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Aquatic annelids (Oligochaeta) of Czechoslovakia

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AQUATIC ANNELIDS (OLIGOCHAETA) OF CZECHOSLOVAKIA

By S. Hrabě

SYSTEMATIC PART

[11]*

Key for the classification of aquatic annelids found in Czechoslovakia.
(The number in parentheses following the species name indicates the number by which the species is identified in the systematic summary).

- 1 Annelids without chaetae with a sucker on the posterior.
Parasitic on crayfish
Branchiobdellidae
- Annelids only rarely without chaetae, without a sucker (in the genera Dero and Aulophorus the sucker with gill fibers is located on the posterior segments). Free-living species, only Hystricosoma chappuisi lives as a commensal on crayfish . . . 2

* Numbers in the right-hand margin indicate the corresponding page numbers in the original text - translator's note.

- 2(1) Ventral tufts contain hairlike chaetae. Glandular cells, located in the skin, usually contain brightly-coloured secretion. The genus Rheomorpha lacks chaetae, the secretion is sometimes colourless, and the posterior is divided into two short lobes.
- Aeolosomatidae 9
- Ventral tufts never contain any hairlike chaetae. The skin lacks cells with brightly-coloured secretion 3
- 3(2) Tiny aquatic worms, usually smaller than 10 mm, reproducing mainly asexually by forming chains of individuals at various stages of development. Usually with a pair of eyes. Only the genera Amphichaeta, Homochaeta, and Pristina have dorsal chaetae beginning on Segment II, whereas other genera, with the exception of the genus Chaetogaster which lacks dorsal chaetae, chaetae are absent from the second to twentieth anterior segments.
- Naididae 18
- Worms usually longer than 10 mm, always without eyes, do not reproduce asexually. Dorsal chaetae always begin on Segment II, but in Haplotaxis gordioides they are frequently missing and in the genus Achaeta they are always absent 4
- 4(3) Worms with four pairs of chaetae in two dorsal and two ventral tufts on each segment except on the first segment and several growing posterior segments. In some earthworm species the chaetae in the tufts are widely spaced apart 7
- Worms with a different number of chaetae in the tufts 5
- 5(4) Forked and sometimes fanlike chaetae are present in the dorsal tufts in addition to hairlike chaetae, which are absent in some species or genera.
- Tubificidae 58

- In the dorsal and ventral tufts the chaetae have a simple spike, but in the genus Propappus the chaetae are forked, and in the genus Achaeta the chaetae are absent. 6

6(5) Whitish or yellowish worms, resembling flatworms in appearance, but they are segmented. The chaetae, usually more than 2 in each tuft, are barlike or S-shaped in 4 tufts on each segment except for the first segment. In the genus Propappus the chaetae are forked, and in the genus Achaeta the chaetae are absent

Enchytraeidae

- The body shape of the worms resembles Gordioids, they are up to 300 mm long and 1.5 mm in diameter. "Tufts" contain 1 chaeta, the dorsal chaetae are frequently missing.

Haplotaxidae

Haplotaxis gordioides (-105-)

7(4) Aquatic worms, usually 10 - 150 mm long. The prostomium is rounded, but in the genus Rhynchelmis it is extended to form a flagellum. Muscular stomach is missing. The clitellum ends before Segment XX. One pair of male sexual openings in Segment IX or X. In the genus Tatriella, there is 1 male opening in Segment X. In species reproducing sexually, the male openings are in other segments.

Lumbriculidae 92

- Terrestrial worms, and, rarely, amphibious worms, generally of larger dimensions, only the family Criodrilidae is aquatic, with male pores in Segment XV (in the genus Eiseniella in Segment XIII). The clitellum begins after Segment XV 8

8(7) Aquatic worms with a body up to 320 mm long and up to 5 mm in diameter, gray-green or gray-brown. Without dorsal pores in the medial line. Relatively inconspicuous clitellum starts at Segment XVI. [12]

Criodrilidae

Criodrilus lacuum

- Terrestrial worms, rarely amphibious, with dorsal pores, with the clitellum starting on some segment after Segment XX. The digestive tube widens in Segment XV or XVI to form a crop, and in Segment XVII-XVIII or XX-XXIII into a more voluminous muscular stomach; in the genus Eiseniella in Segment XVII

Lumbricidae

9(2) Dorso-ventrally flattened body. Free-living worms 10

- Cylindrical body. Worms living on crayfish gills.

Hystricosoma chappuisi (-10-)

10(9) Segments with 4 tufts of hairlike chaetae.

Aeolosoma 11

- Without chaetae. Body posterior is divided into two short lobes

Rheomorpha neizvestnavae (-9-)

11(10) Colourless secretion in glandular skin cells. Dorsal tufts have 2-3(4) and ventral tufts have 3-4 chaetae of equal length. First budding region is after the 5-6(7) pair of chaetal tufts.

Aeolosoma niveum (-7-)

- Coloured secretion in glandular cells 12

12(11) Red or orange secretion 13

- Yellow, yellow-green, blue, or olive green secretion. 14

13(12) Chaetal tufts contain 2-3 long and 2-3 short hairlike chaetae. Short chaetae are folded in the lower portion. Long chaeta in the dorsal tufts are 90 to 120 μ m long, and 70 to 100 μ m long in the ventral tufts. Short chaetae are 60 to 80 μ m and 40 to 60 μ m long in the dorsal and ventral tufts, respectively

Aeolosoma hemprichi (-1-)

- Chaetal tufts in the central region of the body have 2 long and 2 or 3 short hairlike chaetae. Long dorsal chaetae are 50 to 700 μm long and short chaetae are 30 to 45 μm long
- Aeolosoma quaternarium (-2-)
- 14(12) Anterior segments have only hairlike chaetae, central segments have hairlike and S-shaped chaetae, and posterior segments have only S-shaped chaetae mainly on the ventral side. S-shaped chaetae are shorter than hairlike chaetae, and the upper portion is divided into two tiny hooks
- Aeolosoma tenebrarum (-5-)
- Chaetal tufts contain only hairlike chaetae 15
- 15(14) First budding region is behind the 9-17 pair of chaetal tufts each of which contains 5-7 (12) hairlike chaetae up to 600 μm long.
- Aeolosoma headleyi (-4-)
- First budding region is behind the 6th, 7th, (8th) pair of chaetal tufts 16
- 16(15) Body diameter is 78-80 μm . Secretion from the glandular skin cells is yellow-green and is dispersed into numerous small drops which sometimes coalesce into larger drops. In addition to glandular cells, the skin also contains kidney-shaped cells with grains in Brown's motion.
- Aeolosoma variegatum (-3-)
- Body diameter exceeds 100 μm 17
- 17(16) Body is approximately 110 μm in diameter. Dorsal tufts have 2-5 hairlike chaetae, long are 110-140 μm , medium are 70-85 μm , and short are 50-60 μm long
- Aeolosoma flavum (-6-)

- Body is 200-300 μm in diameter. Olive-brown secretion is contained in irregular lobelike cells beside which are cells with grains. . .

Aeolosoma viride (-8-)

- 18(3) Dorsal chaetae are missing or the dorsal tufts, beginning in Segment III, contain only forked chaetae. [13]

Subfamily Chaetogastrinae . 21

- Dorsal chaetae begin in Segment II or IV or some other segment. If they begin in Segment III, then the tufts contain also hairlike chaetae 19

- 19(18) Dorsal chaetal tufts begin in Segment V and contain only forked chaetae. Without eyes. Testes and spermathecae are in Segment IV, ovaries and atriae are in Segment V. During asexual reproduction, only 4 head segments are formed.

Subfamily Paranaidinae. . .

Paranais frici (-17-)

- Dorsal chaetal tufts begin in segments other than Segment V with the exception of Aulophorus furcatus which has dorsal tufts beginning in Segment V and two long protrusions from the posterior. 20

- 20(19) Dorsal chaetal tufts begin in the fourth, sixth, or some other segment. If they begin in Segment II, all chaetal tufts contain only forked chaetae. If they begin in Segment III, tufts contain hairlike as well as forked chaetae. If they begin in Segment V, the posterior has a gill sucker with 2 long protrusions without flagellae. During asexual reproduction, 5 anterior head segments form on the budding individual. Testes and spermathecae are in Segment V and ovaries and atriae are in Segment VI.

Subfamily Naidinae. 26

- Dorsal chaetal tufts begin in Segment II and consist of hairlike and forked chaetae. During paratomical reproduction, 7 anterior segments form on the new individual. Testes and spermathecae in Segment VII, ovaries and atriae in Segment VIII. Without eyes.

Subfamily Pristininae

Pristina 54

- 21(18) Without dorsal chaetae. Ventral chaetae are missing from Segments III to V. Only the dissepiment 3/^d is completely developed.

Chaetogaster 22

- Dorsal chaetae begin in Segment III, ventral chaetae are present in all segments from Segment II. Dissepiments are completely developed

Amphichaeta leydii (-16-)

- 22(21) Free-living species. Upper chaetal notch is longer than the lower . 23

- Species living mainly in the pulmonary openings of several mollusks. Both notches are perpendicular to the axis of the chaeta, and the upper notch is noticeably shorter than the lower one.

Chaetogaster limnei (-14-)

- 23(22) The frontal lobe on living individuals is elongated, conical, and rounded at the end; it is prominent when seen from the dorsal side. On preserved specimens it is triangular, contracted, and rounded at the top, or on some specimens preserved under a microscope slide, it is domelike. The prostomium, as seen from the side, is placed obliquely to the long axis of the individual, because even a contracted frontal lobe extends beyond the lower lip. The longest chaetae in Segment II are 72 to 112 μm long

Chaetogaster diastrophus (-11-)

- Frontal lobe is stunted. Anterior portion of body is almost cylindrical and rounded at the end. On preserved individuals the prostomium is perpendicular to the body axis, and its upper edge does not extend beyond the lower one. In most species, the dorsal edge of the prostomium has a shallow median notch. 24
- 24(23) The longest chaetae in Segment II are almost always longer than 200 μm and are approximately 4.5 μm in diameter. Chains of individuals may be up to 25 mm long and approximately 1 mm in diameter
- Chaetogaster diaphanus (-12-)
- The longest chaetae in Segment II are at most 160 μm long and much more slender than those of Chaetogaster diaphanus 25
- 25(24) The longest chaetae in Segment II are 110 to 160 μm long. The dorsal blood vessel in mature individuals does not extend into the segment containing the pharynx, but divides into 2 secondary blood vessels in front of the stomach which then join to form the ventral blood vessel. The stomach in Segment IV has 20 to 22 radial blood vessels which may be seen on live individuals. [14]
- Chaetogaster cristallinus (-13-)
- The longest chaetae in Segment II are 63 to 100 μm long. The stomach wall has only 9 to 10 radial blood vessels.
- Chaetogaster langi (-15-)
- 26(20) Hairlike chaetae in all dorsal chaetal tufts are missing. 27
- Dorsal chaetal tufts have at least one hairlike chaeta. In Piquetiella blanci the hairlike chaetae may be absent from several or all segments. 29
- 27(26) One cylindrical chaeta is present in Segment IV and all subsequent segments in place of dorsal chaetae. Three to four transverse

pigment stripes are on the anterior

Ophidonais serpentina (-21-)

- Ventral tufts contain S-shaped chaetae. 28

28(27) Dorsal chaetae begin in Segment II. Without eyes.

