
**PHYLUM ANNELIDA**

**Class Oligochaeta**

**Microdrile oligochaetes**

**Megadrile oligochaetes**

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**Fig. 15** Illustration of different parts of Enchytraeidae

1. sigmoid setae (*Lumbrillus* type); 2. straight setae (*Enchytraeus* type); 3. pairwise setae (*Fridericia* type); 4. dorsal view of anterior segments; 5. lateral view of genital organs; 6. nephridia without interstitial tissue; 7-9. nephridia with well-developed interstitial tissue, and effenter ducts originating from antero-ventral, mid-ventral and terminal of postseptal parts. b. brain; int. intestine; o. ovary; od. oviduct; oes. oesophagus; pb. penial bulb; pept. peptonephridia; pp. pharyngeal plate; sf. sperm funnel; sg. septal glands; sp. spermatheca; t. testes; vd. vas deferens.

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Fig. 16  Illustration of different parts of Naididae and Tubificidae
1-3. *Nais*: 1. crotch, 2. hair, 3. needle; 4. lateral view of genital organs of Tubificidae. atr. atrium; o. ovary; pal. palmate; pec. pectinate; pr. prostate; ser. serration; sf. sperm funnel; sp. spermatheca; sph. spermatophore; t. testis; vd. vas deferens.
Fig. 17 Illustration of different parts of Lumbricida
1. external ventral view of anterior end of Amythas; 2. dissection of internal organs of Amythas with dorsal body-wall removed; 3. arrangement of setae of Amythas; 4. arrangement of setae of Allolobophora; 5. spermatheca of Amythas; 6. saddle-shaped clitellum of Eisenia; 6a. ventral view; 6b. cross-section view.
Key to families and genera of Class Oligochaeta

L<40mm; segments and clitellum usually inconspicuous; male pore half a segment from septum bearing male funnel

Microdrile oligochaetes

L>40mm; segments and clitellum usually conspicuous; male pores one segment or more behind septum bearing male funnel

Megadrile oligochaetes
Lumbricidae

gonads more than 2 pairs

very long and slender; setae 1-2 per bundle, usually simple-pointed; male ducts without atria and prostate
Haplotaxidae
Haplotaxis

gonads 2 pairs

setae 2 per bundle, simple-pointed or distal tooth reduced; blind posterior lateral blood vessels usually present; last pair of male pores before septum bearing sperm funnel
Lumbriculidae
Lumbriculus

usually greyish white; setae simple-pointed. male pores on XII, spermathecae in V

Enchytracidae

bifid crotchets usually present; male pores before XII; spermathecae one segment before male pores

usually transparent and small; budding zone often present, male pores on V, VI or VIII, spermathecae on IV, V or VII
Naididae

usually reddish, long and thick; male pores on XI, spermathecae in X
Tubificidae
oesophageal appendages in VI, or IV+VI; transition between oesophagus and intestine sudden

no oesophageal appendages, transition between oesophagus and intestine gradual

Henlea

semenal vesicles lobed

semenal vesicles not lobed

Lumbricillus

coelemocytes of two types

coelemocytes of one type

Hemifridericia

Marionina

dorsal setae absent

dorsal setae present

Chaetogaster
branchial fossa with palps

branchial fossa without palps

branchial fossa and palps absent

Aulophorus

Dero

eyes present; dorsal setae from VI onwards

no eyes; dorsal setae from II onwards

body wall usually surrounded by adhering foreign matter, with rows of sensory papillae

