca. 50 $\mu\text{m}$  in size. Seminal vesicle absent. Spermathecal ducts extending VI—VII, ca. 160 $\mu\text{m}$  in length and 12 $\mu\text{m}$  in width; ampulla cylindrical, in VII—VIII, ca. 60 $\mu\text{m}$  long and 22 $\mu\text{m}$  wide.

**Localities** Banshanting, Yubanqiao, Yiehoushuyuan and Tiefosi, Mt. Hengshan, Hunan Province (April 28, 1991)

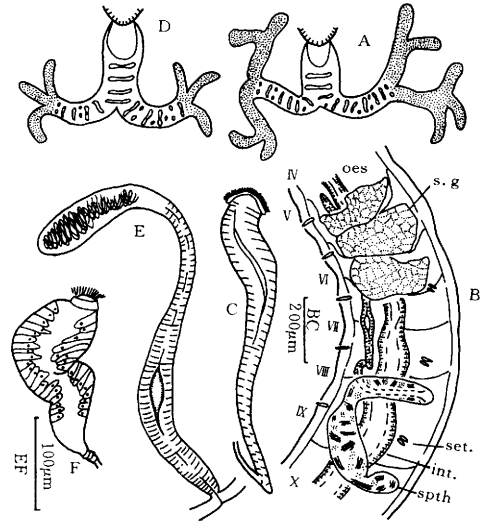


Fig. 3 A—C. *Hemienchytraeus lok sai* Dózsa-Farkas 1989. A. Peptonephridium (freehand drawing). B. Lateral view of IV—X. C. Sperm funnel. D—F. *H. stephensoni* (Cognetti) 1927. D. Peptonephridium (freehand drawing). E. Spermatheca. F. Sperm funnel.

int. intestine; oes. oesophagus; set. setae; s. g. septal gland; spt. spermatheca

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# 中国线蚓科的研究

## I. 半线蚓属的新种及新记录

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**摘要** 本文报道线蚓科(Enchytraeidae)半线蚓属(*Hemienchytraeus*)4种,其中2种为新种,即扁毛半线蚓(*H. planisetosus* sp. nov.)和短囊半线蚓(*H. brachytecus* sp. nov.)。另2种是国内新记录,即史氏半线蚓(*H. stephensoni*)和洛氏半线蚓(*H. loksai*)。

**关键词** 线蚓科,半线蚓属,新种,新记录