Homochaeta. 39

- Dorsal chaetae begin in Segment VI. With eyes. Frontal lobe is swollen. (In Piquetiella blanci individuals rarely without hairlike chaetae, the frontal lobe is not swollen).

Uncinatis uncinata (-20-)

29(26) Dorsal chaetae are in Segment III and all subsequent segments . . .

Bratislavia elegans (-43-)

- Dorsal chaetae begin in Segment IV, V, or VI. 30

- Dorsal chaetae begin only in Segment XVIII to XX.

Haemonais waldvogeli (-40-)

30(29) Posterior of the body has sucker with gills. Ventral chaetae in Segments II to V have extended lower serrations which form an acute angle with the upper serrations 38

- Without a sucker and gills on the posterior 31

31(30) Smooth hairlike chaetae 32

- Thick hairlike chaetae with long serrations 51

32(31) Frontal lobe extended into a flagellum. 33

- Frontal lobe rounded. 35

33(34) Very long hairlike chaetae in Segments VI to VIII, ventral chaetae are missing in Segments IV to V.

Ripistes parasita (-39-)

- Hairlike chaetae in Segments VI to VIII are almost as long as chaetae in other segments 34

- 34(33) Dorsal tufts contain 1 to 3 hairlike and several needlelike chaetae
Stylaria lacustris (-38-)
- Dorsal tufts contain 8 to 18 hairlike chaetae
Arcteonais lomondi (-37-)
- 35(32) Hairlike chaetae in Segment VI are much longer than the body diameter. The body is usually covered by a layer of secretion with attached detritus.
Slavina appendiculata (-34-)
- Hairlike chaetae in Segment VI are only slightly longer than the body diameter. (In Piquetiella blanci the hairlike chaetae are present only in some segments or are absent completely) 36
- 36(35) Dorsal tufts contain 1 to 3 needlelike or forked chaetae in addition to hairlike chaetae beginning in Segment VI.
Nais 40
- Dorsal tufts starting in Segment VI contain 2 to 6 serrated chaetae with 2 more or less bent long serrations in addition to hairlike chaetae. 37
- 37(36) Without eyes. Dorsal tufts contain 2 to 6 hairlike and 2 to 6 serrated chaetae with equally long serrations. Hairlike chaetae are 135 to 180 μm long. Ventral tufts contain 5 to 10 serrated chaetae with an upper serration considerably longer than the lower one
Specaria josinae (-42-)
- With eyes. Dorsal tufts contain at most 3 short hairlike chaetae (which may be missing) and 2 to 6 serrated chaetae. Hairlike chaetae are only 84 to 120 μm long. In ventral chaetae, the upper

serration is as long as or slightly longer than the lower
serration

Piquetiella blanci (-41-)

38(30) Gill sucker extends into 2 protrusions without chaetae.

Aulophorus furcatus (-47-)

- Protrusions without chaetae extending from the gill sucker are
missing. Dero 52

39(40) Upper serration on chaetae on the 4 anterior segments is longer
than the lower serration.

Homochaeta naidina (-18-)

- Upper serration on the 4 anterior segments is shorter than the
lower

Homochaeta setosa (-19-)

40(36) Dorsal tufts beginning in Segment VI contain forked chaetae,
which are divided into 2 serrations visible at a magnification
of at least 1000x , in addition to hairlike chaetae. The chaeta
must be in an appropriate position. The supranodular segment
is deformed in an arch-shape. Particularly in Nais christinae
the serrations are very small 41

- In addition to hairlike chaetae, the dorsal tufts contain
needlelike chaetae which are not serrated at the ectal apex and
are pointed to a certain extent 47

41(40) The lower serration of ventral chaetae in Segments II to V is
erect and forms an acute angle with the upper serration. Chaetae
in Segment VII and in several subsequent segments are much
thicker than chaetae in Segments II to V. 42

- The lower serration on ventral chaetae in Segments II to V is

almost perpendicular to the chaetal axis, or is slightly inclined
in the upward direction 45

- 42(41) Ventral chaetae in Segment VI and in subsequent segments have
an upper serration which is as long as or even shorter than the
lower serration. Forked chaetae have 2 slight serrations. . . .

Nais christinae (-25-)

- Ventral chaetae in Segment VI and in several subsequent segments
have an upper serration which is much longer than the lower
serration. Serrations on forked chaetae are relatively long and
are visible even at a magnification of 700x 43

- 43(42) Hairlike chaetae are short, at most 110 (135) μm long. Gigantic
ventral chaetae in Segment VII and in several subsequent
segments have a stunted serration in older individuals; younger
individuals still without gigantic chaetae may be recognized
by their short hairlike chaetae

Nais bretscheri (-26-)

- Hairlike chaetae are 145-212 μm long. All ventral chaetae always
have a well-developed lower serration

Nais stolci sp. n. (-28-)

- 45(41) Forked chaetae with 2 long serrations. Ventral chaetae with the
upper serration always considerably longer than the lower one. [16
Up to three hairlike chaetae in dorsal tufts. Ventral chaetae
in Segment VI and in subsequent segments are thicker than
chaetae in segments II to V

Nais elinquis (-22-)

- Forked chaetae with 2 short serrations. Ventral chaetae in
Segment VI and in subsequent segments are almost as thick as
chaetae in Segments II to V 46

- 46(45) Hairlike chaetae are 250 - 300 μm long. Esophagus in Segment VII gradually widens to form a stomach (well seen on living individuals). Do not swim.

Nais communis (-24-)

- Hairlike chaetae are (230) 330-350 (400) μm long. Esophagus in Segment VII suddenly expands into a stomach. Swim when excited.

Nais variabilis (-23-)

- 47(40) Lower serration on ventral chaetae in Segments II to V is perpendicular to the axis of the chaeta 48

- Lower serration on ventral chaetae in Segments II to V is erect or stunted. 50

- 48(47) Ventral chaetae in mature individuals are 4-5 μm thick in Segments VI to VII. Hairlike chaetae are thick and there are up to 5 per tuft. Needlelike chaetae are 88 to 118 (132) μm long, ventral chaetae in Segment II are 95-140 μm long. Young individuals with 2-3 ventral chaetae in Segments II to V have ventral chaetae in Segments VI to VII only 2.7 μm thick

Nais barbata (-29-)

- Ventral chaetae are at most 3.3 μm thick. Dorsal tufts have only 1-2 thin hairlike chaetae. Needlelike chaetae are at most 80 μm long. 49

- 49(48) Needlelike chaetae with a sharp ectal apex. Ventral chaetae in Segment II are 70-90 μm long.

Nais pseudobtusa (-30-)

- Needlelike chaetae with a blunt ectal apex. Ventral chaetae in Segment II are 93 to 108 μm long. The upper serration on ventral chaetae in the posterior segments is as long as the lower serration

Nais simplex (-31-)

50(47) Upper serration on ventral chaetae in Segments II to V is not very long and forms an acute angle with the lower serration; in the posterior segments, the upper serration is longer than the lower serration

Nais alpina (-32-)

- Upper serration on ventral chaetae in Segments II to V is unusually long. The lower serration in mature individuals abuts against the upper serration. In younger individuals, the serrations on ventral chaetae in Segments II to V also form an acute angle.

Nais behningi (-33-)

51(31) Without eyes. In Segment VI and several subsequent segments there is one particularly large chaeta with a wide lower serration and 2-3 thin upper serrations in place of the ventral chaetae

Vejdovskyeella intermedia (-36-)

- With eyes. In Segment VI and several subsequent segments there are 3-4 ventral chaetae with an upper serration longer than the lower serration

Vejdovskyeella comata (-35-)

52(38) Dorsal chaetae begin in Segment IV. The gill sucker on the posterior has 5 pairs of gills of which the anterior pair is much smaller than the others

Dero dorsalis (-44-)

- Dorsal chaetae begin in Segment IV. The sucker has fewer gills. 53

53(52) Gill sucker has 4 pairs of gills. Three pairs of large leaflike gills are usually easily visible on preserved individuals, but

the small front gill pair is hidden under the contracted front edge of the sucker.

Dero digitata (-45-)

- Sucker has 3 pairs of gills, two of which are cylindrical and the front pair is leaflike and formed by the edge of the sucker. [17]

Dero obtusa (-46-)

54(20) Frontal lobe is extended into a flagellum 55

- Frontal lobe is not extended into a flagellum 57

55(54) Hairlike chaetae in Segment III are very long (up to 800 μ m).

Dorsal tufts contain needlelike chaetae

Pristina longiseta (-48-)

- Hairlike chaetae in Segment III are not very long. Dorsal tufts have needlelike chaetae 56

56(55) Segment IV or V or both contain 1 pair of ventral chaetae which are thicker than chaetae in subsequent segments, and the upper serration is more than twice as long as the lower serration . .

Pristina aequiseta (-49-)

- Ventral chaetae in Segments IV and V have an upper serration which is as long as those in adjacent segments. Forked chaetae have very short serrations which are visible at a magnification of at least 1000x.

Pristina foreli (-50-)

57(54) Upper serration of forked chaetae is much shorter than the lower.

P. istina rosea (-51-)

- Both serrations of forked chaetae are equally long and clearly visible

Pristina bilobata (-52-)

58(5) Numerous spherical coelemocytes, similar to the coelemocytes of naidids, float freely in the body cavity, particularly in the anterior segments 59

- The body cavity does not contain any coelemocytes similar to the coelemocytes of naidids 60

59(58) The dorsal side of the frontal lobe does not have a sensory pit. Most species have hairlike and fanlike chaetae in the anterior segments. One pair of spermathecae has openings in Segment X. One pair of male funnels is in Segment XI. Groups of ovocytes which are as large as the ovaries and which are shaped like morulae break away from the ovaries. Subfamily Rhyacodrilinae . 63

- A sensory pit is present on the dorsal side of the frontal lobe. Hairlike and fanlike chaetae are absent. A single male sexual opening is present in the median line on the ventral side of Segment VIII or X. Without spermathecae, Morulae of ovocytes do not break off from the ovaries. Sperm are contained in special spermatophores which are attached near the male pore.