body clean, without sensory papillae

Slavina

Nais

proboscis present

no proboscis

Pristina

Pristinella
no hairs; male pore single

no hairs; male pore single

Monopylephorus

celomocytes abundant; prostate diffuse

celomocytes few; prostate solid

Rhyacodrilus

needle usually modified; hair bayonet-shaped

needle normal; usually pectinate; hairs usually pectinate

Aulodrilus

Tubifex
prostate gland absent

clitellum occupying ca 8 segments

clitellum with wings
Lumbricidae

prostate gland present

clitellum occupying ca 21 segments

gizzard reduced or absent

clitellum with wings
Microchaetidae

gizzard present

Glyphidrilus

①

②

③

④

⑤

⑥

⑦
spermatheca present

spermatheca absent

Bimastos

spermathecal aperture at dorsal side or close to dorsal line

Eisenia

clitellum occupying 6-7 segments

clitellum occupying 9-10 segments

clitellum occupying 6 segments, in XXX-XXXV, genital markings on 1/2XXX-1/2XXXV

Octolasion

clitellum occupying 7 segments, in XXVI-XXXII, genital markings on XXVIII-XXXI

Lumbricus
clitellum occupying 9 segments, in XXVI-XXXIV, genital markings on XXXI-XXXIII

Allolobophora

clitellum occupying 10 segments, in XXIV-XXXIII, genital markings on XXXI-XXXIII

Dendrobaena

clitellum occupying 7 or 8 segments normally, if only occupying 5 segments, clitellum with a ventral notch posteriorly

Acanthodrilidae

clitellum occupying 5 segments

Spermathecae 1 pair

Spermathecae 2 pairs

Microscolex
spermatheca present, with diverticulum

spermatheca present, without diverticulum

spermatheca absent

Ilyogena

Malabaria

Ocnerodrilus

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spermathecal apertures in intersegmental furrows VII/VIII and VII/IX

spermathecal apertures on VII and VIII

male pores on XVIII

male pores in intersegmental furrows X-XIV

Pontodrilus

Plutellus

Moniligastridae

clitellum ring-shaped

clitellum saddle-shaped

clitellum

male pores 2 pairs

male pores 1 pair

Megascoleciidae

Octochaetidae

Desmogaster

Drawida
Fig. 18  Common microdriles in China

Fig. 19  Common megadriles in China
PHYLUM ANNELIDA

Class Oligochaeta

Body segmented, without parapodia. Head weakly developed. Setae few and simple. Hermaphroditic, with gonads confined to several anterior segments. Eggs developing in cocoons. Clitellum present when mature. For convenience, the class usually be divided into Microdrile and Megadrile oligochaetes. Microdriles usually shorter than 40 mm. Eggs large and yolky. Clitellum only one cell thick in region of gonopores. Eversible thickened pharynx. Lateral lines present. No typhlosole, gizzard, or anterior digestive glands except septal glands. No subneural blood vessel. Anterior nephridia reduced in number. Megadriles usually longer than 40 mm, with corresponding characters opposite to the former. 179 species belonging to five families and 65 genera of microdriles and 198 species of seven families and 24 genera of megadriles recorded from China.

Order Haplotaxida

Plesioporous microdriles. Octogonadal (two pairs of testes and two pairs of ovaries in successive segments), or lacking GI (3rd pairs of gonads), or GIV or GI and GIV. Atria and prostates absent. Setae lumbricine (two in each of four bundles) or reduced. One family known in the country.

Family Haplotaxidae

Setae single or closely paired per bundle, S-shaped or distally hooked. Dorsal setae sometimes smaller than ventral, sometimes absent posteriorly, or even completely absent. Testes in IX and X, or X and XI, ovaries in XI and XII, or XII, or XII and XIII. Male efferent ducts short, without atria and prostate glands. Male pores two pairs on X and XI or XI and XII, or both on XII. Spermathecae 1–4 pairs. In freshwaters and wetland. One genus known in the country.

*Haplotaxis* Hoffmeister, 1843

Setae one per bundle, with large sickle-shaped ones ventrally and small straight ones dorsally; often absent in many or all segments. Predatory, with massive muscular pharynx. Usually in subterranean waters. One species known in the country from Hunan and Guangdong provinces and Xinjiang Autonomous Region.