Subfamily Bothrioneurinae

Bothrioneurum vej dovskyanum (-56-)

60(58) Each segment on the body posterior has 1 gill on the dorsal and ventral side on the median line. Atria with a diffuse prostate, pseudoparatrium, and pseudopenis are present

Subfamily Branchiurinae

Branchiura sowerbyi (62-)

- Without similar gills. Atria with compact prostate, penises in penial sheaths. Prostate is absent in some species. 61

61(60) Rare species. The genus Aulodrilus has ventral chaetae usually

with a very short upper serration. Sperm clumps are found in spermathecae, but spermatozeugmata do not form.

Subfamily Aulodrilinae. 62

- Species abundant in the waters of Czechoslovakia with other characteristics than those described in 62-67. Spermathecae usually contain spermatozeugmata.

Subfamily Tubificinae . 68

62(61) Ventral chaetae are very abundant (up to 16 per tuft) with an upper serration much shorter than the lower. Hairlike chaetae are short or absent. Penial chaetae are present in most species. Testes are in Segments (IV) V to VI or in Segments (VII) VIII to IX, ovaries are in Segment VII or X. One pair of spermathecae is in Segment VI or 2 pairs in Segments VIII and IX. One pair of male funnels is in Segment VII or X. Prostate is compact and large. Reproduce also by architemy.

[18]

Aulodrilus. 65

- Ventral chaetae are not numerous (up to 5 per tuft) with an upper serration somewhat shorter or even slightly longer than the lower serration. Dorsal tufts contain only serrated chaetae. Spermathecal chaetae in Segment X. One pair of testes and spermathecae in Segment X, 1 pair of ovaries and male openings in Segment XI. Prostate is very small

Peipsidrilus pusillus (-61-)

63(59) Atrium is wide, tubular, much longer than sperm ducts, and without prostatic glandular cells on the surface of the atria. Modified sexual chaetae in Segment XI are missing

Moraviodrilus pygmaeus (-55-)

- Atrium has a different shape, is shorter than sperm ducts, and is covered by a diffuse prostate. Penial chaetae are in Segment XI near male sexual openings.

Rhyacodrilus 64

- 64(63) Dorsal tufts before the clitellum contain hairlike chaetae beside fanlike chaetae. Three to four penial chaetae with a minute upper serration and a larger lower serration or, in sexually mature individuals, with only one serration bent like a hook are contained in chaetal tufts.

Rhyacodrilus coccineus (-53-)

- Without hairlike chaetae in dorsal tufts. One penial chaeta with a thick sicklelike ectal apex replaces ventral chaetae in Segment XI.

Rhyacodrilus falciformis (-54-)

- 65(62) With hairlike chaetae in dorsal tufts 66

- Without hairlike chaetae in dorsal tufts.

Aulodrilus limnobiis (-59-)

- 66(65) Dorsal tufts in Segments VI to VII contain spoonlike chaetae without serrations.

Aulodrilus pigueti (-60-)

- Dorsal tufts always have serrated chaetae in addition to hairlike chaetae 67

- 67(66) Esophagus suddenly expands to form an intestine in the middle of Segment VIII. The upper serration of serrated chaetae is much shorter than the lower. Serrated dorsal chaetae lack intermediate serration. Testes are in Segment (IV) V and VI, ovaries are in Segment VII

Aulodrilus pluriseta (-57-)

- Esophagus suddenly expands to form the intestine only in the posterior half of Segment X. Dorsal serrated chaetae have serrations of equal length and 1-2 intermediate serrations (clearly visible at a magnification of 2000x). Testes are in Segment (VII) VIII and IX, ovaries are in segment X.
- Aulodrilus japonicus (-58-)
- 68(61) Frontal lobe is generally retracted into Segment II. The body surface has numerous secretory papillae
- Peloscolex. 74
- Frontal lobe does not retract into Segment II. Secretory papillae are missing. 69
- 69(68) Sperm ducts are very short, atrium is very long and tubelike.
- Potamothrix 75
- Sperm ducts are at least as long as the atrium. 70
- 70(69) Wide sperm ducts are as long as the atrium.
- Hyodrilus templetoni (-71-)
- Sperm ducts are much longer than the atrium 71
- 71(70) Hairlike chaetae in dorsal tufts in anterior segments 72
- Hairlike chaetae are missing in all dorsal tufts. 73
- 72(71) Atrial ampullae are small and pear-shaped; the part of the male opening located beyond the ampulla is much longer and consists of 3 well-defined sections.
- Psammotyctides. 86
- Male openings have a different structure. 82
- 73(71) Segment XI has penises in penial cylindrical tubes, widened like funnels at their ectal apices.
- Limnodrilus 88

- Segment XI does not have penises in penial tubes. Chaetae in several anterior segments have an upper serration much shorter than the lower serration. Segments IX, X, and XII have sexual chaetae with an upper serration twice as long as the lower. . . .

Isochaetides michaelsoni (-77-)

- 74(68) Secretory papillae are all of equal length. All ventral chaetae, even those in front of the clitellum, are serrated with the upper serration being much smaller than the lower

Peloscolex ferox (-78-)

- One or two rows of larger secretory papillae are present on all segments in addition to numerous smaller papillae. All ventral chaetae are unserrated with a simply-pointed ectal apex

Peloscolex velutinus sarnensis (-79-)

- 75(69) With hairlike chaetae in dorsal tufts in front of the clitellum. 76
- Without hairlike chaetae in dorsal tufts. 80
76(75) Hairlike chaetae are short, at most 190 μm long, and are not even twice as long as serrated chaetae

Potamothrix vejsovskyi (-67-)

- Hairlike chaetae in the anterior segments are much longer . . . 77

- 77(76) Segment X has 1 spermathecal chaeta in place of ventral chaetae; the chaeta has a groove with nearly parallel edges, which end at an oblique angle, on the ectal apex and which are not bent at the ental apex. A small prostate is located at the start of the atrium.

Potamothrix hammoniensis (-66-)

- Spermathecal chaetae in Segment X have a different shape being perceptibly wider above the nodule, or, conversely, they are

narrow and tubelike with a bent ental apex. Atrium does not have a compact prostate (in specimens preserved in formalin, it must not be confused with an ovary). 78

- 78(77) Spermathecal chaetae are widened like spears at the ectal apex and are several times wider than under the nodule. Penial sheaths are shallow

Potamothrix bavaricus (-68-)

- Spermathecal chaetae have a different shape. Penial sheaths are deep. 79

- 79(78) Segments (VII) VIII to IX or X and XI, which contain spermathecae and male openings, have spermathecal and penial chaetae which resemble birds' beaks when viewed from the side

Potamothrix bedoti (-69-)

- Spermathecal chaetae in Segment X are of constant thin diameter along their entire length and are bent at their ental apex. . .

Potamothrix heuscheri (-70)

- 80(75) Segments in front of the clitellum contain 7-10 serrated chaetae with an upper serration longer than the lower. Spermathecae have openings along the line of ventral chaetae. Dissepiments 3/4-10/11 are thin. Atrium is without a compact prostate. . . .

Potamothrix moldaviensis (-63-)

- Tufts in front of the clitellum have only 4-5(6) serrated chaetae with 2 equally long serrations. Spermathecae have openings along an adjacent line. Atrium with a small prostate. Dissepiments 3/4-10/11 or even 11/12 are strengthened appreciably. 81

- 81(80) One pair of spermathecae is in Segment (X) XI (XII). One pair of male openings is in the next segment. Spermathecal chaetae are missing

Potamothrix mrazeki (-64-)

- One pair of spermathecae in Segment X, male sexual openings in Segment XI. Spermathecal chaetae of the hammoniensis type in Segment X in place of ventral chaetae
- Potamothrix danubialis (-65-)
- 82(72) Ventral chaetae in front of the clitellum have an upper serration which is twice as long as the lower one. Modified sexual chaetae are in Segments X and XI. Penial tube with a rolled up ectal end.
- Tubifex speciosus zavreli (-76-)
- Ventral chaetae with a shorter lower serration. Modified sexual chaetae are either missing or are not present simulataneously in two segments. 83
- 83(82) Sperm ducts are very long and are differentiated into two sections: a narrow anterior section which has chaetae on the inside surface changes suddenly to a much longer posterior section which is approximately twice as wide as the anterior section and which has transverse grooves without chaetae on the interior. Atrial ampullae are pear-shaped with long necks. Spermathecae have openings along a line in the side of Segment X and are frequently missing. This species is very abundant in the waters of Czechoslovakia.
- Tubifex tubifex (-72-)
- Less abundant to rare species. Spermathecae, if present, have lateral openings near ventral chaetae in Segment X. Sperm ducts have chaetae along their entire length on the interior surface and are not differentiated into two sections. 84
- 84(83) Hairlike chaetae in the central segments are longer than the body diameter. Dorsal tufts in segments in front of the clitellum

have 2 hairlike and 2 fanlike chaetae per tuft. Fanlike chaetae in the supranodular segment are deformed in an S-shape.

Tubifex ignotus (-73-)

- Hairlike chaetae are shorter than the body diameter. Dorsal tufts in front of the clitellum contain more hairlike and fanlike chaetae than [Tubifex - added by translator] ignotus. 85

85(84) Penial chaetae in Segment XI. Spermathecae have lateral openings slightly removed from ventral chaetae in Segment X. Penis is without penial tube

Tubifex nerthus (-74-)

- Without penial chaetae. Spermathecae are missing. Penial tubes are shaped like funnels. Ventral chaetae in front of the clitellum have a very long upper serration which is twice as long as the lower serration

Tubifex montanus (-75-)

86(72) Segments II to X (XII) have fanlike chaetae of a peculiar platelike shape with both edge serrations being narrow and spaced widely apart and with numerous intermediate serrations between them. Very long penises are usually retracted into penial bulbs: their cuticular hardened covering is turned inside to form the "underlining" of the passage thus formed.

Psammoryctides barbatus (-80-)

- Platelike chaetae are missing in dorsal tufts in the anterior segments. Cuticular covering of the penis does not turn inside the bulb. 87

87(86) Fanlike chaetae in dorsal tufts in the anterior segments resemble, by their shape, the ventral chaetae; they have an upper serration

which is much shorter than the wide lower serration, and they have 2-3 intermediate serrations.

Psammoryctides albicola (-81-)

- Fanlike chaetae in Segments II to XIII (XIV) have serrations of equal length and sometimes up to 5 intermediate serrations .

Psammoryctides moravicus (-82-)

88(73) Chloragogenic cells beginning in dissepiment 4/5, that is, in Segment V, cause a dark colouration of the alimentary tract . . 89

- Chloragogenic cells beginning only in dissepiment 5/6, that is, in Segment VI, cause a dark colouration of the alimentary tract 91

89(88) Chaetae in front of the clitellum have an upper serration which is longer than the lower, and after the clitellum the length of the upper serration decreases. Penial tubes in Segment XI are very long, even as long as 33 times the diameter of their ental end. [21

Limnodrilus claparedeanus (-87-)

- Chaetae in front of the clitellum have the upper serration at most as long as the lower one or even shorter. Penial tubes are bent near the ectal end. 90

90(89) Upper serration is almost as long as the lower one. Penial tubes in Segment XI are 8 to 11 times as long as the diameter of their ental end

Limnodrilus hoffmeisteri (-85-)

- Upper serration of chaetae in the anterior segments is visibly shorter than the lower. Penial tubes are 9 to 11 times as long as the diameter of their ental end.

Limnodrilus hoffmeisteri f. parva (-86-)

91(88) Chaetae in front of the clitellum in individuals as short as 8 mm have a very long upper serration. Penial tubes in Segment XI are only 4-5 times longer than the diameter of their ental end.

Limnodrilus udekemianus (-83-)

- Chaetae in front of the clitellum have 2 nearly equally long serrations. Penial tubes in Segment XI are straight and only 5 times longer than the diameter of their ental end

Limnodrilus helveticus (-84-)

92(7) Male opening in Segment IX consists of a funnel on dissepiment 9/10, and spermathecae and atrium in Segment X. Species of this annelid genus have not yet been found in Czechoslovakia

Dorydrilus

- Male opening with 2 funnels or with only one funnel on the posterior dissepiment of the atrial segment 93

93(92) Without spermathecae. Egg-shaped atrium with a very thick (35-47 μ m) muscular layer. Species also not yet found in Czechoslovakia (from Switzerland and Vienna).

Dichaeta sanguinea

- With spermathecae; if they are missing, or if there is only one in Segment VIII, the atrium has a different shape than in Dichaeta. 94

94(93) Frontal lobe is extended into a long flagellum. One pair of very long and thin tubular atriae has openings in Segment X and one pair of spermathecae is in Segment VIII; both pairs are behind the ventral chaetae.

Rhynchelmis 95

- Frontal lobe is rounded, not flagellate 98

95(94) Body of living individuals is pink, up to 150 mm long and 2-3 mm

in diameter. The central and posterior segments each have one pair of lateral blood vessels with numerous blind-ending vessels. One stunted atrium without funnels and sperm ducts is in Segment IX.

Rhynchelmis himosella (-101-)

- Body of living individuals is milk-white and up to 60 mm long . 96
96(95) Two pairs of spermathecae in Segments VIII and IX. Lateral blood vessels beginning approximately in Segment XXV have up to 1? short blind-ending vessels. This species is found in the drainage basin of the Hron and Tisa rivers

Rhynchelmis granuensis (-103-)

- One pair of spermathecae is in Segment VIII 97
97(96) Central and posterior segments each have 1 pair of lateral blood vessels with at most 3 blind-ending vessels. Two pairs of testes are in Segments IX and X. A stunted atrium is in Segment IX. This species is found only in the Hron drainage basin

Rhynchelmis vagensis (-102-)

- Lateral blood vessels are missing in the central and posterior segments. Only one pair of testes is located in Segment X on dissepiment 9/10. Without stunted atrium in Segment IX. Found only in Carpathian Ruthenia [22]

Rhynchelmis vejnovskyi (-104-)

- 98(94) Chaetae are serrated with an upper serration much shorter than the lower; in the genus Stylodrilus the upper serration is blunt in the anterior segments. 99
- Chaetae are generally not serrated. 10?
99(98) Each central and posterior segment has one pair of lateral blood vessels with numerous blind-ending blood vessels. Live individuals

have green intersegmental stripes on the anterior segments.

Reproduce asexually by architomy so that individuals regenerating 8 head segments, which differ in colour and size from the subsequent parent segments, are frequently found. Sexual individuals are rare. This species is abundant in the waters of Czechoslovakia, particularly in acidic waters

Lumbriculus variegatus (-100-)

- Lateral blood vessels with blind-ending vessels are missing in central and posterior segments. Species reproducing only by amphigony 100

100(99) Two pairs of testes in Segments VIII and IX, one pair of ovaries and one pair of spermathecae in Segment X, and one pair of atriae has openings in Segment IX

Trichodrilus strandi (-98-)

- Two pairs of testes in Segments IX and X, one pair of ovaries in Segment XI, one pair of atriae in Segment X, and two pairs of bell-shaped male funnels free in the cavity of Segments X and XI or at the beginning of the second and third pair of sperm sacs.

Stylodrilus 101

101(102) One pair of slender funnel-like 300 μ m long male copulatory organs is located on Segment X behind the ventral chaetae . . .

Stylodrilus heringianus (-88-)

- Copulatory organs are missing, or they are only 30 μ m long and are retracted into penial sheaths 102

102(101) Central and posterior segments each have 2 pairs of lateral blood vessels with blind-ending vessels, only the species Bythonomus absoloni has 2 pairs of short lateral blood vessels

- without blind-ending blood vessels. 104
- Central and posterior segments do not have lateral blood vessels with blind-ending blood vessels 106
- 104(103) Species which reproduce in the summer by architomy in cysts. In November the young individuals leave the cysts and display a considerable difference in colouration between the dark brown old segments and the newly regenerated 8 anterior and light brown central and posterior segments. Sexual individuals are rare. Atrium with posterior funnels. Spermathecae behind the atrium. In asexual individuals there are 2 pairs of gonads in Segments VIII and IX, and sometimes even in Segment X.

Lampodrilus mrazeki (-99-)

- Two pairs of testes in Segments IX and X, one pair of ovaries in Segment XI, one pair of spermathecae in Segment IX, one pair of atriae in Segment X, and two pairs of male funnels connected to dissepiments 9/10 and 10/11.

Bythonomus. 105

- 105(104) Beginning in Segment XXVI, 2 pairs of lateral blood vessels have numerous blind-ending blood vessels

Bythonomus lemani (-91-)

- Beginning in Segments XVII to XVIII, two pairs of short lateral blood vessels without blind-ending blood vessels branch off from the dorsal blood vessel

Bythonomus absoloni (-92-)

- 106(103) Unpaired male opening exits exactly at the ventral median line in Segment X. Spermathecae are usually missing, but very rarely a single spermatheca has an opening in the ventral median line

in Segment VIII

Tatriella slovenica (-93-)

- One pair of atriae in Segment X. One or two pairs of spermathecae
- have openings in Segment XI or XII.

Trichodrilus. 107

107(106) One pair of spermathecae has openings in Segment XI 106

- Two pairs of spermathecae have openings in Segments XI and XII. 109

108(107) Atrium is spherical or egg-shaped with a short duct

Trichodrilus pragensis (-95-)

- Atrium is long and pear-shaped with a long and narrow duct. . .

Trichodrilus tatrensis (-97-)

109(107) Each segment in the posterior half of the body has several pairs
of lateral blood vessels without blind-ending blood vessels . .

Trichodrilus allobrogum (-94-)

- Lateral blood vessels in the central and posterior segments
are missing

Trichodrilus moravicus (-96-)

KEY FOR THE CLASSIFICATION OF THE MOST COMMON ANNELIDS OF
CZECHOSLOVAKIA

- 1 Ventral tufts contain hairlike chaetae. The skin contains numerous
orange or green droplets.

Aeolosomatidae

- Ventral tufts never contain hairlike chaetae and the skin never
contains coloured droplets. 2

2(1) Worms usually shorter than 10 mm, frequently with 1 pair

of eyes; most species lack dorsal chaetae in several anterior segments. Reproduce mainly asexually by paratomy whereby chains of individuals at different stages of development are formed. .

Naididae

- Worms generally longer than 10 mm, always without eyes, with dorsal chaetae always beginning in Segment II, do not reproduce by paratomy 3
- 3(2) Each segment except Segment I has 2 pairs of dorsal and 2 pairs of ventral chaetae which are fully developed 12
- Worms with a different number of chaetae in chaetal tufts 4
- 4(3) Chaetae are always serrated (except in Propappus), usually there are more than 2 in each tuft. White body.

Enchytraeidae

- Ventral chaetae are serrated at the end 5
- 5(4) Anterior dorsal tufts contain only serrated chaetae 6
- Anterior dorsal tufts contain hairlike chaetae in addition to serrated chaetae (with intermediate serrations) 9
- 6(5) Chloragogenic cells beginning in dissepiment 4/5, that is, in Segment V, cause a dark colouration of the alimentary tract 7
- Chloragogenic cells beginning only in dissepiment 5/6 in Segment VI cause a dark colouration of the alimentary tract 8
- 7(6) Chaetae in front of the clitellum have an upper serration longer than the lower serration. Penial tubes in Segment XI are very long, up to 33 times as long as the diameter of their ental end.

Limnodrilus claparedeanus (-87-)

- Chaetae in front of the clitellum have an upper serration which is at most as long, or even shorter, than the lower serration.

Penial tubes are somewhat bent near the ectal end, and they are 8-10 times as long as the diameter of their ental end

Limnodrilus hoffmeisteri (-85-)

8(6) Chaetae in front of the clitellum have a very long upper [24]
serration even in individuals only 8 mm long. Penial tubes in Segment XI are only 4-5 times as long as the diameter of their ental end

Limnodrilus udekemianus (-83-)

- Chaetae in front of the clitellum have 2 nearly equally long serrations. Penial tubes in Segment XI are straight and only 5 times as long as the diameter of their ental end.

Limnodrilus helveticus (-84-)

9(5) Dorsal tufts in Segments II to X contain fanlike chaetae shaped like plates (Fig. 82)

Psammoryctides barbatus (-80-)

- Platelike chaetae are missing 10

10(9) Grey or rust-coloured body is covered by papillae from foreign particles fused by secretion. Frontal lobe and Segment I is retracted into Segment II. Worms with limited mobility.

Peloscolex ferox (-77-)

- Body without secretory papillae. Frontal lobe is never retracted into Segment II 11

11(10) Sexually mature individuals have several ordinary serrated chaetae in ventral tufts in Segment X. Spermathecae have openings in the lateral line in Segment X, and are never missing. Sperm duct is long, consisting of two parts, narrow at the beginning, covered by chaetae on the inside; in the distal half it is approximately

twice as wide, without chaetae, serrated on the inside. Pear-shaped atrium is in Segment XI

Tubifex tubifex (-72-)

Sexually mature individuals have one modified spermathecal chaeta (Fig. 64) on the ventral side of Segment X. Segment XI has 2 long tubelike atriae with short sperm ducts and a small prostate. Spermathecae have openings always in Segment X in the lateral line.

Potamothrix hammoniensis (-66-)

12(3) Chaetae are always non-serrated. Clitellum begins after Segment XX. Terrestrial or amphibious annelids.

Lumbricidae

- Serrated chaetae. Clitellum ends before Segment XX. True aquatic worms 13

13(12) Central segments have one pair of lateral blood vessels with numerous blind-ending blood vessels. Live individuals have green pigment in lateral stripes on the anterior segments

Lumbriculus variegatus (-100-)

- Lateral blood vessels are missing in central segments. Segment X has one pair of male copulatory organs past the ventral chaetae. Green pigment is missing.