Order Lumbriculida

Prosoporous microdriles. Octogonadal or with GIV lost, sometimes GI or GII also. Atria present, with external prostates. Setae lumbricine, sometimes bifid. One family known in the country.
Family Lumbriculidae

Setae from II onwards, simple-pointed or bifid, occasionally absent; Blind posterior lateral blood vessels usually present. Testes 1 - 4 pairs, in (VI) VII-X (XI). Ovaries 1 - 2 pairs, situated one or rarely two segments behind last testes-bearing segment. Vasa deferentia each discharging into an atrium, or vasa deferentia of the same side into a common atrium. Male pores on VII-XV, opening at segment bearing corresponding pair of testes, or at segment bearing last pair of testes. Spermathecae variable in number and position, opening at VII-XV. Freshwater inhabitants. Two species of two genera known in the country, mainly distributed in the north.

*Lumbricus* Grube, 1844

Setae bifid with reduced distal tooth. Testes 1 - 4 pairs in VII-XIII. 1 - 2 pairs testes associated with each pair atria. Atria cylindrical to saciform with prostate cells in discrete masses. Male pores 1 - 4 pairs on VII-XIII. Ovaries 1 - 2 pairs in segment behind last pair of testes. Spermathecal variable in number, mostly 2 - 5 pairs situated two segments behind last atrial segment. One species known in the country from Heilongjiang, Jiangsu and Hunan provinces, Guangxi and Xizang (Tibet) Autonomous Regions.

Order Tubificida

Plesioporous microdriles. Gonads in GII and GIII. Atria usually present, with or without prostates. Setae from lumbricine to complex.

Family Enchytraeidae

Usually greyish white. No proboscis. No eyes. Head pore usually present. Dorsal pores present or absent. Setae from II onwards; dorsal and ventral setae similar in form, simple-pointed, sigmoid or straight; mostly four bundles per segments, with setal number in a bundle variable, sometimes absent. Septal glands three pairs in 4/5, 5/6, 6/7. Testes in XI, ovaries in XII. Sperm funnels usually cylindrical in XI. Atria mostly absent. Spermathecae one pair, opening behind 4/5, sometimes with diverticula and accessory glands, with or without connection with oesophagus. Sexual reproduction only. Terrestrial, freshwater and marine inhabitants. Widespread in the country, 36 species belonging to 12 genera known.

*Mesenchytraeus* Eisen, 1878

Setae sigmoid, with nodulus; ventral setae more than dorsal. Nephridia almost without interstitial tissue. Vasa deferentia short and thick, usually expanding ectally into thick-walled atria with prostate glands. Usually in moist soil. Only one unidentified species known in the country from Hunan Province.

*Hemiencychtraeus* Cernovitov, 1935


*Acheta* Vejdosky, 1877

Setae absent, with transparent bodies often in the position of setal bundle. Oesophageal
appendages usually present. Transition between oesophagus, and intestine more or less sudden. Penial bulb with numerous gland-cells arranged in fan-shape. Spermathecae without connection with oesophagus. Usually in terrestrial habitats. Three species known in the country from Zhejiang, Hubei, Hunan provinces and Beijing.

*Henlea* Michaelsen, 1889

Setae unequal or equal in size in a bundle. Transition between oesophagus and intestine sudden. Oesophageal appendages in VI or IV + VI. Spermathecae simple, with connection with oesophagus. Freshwater and terrestrial inhabitants. Species numerous in the country, but only 2 species from Hunan Province and Xizang Autonomous Region identified.

*Hemifridericia* Nielsen et Christensen, 1959

Peptonephridia absent. Coelomocytes of two types. Spermathecae simple, with connection with oesophagus. Terrestrial inhabitants. One species known in the country from Hunan Province.

*Fridericia* Michaelsen, 1889

Dorsal pores from VII onwards. Setae disposed in pairs, with outermost pair longest and innermost shortest. Peptonephridia paired, usually with branches. Coelomocytes of two types. Spermathecae simple or with diverticula, with connection with oesophagus. Mostly terrestrial. Widespread in the country, six species known.

*Enchytraeus* Henle, 1837

Dorsal pores absent. Peptonephridia paired, without branches. Spermathecae connected with oesophagus. Freshwater, marine or terrestrial inhabitants. Widespread in the country, three species known.