Stylodrilus heringanus (-88-)



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AQUATIC ANNELIDS (*OLIGOCHAETA*) OF CZECHOSLOVAKIA

By S. Hrabě

Naididae BENHAM, 1890

Small annelids, generally only several millimetres long. Frontal lobe is well developed, and in the majority of the species of the genus Chaetogaster it is stunted, while in the genus Stylaria and in some species of the genus Pristina it is extended into a long and flexible flagellum. [30]*

Eyes in most species are at the sides of Segment I in contrast to other families which lack similar sensory organs.

Chaetae are in 2 dorsal and 2 ventral tufts; their number increases with the age of the individual, sometimes the chaetae are interchanged at which time their shape may sometimes change.

Ventral chaetae always begin in Segment II and they are forked at the ectal end protruding from the body.

Dorsal chaetae start in Segment II only in the genera Homochaeta and Pristina as well as in other Oligochaeta, in Segment III in the

* Numbers in the right-hand margin indicate the corresponding page numbers in the original text - translator's note.

genera Amphichaeta and Bratislavia, in Segments IV to V in the genus Paranais, and in Segment V in the genus Aulophorus. Dorsal chaetae start in Segment VI in the genera Nais, Specaria, Uncinais, Ophidonais, Slavina, Vejdovskyella (in V. comata they start in Segment V), Arcteonais, Stylaria, Ripistes, Piquetiella, Dero (in Dero dorsalis they start in Segment IV), and in Segments XVIII to XX in the genus Haemonais; dorsal chaetae are missing in species of the genus Chaetogaster. Dorsal tufts generally contain hairlike chaetae with either forked or needlelike chaetae beside them. Forked chaetae have two, usually very small, barbs at the ectal end, which are well visible at a magnification of at least 1000 x if they are positioned properly. Needlelike chaetae are not serrated at the end and they resemble hairlike chaetae but they are much shorter and thinner. The genus Ophidonais has a single barlike chaeta in place of dorsal tufts. In the genera Uncinais, Homochaeta, Amphichaeta, Paranais, and, as already mentioned, Ophidonais, hairlike chaetae are missing. In sexually mature individuals, Segment VI has modified ventral penial chaetae.

The alimentary tract begins at the mouth located under the frontal lobe and consists of the pharynx, esophagus, stomach, intestine, and anal opening in the last body segment. Among the epithelial cells of the dorsal pharynx bulge are the openings of glandular cells of the anterior and posterior pharynx glands, which are missing in the genus Chaetogaster.

The circulatory system consists primarily of the dorsal and ventral blood vessels; in the head segments they are connected by dorsal-ventral blood vessels which often branch and form a network.

Nephridia start by a funnel, but in the genus Chaetogaster they are closed at the beginning. The nephridium continues and forms a duct

which passes through the dissepiment into the adjacent segment where it changes to a glandular segment (postseptale) from which a developed tube passes to the surface of the body.

The nervous system consists of the cerebral ganglion and ventral nerve cord located in the body cavity; in the genus Chaetogaster the nerve cord forms a ladder in the anterior region.

The clitellum in sexually mature individuals is developed in the segments which contain gonads. One pair of testes is in Segment V, one pair of ovaries is in Segment VI, but in the subfamily Pristininae they are in Segments VII to VIII, and one pair of male funnels is in Dissepiment 5/6, but in Paranaidinae it is in Dissepiment 4/5, and in Pristininae it is in Dissepiment 7/8. Behind the male funnel there is a sperm duct leading to the atrium in the next segment (that is, Segment IV, V, or VIII). Prostatic glands cover the entire sperm duct or only its ectal (posterior) section in the genera Nais, Ophidonais, Uncinaiis, and Specaria. In the genera Slavina, Vejdovskvella, Arcteonais, Ripistes, and Piguetiella the prostatic glands cover the atria, and in Stylaria lacustris they cover not only the atria but part of the sperm duct as well. The genera Chaetogaster, Amphichaeta, Paranais, Homochaeta, Dero, Aulophorus, and Pristina do not have prostatic glands. Spermathecae are in Segment V, in Paranaidinae in Segment IV, and in Pristininae in Segment VII. Sperm and egg sac is unpaired.

[31]

Naidids reproduce mainly by paratomy. During paratomy, pharynx segments of the new individual preceded by the new posterior segments of the parent stock begin to form in the fission zones of the parent stock. In some species, a new fission zone begins to form on the new individual or on the parent stock so that chains of zooids, composed of several

individuals at various stages of development are formed. After reaching a certain stage of development, the new individual separates from the parent. During fixation the chains of individuals at various stages of development fall apart, and separate new individuals which are not yet fully developed sometimes pose problems in identification.

During architomal reproduction, which is rare in Naidids, the parent individual separates into 2 or more fragments. These then independently form the missing head and posterior segments.

Naidids feed on algae (mainly diatoms) and on organic detritus. Species of the genus Chaetogaster prey on smaller organisms such as Cladocera and Eucopepoda. Chaetogaster diaphanus even feeds on species of the genus Nais.

The family Naididae is divided into 4 subfamilies: Chaetogastrinae, Paranaidinae, Naidinae, and Pristininae.

Chaetogastrinae LASTOČKIN, 1921

1921 Chaetogastrinae, LASTOČKIN, Izv. Ivan.-Vozn. politech. inst., 3:201-213.

1948 Chaetogastrinae, SPERBER, Zool. Bidr. Uppsala, 28:57.

Without eyes. Dorsal chaetae are missing or they begin only in Segment III; like ventral chaetae they are always forked, only in Chaetogaster setosus (from the USSR) they are not forked. The pharynx is attached to the body wall from all sides by numerous radial muscles. The cylindrical stomach is well defined and is easily distinguished by its larger diameter from the narrow pharynx. Without pharynx glands. Nephridia are closed, without funnels. Coelemocytes do not float in the body cavity. One pair of testes, male funnels, and spermathecae in Segment V, and one pair of

ovaries, sperm ducts, and atria in Segment VI. Male openings lack prostatic cells.

Chaetogaster von BAER, 1827

1827 Chaetogaster von BAER, Nova Acta Ac. Leop., 13:605.

Frontal lobe in most species is rudimentary. Only Dissepiment 3/4 is completely developed, the others are very thin and incomplete. Without dorsal chaetae. Ventral chaetae are missing in Segments III to V, that is, they are present in Segments II and V and subsequent segments. Pharynx is in Segment II, esophagus is in Segment III, and stomach is in Segment IV. Circulatory system consists of the dorsal and ventral blood vessel. In the region around the esophagus both blood vessels are connected by a pair of dorsoventral blood vessels. The dorsal blood vessel branches into several peripheral blood vessels which cover the surface of the stomach. Connectives of the ventral nerve cord, initially separated, are connected together by several groups of ganglion cells so that they form a nerve ladder. Radial muscles pass through openings between their connectives. Clitellum is in Segments V to VI. Penial chaetae are in Segment VI.

[32]

11. Chaetogaster diastrophus (GRUITHUISEN, 1828)

Table 2, Figs. 1-4, 13

1828 Nais diastrophus GRUITHUISEN, Nova Acta Ac. Leop., 14:416:420,

Table 25, Figs. 6-8.

1884 Chaetogaster diastrophus, VEJDOVSKÝ, Syst. Morph. Olig.:38,
Table 6, Figs. 11-15.

1948 Chaetogaster diastrophus, SPERBER, Zool. Bidr. Uppsala, 28:59-62,
Figs. 3 C, 6, 7 A, B, G.

Frontal lobe in live individuals is conical and elongated.

Segment II contains 4-8 serrated chaetae per tuft; the chaetae are 70-112 μm long and approximately 1.6 μm in diameter. Sexually mature individuals have 2-3 modified penial chaetae, 70 μm long, in Segment VI.

Dorsal blood vessel extends into Segment I. Stomach has 12-20 peripheral blood vessels.

A single individual has 8 segments, and chains of zooids are up to 5 mm long.

England, France, Switzerland, Federal Republic of Germany, Denmark, Sweden, Finland, Poland, USSR, India, China, North and South America.

Bohemia: Labe, Vltava, Třeboň, wells in Prague (VEJDOVSKÝ, 1884).

Moravia: Svratka in Brno-Bystrc (HRABĚ, 1976 leg.).

12. Chaetogaster diaphanus (GRUITHUISEN, 1828)

Table 2, Figs. 9-11

1828 Nais diaphana GRUITHUISEN, Nova Acta Ac. Leop., 14:409-416, Table 25,
Figs. 1-5.

1884 Chaetogaster diaphanus, VEJDOVSKÝ, Syst. Morph. Olig.: 37, Table 5,
Figs. 1-18, Table 6, Figs. 19-21.

1948 Chaetogaster diaphanus, SPERBER, Zool. Bidr. Uppsala, 28:66-68,
Figs. 5,7 D.

Frontal lobe is stunted as it is in most species of the genus Chaetogaster. In preserved individuals the anterior end is truncated.

Segment II has 6-13 serrated chaetae with an upper serration much longer than the lower one; chaetae are (145) 200-350 μm long and have a mean diameter of approximately 4.5 μm .

Peripheral blood vessels are present only on the anterior stomach segment.

A single individual consists of 9 to 12 segments, and chains of zooids are up to 25 mm long. The body diameter in Segment IV is 1 mm.

England, France, Switzerland, Italy, Federal Republic of Germany, Finland, Poland, Bulgaria, Roumania, USSR, North America.

Bohemia: Vltava in Prague, Labe near Neratovice (VEJDOVSKÝ, 1884).

Moravia: Svratka in Brno-Bystrc (HRABĚ, 1976 leg.).

13. Chaetogaster cristallinus VEJDOVSKÝ, 1883

[33]

Table 2, Figs. 5-8, 12

1883 Chaetogaster cristallinus VEJDOVSKÝ, S. B. k. böhm. Ges. Wiss., 1883:220.

1884 Chaetogaster cristallinus, VEJDOVSKÝ, Syst. Morph. Olig.:37,

Table 6, Figs. 1-10.

1948 Chaetogaster cristallinus, SPERBER, Zool. Bidr. Uppsala, 28:68-71,

Figs. 7 E, K.

Frontal lobe is stunted and has a dorsal median notch.

Segment II has 4-13 serrated chaetae per tuft; chaetae are 110-160 μm long and 1.7 μm in diameter.

The dorsal blood vessel in fully mature individuals ends in Segment III and divides into two branches which then join and form the ventral blood vessel. Individuals which are not yet fully mature have the remnants of the dorsal blood vessel, full of blood, of the parent individual in Segment III (esophagus segment). This is illustrated and described by VEJDOVSKÝ (1884:114, Table 6, Fig. 1 sk). In fully mature individuals, only an inconspicuous deflated ropelike structure remains in place of the anterior section of the dorsal blood vessel in Segment III; it is well visible in live individuals. In sexually mature individuals, the dorsal blood vessel does not extend to Segment I.

A single individual consists of 8 to 9 segments, and chains of zooids are up to 7 mm long.

England, Switzerland, Finland, Federal Republic of Germany, Denmark, Poland, Bulgaria, USSR, Africa.

Bohemia: Kouřimka, Bynovský Stream near Děčín, Labe, and Vltava (VEJDOVSKÝ, 1884).

14. Chaetogaster limnaei VON BAER, 1827

Table 2, Fig. 14

1827 Chaetogaster limnaei VON BAER, Nova Acta Ac. Leop., 13:611-615,

Table 29, Fig. 23.

1884 Chaetogaster limnaei, VEJDOVSKÝ, Syst. Morph. Olig., Table 6, Figs. 16-18.

1948 Chaetogaster limnaei, SPERBER, Zool. Bidr. Uppsala, 28:72-74, Figs. 3 A,B, 7 F.

Frontal lobe is stunted.

Segment II has 5-20 serrated chaetae and subsequent segments have 4-20 chaetae. Serrations are perpendicular to the chaetal axis, and the upper serration is noticeably shorter than the lower. Esophagus is short.

In front of the cerebral ganglion, the dorsal blood vessel divides into 2 branches which then merge to form the ventral blood vessel. In front of the esophagus there are 2 secondary blood vessels which branch from the dorsal blood vessel and then join the ventral blood vessel.

Chaetogaster limnaei lives in the pulmonary openings and on the body surface of various lung and fresh-water front-gill gastropods (various species of the genera Lymnaea, Planorbis, Physa, Ancylus, Viviparus and Bythinia).

England, France, Switzerland, Federal Republic of Germany, Poland, USSR, India, USA, Australia.

Bohemia: Labe, Vltava, southern Bohemia (VEJDOVSKÝ, 1884).

Moravia: Svatka in Brno-Bystrc (HRABĚ, 1976 leg.).

15. Chaetogaster langi BRETSCHER, 1896

1896 Chaetogaster langi BRETSCHER, Rev. suisse Zool., 3:512-513, Fig. 1.

1948 Chaetogaster langi, SPERBER, Zool. Bidr. Uppsala, 28:387, Figs. 2-3.

Frontal lobe is stunted.

[34]

Segment II has 3-9 serrated chaetae, 63-100 μm long and 1.6 μm in diameter, and subsequent segments have 4-5 chaetae only 50-63 μm long.

Stomach has only 8-10 peripheral blood vessels.

A single individual has 8-9 segments, chains of zooids are 2 mm long.

Europe, Asia, Africa, North and South America.

Bohemia: Doksy (SCHUSTER, 1915), Vltava (WOLF, 1928), Central Labe Region (LIŠKOVÁ, 1976).

Amphichaeta TAUBER, 1879

1879 Amphichaeta TAUBER, *Annulata Danica*, 1:76.

Frontal lobe and dissepiments are fully developed. Chaetae are forked, all have the same shape, dorsal start in Segment III, ventral in Segment II. Pharynx is narrow in Segments II to III, esophagus in Segment IV and partly in Segment V. Cylindrical stomach has a much larger diameter in Segments V and VI, and intestine in Segment VII is also very wide. Lateral blood vessels connecting the dorsal and ventral blood vessels are missing. Nephridia start from funnels. Circumpharyngeal connective nerves have merged in the anterior segments to form a nerve cord. Clitellum is in Segments V to VI, one pair of testes and spermathecae in Segment V, and one pair of ovaries and atria in Segment VI.

Two species in Europe: A. leydigii and A. sannio KALLSTENIUS, 1892 (Table 3, Fig. 1), the latter of which lives in brackish water.

16. Amphichaeta leydigii TAUBER, 1879

Table 3, Figs. 2-3.

1879 Amphichaeta leydigii TAUBER, *Annulata Danica*, 1:76.

1948 Amphichaeta leydigii, SPERBER, *Zool. Bidr. Uppsala*, 28:76.

Frontal lobe is rounded. Eyes are missing.

Segments II and III have 4 chaetae in ventral tufts, Segments IV

to V had 2 chaetae and Segments VI to IX had 4 chaetae in three individuals which I examined; the other 2 individuals had 3 chaetae in ventral tufts in Segments IV to IX. Dorsal chaetae were missing in Segment II, each tuft in Segment III had 4 chaetae in 2 of the first 3 individuals examined; the remaining 2 individuals had 5 chaetae in each tuft in Segment III. Three individuals had 2 chaetae in Segments IV to V and 4 dorsal chaetae in Segments VI to IX; the remaining 2 individuals had 3 chaetae in dorsal tufts in Segments IV to IX. Chaetae are conspicuously slender, serrated into 2 equally-long barbs of which the lower is wider than the upper. Their length varies between 60 and 70 μm .

They are small and very mobile annelids with a body composed of 9 to 11 segments. Sexual individuals are at most 1.7 mm long, chains are at most 4 mm long.

France, Federal Republic of Germany, Poland, USSR.

Bohemia: Vltava River downstream from Prague (WOLF, 1928, Kunst 1948 leg.).

Moravia: Kniničská Reservoir near Brno (Hrabě 1976 leg.).

Paranaidinae SPERBER, 1948

[35]

1948 Paranaidinae SPERBER, Zool. Bidr. Uppsala, 28:82.

Without eyes. Serrated dorsal chaetae start in Segment V. Without nephridia. Coelomocytes float in the body cavity. Testes and spermathecae in Segment IV, ovaries and atria in Segment V. During paratomical reproduction, only 4 head segments form on the anterior of the new individual.

Paranais CZERNIAVSKY, 1880

1880 Paranais CZERNIAVSKY, 1880: Bull. Soc. Natur. Moscow 55:313.

Diagnosis agrees with the diagnosis of the subfamily.

17. Paranais frici HRABĚ, 1941

Table 3, Figs. 4-6

1941 Paranais frici HRABĚ, Práce mor. přír. spol., 13(12):20-22, Fig. 16-19.

1948 Paranais frici SPERBER, Zool. Bidr. Uppsala, 28:86-87, Fig. 8 E-H.

Frontal lobe is short, in preserved individuals it is conspicuously blunt. The body is covered by a thin layer of detritus clumped in lateral rows; living individuals appear to be covered in flour. Blood is red.

Dorsal tufts in Segment V have 3, other segments have 2 serrated chaetae. Ventral tufts in Segment II contain 3-4 chaetae similar to the dorsal chaetae, whereas all other segments have only 2 chaetae per tuft. The upper serration of ventral chaetae in Segments II to V is more than twice as long as the lower serration and its base is somewhat wider. In Segment VI and in all subsequent segments the ventral as well as all dorsal chaetae have an upper serration which is somewhat shorter [than in other segments - added by translator], but still perceptibly longer than the lower serration.

Clitellum in Segments V to VI, one pair of spermathecae has openings in Segment IV directly in front of the ventral chaetae. One pair of atria has openings in Segment V.

Chloragogenic cells cover the alimentary tract starting from the posterior half of Segment V. The esophagus suddenly expands to form a stomach in Segment VII.

One individual has 12 to 13 segments, chains of individuals after fixation are up to 6 mm long and consist of 30 to 34 segments. They swim.

France, Sweden, Finland, Federal Republic of Germany, Poland, Bulgaria, USA.

Moravia: Dyje downstream from Mušov (HRABĚ 1971, 1976 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Naidinae LASTOČKIN, 1921

1921 Naidinae LASTOČKIN, Izv. Ivan. - Vozn. polytech. inst., 3:201-213.

1948 Naidinae, SPERBER, Zool. Bidr. Uppsala, 28:92.

1962 Naidinae, ČEKANOVSKAJA, Opred. faun. USSR, 79:157.

Frontal lobe is rounded, and only in some genera it is extended to form a flagellum (Stylaria, Arcteonais, Ripistes). Most genera have eyes. Testes and spermathecae are in Segment V (rarely in Segment IV), and ovaries and atria are in Segment VI (rarely in Segment V). During paratomical reproduction the ne: individuals form 5 head segments (rarely 4 head segments). Dorsal tufts generally contain forked or needlelike chaetae in addition to hairlike chaetae. Hairlike chaetae are missing in the genera Uncinaiis, Homochaeta, and Ophidonais. Uncinaiis and Homochaeta have only dorsal serrated chaetae, and Ophidonais has barlike chaetae.

[36]

Homochaeta BRETSCHER, 1896

1896 Homochaeta BRETSCHER, Rev. Suisse Zool., 3:508.

Without eyes. Dorsal chaetae begin in Segment II. Dorsal and ventral tufts contain only serrated chaetae of the same shape.

18. Homochaeta naidina BRETSCHER, 1896

1896 Homochaeta naidina BRETSCHER, Rev. Suisse Zool., 3:508-509.

1948 Homochaeta naidina, SPERBER, Zool. Bidr. Uppsala, 28:92-93.

Frontal lobe is elongated. Anterior segments are pigmented.

Upper barb on dorsal chaetae in Segments II to V is longer than the lower one; in other segments the barbs are equally long on all ventral chaetae. In Segments II to V there are 5-6 dorsal chaetae per tuft, in other segments there are 3-5 dorsal and ventral chaetae per tuft.

One individual has 20 segments, chains of zooids are up to 8 mm long.

England, Switzerland, Federal Republic of Germany, Roumania, USSR, Japan.

Bohemia: Vltava near Prague (WOLF, 1928). Findings must be verified.

19. Homochaeta setosa (MOSZYNSKI, 1933)

Table 3, Figs. 7-8

1933 Paranaïs setosa MOSZYNSKI, Arch. hydrob. ichthyol., 7:141-143.1948 Homochaeta setosa, SPERBER, Zool. Bidr. Uppsala, 28:93, Fig. 27 C on p. 258.1973 Homochaeta setosa, HRABĚ, Biol. Vest., (Ljubljana) 21:42-43, Figs. 1-3.

Frontal lobe is short and conical. The posterior of the body ends by a long breathing tube which is similar to the respiratory organ of the genus Aulodrilus. Without eyes and without pigment on the anterior segments.

Dorsal and ventral serrated chaetae have an upper barb which is much shorter than the lower. Segments II to III contain 4-8 chaetae per tuft, other segments have up to 12 chaetae per tuft.

Esophagus suddenly expands to form a stomach in Segment VIII.

Individuals from the Krka River are 6.6 and 9.3 mm long and consist of 42 and 54 segments, respectively. They live in tubes of fused sand.

France, Federal Republic of Germany, Roumania, Yugoslavia. [37]

The species has not yet been found in Czechoslovakia.