*Lumbricillus* Ørsted, 1844

Setae usually sigmoid, without nodulus. Glands enveloping nerve cord usually present in several postclitellar segments. Testes lobed, enclosed in seminal vesicles. Spermathecae connected with oesophagus. Mainly marine, seldom freshwater and terrestrial. One species known in the country from Jiaozhou Bay.

*Marionina* Michaelsen, 1889

Setae sigmoid or straight, usually few in number, sometimes absent in several or all segments. Oesophageal appendages present or absent. Spermathecae simple or with diverticula, mostly with connection with oesophagus, and with accessory glands at ectal duct and orifice. Freshwater, marine or terrestrial inhabitants. Species numerous and widespread in the country, five species identified.

**Family Naididae**

Prostomium usually well developed, with or without proboscis. Eyes usually present. Dorsal setae usually from II-VI onwards, with hairs and needles; ventral setae from II onwards; bifid crotchets, or sometimes simple-pointed. Testes and ovaries one pair each, in IV-V, V-VI, or VII-VIII. Prostate glands diffuse, on vasa deferentia or atria. Spermathecal setae present or absent. Penial setae usually present. Asexual reproduction by budding or fragmentation prevalent, maturing only in a certain season. Mostly freshwater inhabitants.
Widespread in the country, 58 species belonging to 21 genera known.

*Chaetogaster* von Baer, 1827

Prostomium weakly developed. No dorsal setae; ventral setae bifid or simple crotchets, absent in III-V. Freshwater inhabitants. Widespread in the country, five species known.

*Nais* Müller, 1773

Eyes normally present. Anterior segments usually pigmented. Dorsal setae from VI onwards, with hairs and needles; ventral setae of II-V mostly differentiated from those following. Freshwater inhabitants. Widespread in the country, nine species known.

*Slavina* Vejdovsky, 1883

Body wall usually surrounded by adhering foreign matter, and provided with rows of sensory papillae. Eyes present or absent. Dorsal setae from IV or VI onwards, with no-serrated hairs and simple needles. Freshwater inhabitants. One species widespread in the country (eyes present; dorsal setae from VI onwards).

*Dero* Oken, 1815

Anus opening into a ciliated branchial fossa, without palps. Dorsal setae from IV, or VI onwards; ventral setae of II-V as a rule sharply differentiated from those following. Usually in tubes of secreted mucus and foreign matter. Freshwater inhabitants. Five species known in the country, mainly distributed in the south.

*Aulophorus* Schmarda, 1861

Branchial fossa present with palps. Dorsal setae from IV, V or VI onwards; ventral setae of II-V different or not different from those following. Usually living in portable tubes. Freshwater inhabitants. Five species known in the country, mainly distributed in the south.

*Pristinella* Brinkhurst, 1985

No proboscis. Dorsal setae from II onwards, with hairs. Stomachal dilatation in VII or VIII, with intra-cellular canals. Freshwater or terrestrial inhabitants. Six species known in the country, mainly distributed in the south.

*Pristina* Ehrenberg, 1828

Proboscis present. Dorsal setae from II onwards, with hairs. Stomachal dilatation in VII or VIII, with intra-cellular canals. Freshwater inhabitants. Six species known in the country, mainly distributed in the south.

**Family Tubificidae**

Prostomium without a proboscis. No eyes. Setae from II onwards, four bundles per segments. Hairs present or absent. Needles bifid crotchets, sometimes with intermediate teeth forming obscurely to completely pectinate setae or (rarely) palmate setae; occasionally simple-pointed, mostly in the posterior. Ventral setae bifid or (seldom) simple-pointed. Testes and ovaries one pair each, in X and XI. Male funnels in testes-bearing segment, atrium and male pores in succeeding segment together with female funnels. Female pores in furrow behind segment bearing male pores. Spermathecae paired in X, or single. or absent,
with spermatophores or free sperm masses. Sexual reproduction prevalent. Freshwater, marine or terrestrial inhabitants. Widespread in the country, 82 species belonging to 29 genera known.