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Uncinais LEVINSEN, 18841884 Uncinais LEVINSEN, Vid. Medd. dansk. naturh. For., 1883:218.

With eyes. Dorsal and ventral tufts contain only serrated chaetae. Dorsal chaetae begin in Segment VI. Ventral chaetae in Segments II to V have an upper serration which is much longer than the lower. Prostatic cells on spermathecae. Coelemocytes float in the body cavity. Only one species.

20. Uncinais uncinata (ØRSTED, 1842)

1842 Nais uncinata, ØRSTED, Naturhist. Tidsskr., 4:136.

1948 Uncinais uncinata, SPERBER, Zool. Bidr. Uppsala, 28:98-99, Fig. 26 G.

The anterior of the body is rounded, and with the frontal lobe it resembles, as noted by Piguet (1906), the head of a dolphin. Dark-brown pigmentation on the anterior segments disappears after fixation with 4% formalin. With eyes.

Dorsal tufts starting in Segment VI have 2-4 chaetae, ventral tufts have 2-7 chaetae. Ventral chaetae in Segments II to V have an upper serration much longer than the lower, in other segments the difference in length of the serrations decreases. Ventral chaetae in Segment II are up to 120 μm long, in Segment III they are up to 125 μm long, and in Segments XII to XV they are up to 130 μm long; dorsal chaetae are somewhat shorter. Penial chaetae with a bent ectal end are 110 μm long, and there are 2-3 of them in Segment VI.

Chl. yogenic cells cover the esophagus starting in the posterior half of Segment VI. Wide stomach begins in Segment VIII. Blood vessels form a complex net in the 5 anterior segments.

One individual has 19 to 30 segments, chains of zooids are up to 18 mm long.

England, France, Switzerland, Italy, Yugoslavia, Federal Republic of Germany, Sweden, Finland, Poland, Bulgaria, Roumania, USSR, USA.

Bohemia: Vltava downstream from Prague (WOLF, 1928), Labe near Roudnice and downstream from Lovosice, Ohře near Radonice and Levousy, Malše in České Budějovice (HRABĚ, 1939), Blatná, Třebovice, Česká Třebová (Kunst 1947, 1953 leg.).

Moravia: the spring of Jedovnický Stream in the quarry near Býčí Cliff near Adamov (Hrabě 1933, 1935 leg.), Hamerský Stream in Dobrá Voda near Mrakotín (Hrabě 1976 leg.), Libochůvka near Tišnov (Hrabě 1978 leg.), Morava River near Chropyně (Hrabě 1928 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Ophidonais GERVAIS, 1838

1838 Ophidonais GERVAIS, Bull. Ac. Belg., 5:19.

With eyes. Barlike dorsal chaetae begin in Segment VI, however sometimes they are missing in some or even all segments. Upper serration on ventral chaetae is as long as the lower serration in all segments. Coelemocytes float in the body cavity. Prostatic cells cover the spermathecae.

[38]

21. Ophidonais serpentina (O. F. MÜLLER, 1773)

Table 3, Figs. 14-18

1773 Nais serpentina MÜLLER, Verm. terr. fluv., 1 (2):20-21.

- 1884 Ophidonais serpentina, VEJDOVSKÝ, Syst. Morph. Olig., 27, Table 3, Figs. 14-16.
1948 Ophidonais serpentina, SPERBER, Zool. Bidr. Uppsala, 28:100-101. Figs. 10, 26F.

Frontal lobe is short and rounded. The anterior of the body has 3-4 wide lateral brown stripes of pigment cells. Individual segments have 2 transverse lines of sensory ganglia. The body is covered by a thin layer of foreign particles if the individual lives in the substrate.

Dorsal tufts are replaced by 1 dorsal chaeta. In some segments the dorsal chaetae are missing, or sometimes the dorsal chaetae are entirely absent. The chaetae are barlike, thick, and serrated to form 2 small rounded serrations on the ectal end. When rotated by 90 degrees, one serration is hidden and the end appears to be rounded and unserrated. Ventral tufts contain 2-6 chaetae with an upper serration only slightly longer and much narrower than the lower serration; in the posterior segments the serrations have equal length.

The stomach widens in Segments VIII to IX or in Segments IX to XI.

A single individual may have up to 97 segments, chains of zooids are as long as 36 mm.

Worms with little mobility, usually found wrapped around the stems of water plants like snakes.

England, France, Switzerland, Italy, Federal Republic of Germany, Denmark, Finland, Poland, Bulgaria, Roumania, USSR, USA, South America.

Bohemia: Vltava and Labe near Kostelec, Kouřimský Stream, Ohře, surroundings of Třeboň (VEJDOVSKÝ, 1884), stream near Hrdlořez, Vltava near Prague (ŠTOLC, 1886), central Labe region, Blatná (LIŠKOVÁ, 1976), Ploučnice (Rosol 1971 leg.).

Moravia: Říčka near Líšně, Hamerský Stream in Dobrá Voda near Mrakotín (HRABĚ, 1976 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Nais MÜLLER, 1773

1773 Nais (part.) Müller. Verm. terr. fluv., 1 (2):20.

1884 Nais, VEJDOVSKÝ, Syst. Morph. Olig.:28.

Generally with eyes. Anterior segments are usually pigmented. Ventral chaetae in Segments II to V differ in most species by their size and shape from chaetae in other segments. Dorsal tufts begin in Segment VI and contain hairlike and forked or needlelike chaetae. Coelemocytes float in the body cavity. Clitellum is in Segments V to VII. Testes and spermathecae are in Segment V, ovaries and atria are in Segment VI. Modified penial chaetae are in Segment VI.

22. Nais elinguis O. F. MÜLLER, 1773

[39]

Table 4, Figs. 1-5

1773 Nais elinguis MÜLLER, Verm. terr. fluv., 1 (2):22

1884 Nais elinguis, VEJDOVSKÝ, Syst. Morph. Olig.:28, Table 2, Figs. 16-23, Table 3, Figs. 5-6.

1906 Nais elinguis, PIGUET, Rev. suisse Zool., 14:241-247, Table 10, Fig.8, Table 11, Figs. 8-13, Table 12, Fig. 10.

1948 Nais elinguis, SPERBER, Zool. Bidr. Uppsala, 28:127-130, Fig. 14 A-C.

Frontal lobe is rounded. Generally with eyes.

Dorsal tufts starting in Segment VI have 1-3 hairlike, and 1-3 forked chaetae. Ventral tufts have 2-5 serrated chaetae, in Segments VI to XIV they have generally 3-4 chaetae, and in subsequent segments their number decreases. Forked chaetae are serrated to form 2 long parallel serrations which are apparent even at a magnification of 700 x (the chaeta must be positioned appropriately). These serrations are pointed at the end, and the lower serration is slightly longer than the upper. Hairlike chaetae are smooth and thin. Ventral chaetae have an upper serration generally twice as long as the lower serration in the anterior segments, and in the posterior segments it is 1.8 times as long as the lower. Serrations on ventral chaetae are never equally long and never have the upper serration shorter than the lower. Chaetae in Segments II to V are only slightly thinner than those in Segment VI and several subsequent segments.

The length of the chaetae depends on the age of the individual, and varies in individuals caught at the same time. For example, the sample taken from the stream near Branná in Jeseník on June 28, 1976 had several individuals who had ventral chaetae in Segment II 100-103 μm long, whereas others had chaetae only 80 μm long. The former group of individuals had chaetae in Segments III to V 92-100 μm long, and the latter group had chaetae only 70-73 μm long. A similar difference in the length of the chaetae was also noticed in other segments.

Hairlike chaetae are (150) 200-227 (305) μm long, forked are 58-77 (100) μm long.

The esophagus gradually expands in Segments VII to VIII to form a stomach (on preserved individuals it appears as if it expanded suddenly

because of the contraction of the body).

In sexually mature individuals the spermathecal ampulla is elongated with a narrow and long outlet. Sperm duct is long, entirely covered by prostatic cells, atrial ampulla is spherical with a very thick muscular layer, and its outlet is long and wide. Modified penial chaetae, which are bent like hooks at the end, are 103-121 μm long.

A single individual consists of 12-21 segments, chains of zooids consist of 15-37 segments and are up to 12 mm long. They swim by rotating in a spiral manner.

England, France, Switzerland, Denmark, Italy, Sweden, Finland, Bulgaria, Roumania, USSR, India, USA.

Bohemia: in various locations (VEJDOVSKÝ, 1884), Labe near Roudnice (HRABĚ, 1939).

Moravia: very widely-spread species.

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Nais elinguis belongs among the very widely-spread species of the family Naididae. It lives in clean as well as in considerably polluted waters.

It is easily classified because all ventral chaetae have an upper serration which is much longer than the lower one, which is perpendicular to the chaetal axis, and because it has 2 long serrations on the ends of forked chaetae which are visible even at a magnification of 700x.

23. Nais variabilis PIGUET, 1906

[40]

Table 4, Figs. 14-15

1906 Nais variabilis PIGUET, Rev. suisse zool., 14:254-256, Table 11, Figs. 18, 21, Table 12, Fig. 13.

1909 Nais variabilis, PIGUET, Rev. suisse Zool., 17:195-198, Table 3, Figs. 9-11.

1948 Nais variabilis, SPERBER, Zool. Bidr. Uppsala, 28:107-110.

Frontal lobe is rounded. Eyes are almost always present.

Dorsal tufts starting in Segment VI have 1-2 hairlike and 1-2 forked chaetae. Ventral tufts in Segments II to V contain 2-4 serrated chaetae, in Segment VI tufts contain generally 4-5 (7) chaetae, and in other segments the number of chaetae decreases; in some individuals there may be 6-7 chaetae even in Segment XVIII.

Sexually mature individuals have in Segment VI one pair of penial chaetae of a shape typical for all species of the genus Nais. Forked dorsal chaetae are serrated at the ectal end to form 2 minute divergent serrations (they are visible at a magnification of at least 1000x and at an appropriate orientation of the chaeta). Hairlike chaetae are thin and smooth. Ventral chaetae in Segments II to V have an upper serration which is 1.2 to 1.4 times as long, and the base of which is 2-3 times as thin as the lower serration, which is nearly perpendicular to the chaetal axis. In Segment VI and in all subsequent segments the ventral chaetae are nearly indistinguishable in their shape, size, and thickness from chaetae in Segments II to V. Only in the posterior segments does the length of the upper serration decrease, but even then the upper serration is slightly longer

than the lower. According to SPERBER (1948:110), hairlike chaetae are 170-570 μm long, but in the specimens which I collected they are most frequently 330 to 350 μm long, and more rarely only 231-295 μm or 360-410 μm long. Forked chaetae are 42-86 μm long. Ventral chaetae are according to SPERBER 78-117 μm long in Segment II and 64-96 μm long in Segment V, in my material they are 73-84 μm long.