*Tubifex* Lamarck, 1816

Hairs present, needles pectinate anteriorly; ventral setae crotchets. Vasa deferentia coiled, entering atria apically or subapically. Atria moderately large, gradually tapering distally. Prostate glands large, connected to atria subapically on anterior side through short and stout necks. No ejaculatory duct. Penes present, without conspicuous penial sheath. Spermatophores present. One species known in the country, mainly distributed in the north.

*Limnodrilus* Claparède, 1862


*Spirosperma* Eisen, 1879

Brownish to dark black. Body wall chitinosely papillate, with rings of sensory papillae. Dorsal setae hairs and pectinate needles, and ventral setae crotchets. Vasa deferentia long. Atria broad tubes, mostly horse-shoe shaped over connection with large prostate glands situated 1/3 to 1/2 way down from union with vasa deferentia. Penes true. Spermatophores present. Freshwater inhabitants. Three species known in the country, mainly distributed in the north.

*Autodrilus* Bretscher, 1899

Vasa deferentia short. Atria globular or bean-shaped to elongate cylindrical. Prostate glands solid, connected with atria through necks. Penes true. Penial setae spoon-shaped or absent. Spermatothecae present or absent, without spermatophores. Reproductive organs commonly located more anteriorly than usual due to asexual reproduction. In tubes, using unsegmented posterior end as respiratory organs. Freshwater inhabitants. Widespread in the country, six species known.

*Bothrineurum* Stolc, 1888

Head pore present. Coelomocytes abundant. Vasa deferentia short. Atria of two parts, with the proximal covered with prostate cells and the distal naked. Copulatory chambers large with paratria, eversible to form pseudopenes. Penial setae usually present. Reproductive organs commonly located more anteriorly than usual due to reproduction by fragmentation. Freshwater and terrestrial inhabitants. Tree species known in the country, mainly distributed in the north.

*Rhyacodrilus* Bretscher, 1901


*Monopylephorus* Levinsen, 1884

Coelomocytes abundant. Vasa deferentia entering atria apically. Atria tubular, with
prostate cells. Penes present or absent. No spermatothores. Male pores and spermathecal pores frequently included in median inversions of the body wall. Freshwater, brackish and marine inhabitants. Widespread in the country, three species known.

**Branchiura Beddard, 1892**


**Order Lumbricida**

Opisthoporous megadriles. 3rd pair of gonads usually absent, 1st and 2nd pairs usually present. Setae lumbricine or perichaeine. Seven families known in the country.

**Family Moniligastriidae**

Setae four pairs per segment. Clitellum in X-XIII (or X-XIV). Male pores one pair in intersegmental furrow X/XI (or two pairs in intersegmental furrows XI/XII and XII/XIII). Female pores one pair in intersegmental furrow XI/XII (or on segment XIV). Dorsal pore absent. Gizzard number more than one. Sixteen species belonging to two genera known in the country.

1. **Drainida Michaelsen, 1900**

   Body median or small sized. Clitellum in X-XIII. Male pores one pair, in intersegmental furrow X/XI. Female pores one pair, in intersegmental furrow XI/XII. Spermathecal apertures one pair in intersegmental furrow VII/VIII. Gizzards more than three. Testis sacs suspended on septum IX/X. Fifteen species known from Hebei, Shandong, Shanxi, Gansu, Xinjiang, Sichuan, Anhui, Jiangsu, Zhejiang, Jiangxi, Fujian, Hainan and Neimenggu.

2. **Desmogaster Rosa, 1895**

   Body large sized. Each segment with 3–7 circular furrows. Clitellum in X-XIV. Male pores two pairs, in intersegmental furrows XI/XII and XII/XIII. Female pores one pair on XIV. Spermathecal apertures two pairs in intersegmental furrows VII/VIII and VIII/IX. Gizzards three. Testis sacs suspended on posterior faces of septa X/XI and XI/XII. One species known from Jiangsu.

**Family Ocnerodrillidae**

Setae four pairs per segment. Clitellum occupying 5–8 segments. Male pores one pair on XVII. Female pores one pair on XIV. Spermatheca absent, or one pair at IX. Nephridia meganephridial. Oesophageal pouches in IX. Gizzard reduced or absent. Three species belonging to three genera known in the country.

1. **Hlyogenia Beddard, 1892**

2. *Malabaria* Stephenson, 1924


3. *Ocnerodrilus* Eisen, 1878


**Family Acanthodrilidae**

Setae four pairs per segment. Clitellum in XIII-XVII. Female pores on XIV. Nephridia meganephridial. Gizzard reduced or absent. Four species belonging to three genera known in the country.

1. *Microscolex* Rosa, 1887

Body small sized. Clitellum ring-shaped. Male pores one pair on XVII. Spermathecal apertures one pair in intersegmental furrow VIII/IX. One species known from Wuxi, Jiangsu.

2. *Pontodrilus* Perrier, 1874

Body median sized. Clitellum saddle-shaped. Male pores two pairs in intersegmental furrows XVII/XVIII and XVIII/XIX, or one pair on XVIII. Spermathecal apertures two pairs in intersegmental furrows VII/VIII and VIII/IX. Two species known from Hainan and Yunnan.

3. *Plutellus* Perrier, 1873

Clitellum saddle-shaped, in 1/2XIII – 1/2XVIII. Male pores one pair on ventral side of XVIII, located on rounded papillae. Spermathecal apertures two pairs, on VII and VIII, in line with c. One species known from Sichuan.

**Family Octochaetidae**

Clitellum saddle-shaped. Male pores one pair on XVIII. Female pores on XIV. Spermathecal apertures two pairs in intersegmental furrows VII/VIII and VIII/IX. Three species belonging to two genera known from Hainan and Fujian.

1. *Howascolex* Michaelsen, 1901


2. *Dichogaster* Beddard, 1888

Family Microchaetidae


Family Lumbricidae


1. *Allolobophora* Eisen, 1874

Clitellum in XXVI-XXXIV. Spermathecal apertures two pairs in intersegmental furrows IX/X and X/XI. Testes without testis sac. Six species known from Shandong, Gansu, Xinjiang, Sichuan, Yunnan, Anhui, Jiangsu, Zhejiang, Jiangxi and Hunan.

2. *Eisenia* Malm, 1877

Clitellum in XXV (or XXV or XXVI or XXVII) - XXXII (or XXXIII). Spermathecal apertures two pairs in intersegmental furrows IX/X and X/XI, in line with d, near dorsal line in some species. Testes without testis sac. Five species known from Heilongjiang, Jilin, Beijing, Gansu, Shanxi, Xinjiang and Sichuan.

3. *Bimastos* Moore, 1893

Body small sized. Clitellum in XXV-XXXII, puberty wall indistinct or absent. Spermatheca absent. Testes without testis sac. Two species known from Heilongjiang, Gansu, Xinjiang, Xizang, Sichuan, Jiangsu, Zhejiang and Jiangxi.

4. *Lumbricus* Linnaeus, 1758

Clitellum in XXVI-XXXII, puberty wall in XXVIII-XXXI. Spermathecal apertures two pairs, in intersegmental furrows IX/X and X/XI. Testes with testis sacs. One species known from the east-north and west-north parts of China.

5. *Octolasion* Oerley, 1885

Clitellum in XXX-XXXV, puberty wall in 1/2XXX-1/2XXXV. Spermathecal apertures two pairs, in intersegmental furrows IX/X and X/XI. Testes with testis sacs. One species known from Haerbin, Heilongjiang.

6. *Dendrobaena* Eisen, 1874

Clitellum in XXIV-XXXIII, puberty wall in 1/2XXXI-XXXIII. Spermathecal apertures two pairs, in intersegmental furrows IX/X and X/XI. Testes without testis sac. One species known from Tacheng, Xinjiang.