The esophagus suddenly expands in Segment VII to form a stomach (in live individuals).

Spermathecal ampullae are spherical with a long outlet which is widened at the center. Atria are spherical or pear-shaped. Prostatic glands cover the sperm duct, but they may be missing or they may only be present at its ectal section.

A single individual consists of 12-21 segments, chains of zooids consist of 18-38 segments and are up to 10 mm long.

England, France, Switzerland, Federal Republic of Germany, Finland, Poland, Roumania, USSR, India, Japan, USA.

Czechoslovakia: species very widely distributed in Czechoslovak waters.

24. Nais communis PIGUET, 1906

Table 4, Figs. 6-10

1906 Nais communis PIGUET, Rev. suisse Zool., 14:247-253, Table 11, Figs. 14-17,19, Table 12, Fig. 11.

1948 Nais communis, SPERBER, Zool. Bidr. Uppsala, 28:102-107.

Frontal lobe is rounded. Eyes are present.

Dorsal tufts beginning in Segment VI have 1-2 (3) hairlike and 1-2 (3) forked chaetae. Ventral tufts in Segments II to V have (2) 3-4 (6) [41] serrated chaetae, and in Segment VI and in subsequent segments 4-6 chaetae; their number gradually decreases toward the posterior of the body. Forked chaetae are serrated at the ectal end to form 2 minute serrations. Hairlike chaetae are thin and smooth. Ventral chaetae in Segments II to V have an upper serration at most 1.4 times as long as the lower serration, which is perpendicular to the chaetal axis. Ventral chaetae in Segment VI and in subsequent segments do not differ significantly by their thickness from chaetae in Segments II to V. Their upper serration becomes shorter, and in the last segments both serrations are at most of the same length, but the upper serration is never shorter than the lower. Forked chaetae are (40) 50-55 (78) μm long, and hairlike chaetae are at most 255-268 μm long. Ventral chaetae in Segment II are 93 μm long, and in Segment V they are 54-66 μm long.

The esophagus gradually widens in Segments VII to VIII to form a stomach, which may be clearly seen only on living individuals.

Spermathecal ampullae are thin-walled, baggy, and according to Piguet, they elongate into Segment VI; their duct is narrow. Prostatic glands cover only the ectal half of the sperm duct. Atrial ampullae are spherical, and their outlet widens near the opening of the sperm duct and the outlet is as long as the ampulla.

A single individual consists of 10-21 segments and chains of zooids have as many as 32 segments.

Do not swim.

England, France, Holland, Switzerland, Federal Republic of Germany, Denmark, Sweden, Finland, Poland, Bulgaria, Roumania, USSR, India, Japan, USA, Brazil.

Czechoslovakia: very widely spread species.

Nais communis has forked chaetae with minute serrations. Ventral chaetae in Segments II to V do not differ significantly by their thickness from chaetae in Segment VI and in several subsequent segments. Lower serration of chaetae in Segments II to V is perpendicular to the chaetal axis. These traits are also characteristic for Nais variabilis. Both species may be easily distinguished when living because Nais communis does not swim and the esophagus gradually expands in Segments VII to VIII to form a stomach. Conversely, Nais variabilis swims and its esophagus, as in many other species of the genus Nais, suddenly expands to form a stomach. When preserving specimens, field notes of which species swims and which does not are not usually taken. When the specimens die, the segments contract and the posterior part of the esophagus frequently shifts toward the stomach in Nais communis, and gives the appearance that it suddenly expands to form the stomach. Both of these traits are therefore not suitable for classifying fixed material. I attempted to find other distinguishing traits for these widely spread species. The longest hairlike chaetae in Nais communis according to Sperber are as long as 268 μm , whereas in Nais variabilis they are as long as 570 μm . In my collections, Nais communis collected in 28 localities have hairlike chaetae at most 210 μm long, and only from 2 localities up to 265 μm long, whereas hairlike chaetae of Nais variabilis are most frequently 300-350 μm long and much more rarely 230-295 μm or 360-400 μm long. Therefore the length of hairlike chaetae in Segments X to XV may be a distinguishing trait for both species when classifying fixed material.

25. Nais christinae KASPARZAK, 1973

Table 4, Figs. 16-21

1906 Nais variabilis var. » des grands lacs « , PIGUET, Rev. suisse Zool., 14:256-259, Table 11, Figs. 20, 23, Table 12, Fig. 13.

1948 Nais variabilis, (part.), SPERBER, Zool. Bidr. Uppsala, 28:109.

1973 Nais christinae, KASPARZAK, Bull. Ac. Polon. Sci., ser. Sci. biol., C1 II, vol. 21:535-539, Figs. 1-4.

Frontal lobe is rounded. Eyes are present.

[42]

Dorsal tufts beginning in Segment VI contain 1 hairlike and 1 forked chaeta. Ventral tufts in Segments II to V contain 3-4 serrated chaetae, (2) 3-4 chaetae in Segment VI, and their number decreases gradually in subsequent segments. Forked chaetae are 66-73 μm long and they are serrated at the ectal end to form 2 short serrations. Hairlike chaetae are smooth, thin, and up to 330 μm long. Ventral chaetae in Segments II to V have an upper serration which is twice as long as the lower serration, it is erect as in Nais bretscheri, stolci, pardalis, and alpina, and it forms a characteristic, very acute angle with the lower serration (Table 4, Fig. 16). The base is as thick as the base of the lower serration. Ventral chaetae in Segment VI and in all subsequent segments are conspicuous by their thickness. In Segment V they are 2.6-2.9 μm in diameter, whereas in Segment VI and in several subsequent segments, their diameter is 4.4 to 4.9 μm . From Segment VI to the last segment, these chaetae have nearly equally-long serrations, but the lower serration has a basal diameter at least twice as large as the upper serration, and it is perpendicular to the chaetal axis. Ventral chaetae in Segment II are 112-127 μm long,

112-122 μm long in Segment V, and 85-110 μm long in Segment VI and in several subsequent segments.

The body of a single individual consists of 16-23 segments, and chains of zooids consist of up to 47 segments. It swims by rotating in a spiral manner.

Switzerland, Sweden, Poland, USSR.

Bohemia: Ploučnice (Rosol 1971 leg.).

Moravia: Říčka u Lišně (Hrabě 1936, 1967, 1977 leg.), Kníčovská Reservoir near Brno (Hrabě 1977 leg.).

Slovakia: Danube near Čilistov (Hrabě 1934 leg.).

Nais christinae described from several Polish lakes is a species identical to the variety "from large Swiss lakes", which PIGUET (1906) classified as the species Nais variabilis. This is shown not only by Fig. 13 in Table 12 in PIGUET'S paper (1906:257) and the statement that chaetae have "un angle extremement aigu" between serrations, but also by several individuals classified by PIGUET from Neuchâtel Lake which I have in my collection.

26. Nais bretscheri MICHAELSEN, 1899

Table 5, Figs. 1-11

1899 Nais bretscheri MICHAELSEN, Zool. Jb. Syst., 12:121-122.

1906 Nais bretscheri, PIGUET, Rev. suisse Zool., 14:267-270, Table 12, Fig. 16.

1948 Nais bretscheri, SPERBER, Zool. Bidr. Uppsala, 28:120-123, Fig. 13 A-M.

The body of living individuals is red-brown with wide transverse stripes of brown pigment on the dorsal side and on the sides of the anterior 10 to 12 segments. With eyes.

Ventral tufts in Segments II to V in completely mature (older) individuals have 4-6 serrated chaetae which are 70-105 μm long, 1.6 μm in diameter, and which have an upper serration more than twice as long as the lower. The lower serration is erect, points upward, and its base is as thick as the base of the upper serration, and possibly somewhat narrower. Younger individuals have only 3-4 chaetae in ventral tufts in Segments II to V. In older individuals, Segment VI has ventral tufts with 3-4 chaetae which are thicker than the chaetae in the preceding 5 segments. Their upper serration is also much longer than the short lower serration, but it is nearly perpendicular to the chaetal axis; the same chaetae, 2-3 in number, are also present in the tufts in Segment VI in younger individuals. Segments VII to VIII have, shortly after separation from the parent individual, one so-called giant chaeta with a short lower serration. In older individuals, these chaetae, without the lower serration, are present not only in Segments VII to VIII, but also in several subsequent segments as far as Segment XIII. Giant chaetae are 106-122 μm long, 7-8 μm in diameter, and they have a very long upper serration which is pointed and wide at the base. The lower serration on giant chaetae of individuals at the definitive developmental stage does not form, and in its place on the growing giant chaeta, still without the ental segment, there is an irregular bumpy plateau. Following the segments with giant chaetae, that is, after approximately Segment XIII until the last Segment XXX to XXXV, there are segments which have 3-5 ventral chaetae per tuft with an upper serration at least twice as long as the

[43]

lower serration (they are present even in the last growing segments). Sometimes the giant chaetae are missing or only their ectal segment is developed, and then the individuals have 3-4 normal ventral chaetae per tuft which are the same as chaetae of the central segments; the older chaeta, positioned closer to the ventral median line, resembles by its shape and possibly by its dimensions, the ventral chaetae of the central segments, whereas the developing ectal segment of the giant chaeta is closer to the lateral line. Between these two extremes, there are intermediate chaetal forms which are shown in Figs. 8-10 in Table V.

Hairlike chaetae are smooth, very short, and are only 85-106 (135) μm long. Forked chaetae have 2 very long (4.5 μm) serrations, and the chaetae are 52-73 μm long.

The esophagus gradually expands in Segment VIII to form a stomach. Normal ciliated epithelium is present in the stomach around the opening of the esophagus.

A single individual consists of 13 to 22 segments, and chains of zooids consist of 19 to 35 segments and they are up to 7 mm long.

England, France, Switzerland, Federal Republic of Germany, Denmark, Sweden, Poland, Bulgaria, Roumania, USSR, Japan, USA.

Czechoslovakia: species very abundant in the waters of Czechoslovakia.

Fully developed individuals may be easily classified by their giant chaetae in Segment VII and in several subsequent segments; younger individuals are classified primarily by their short hairlike chaetae (from 106 to 135 μm long), and also by the ventral chaetae in Segments II to V which have an erect lower serration, and which have an upper serration always much longer than the lower one, even in the last segments. These

three traits are also characteristic for old and fully developed individuals.

Individuals without giant chaetae, which, in the material collected by SPERBER (1948:122, Fig. 13 B-D), had ventral chaetae in Segments XIV to XV with serrations of equal length, and which the author classified as Nais bretscheri, definitely are the species Nais pardalis.

27. Nais pardalis PIGUET, 1906

Table 5, Figs. 12-19

1906 Nais bretscheri var. pardalis PIGUET, Rev. suisse Zool., 14:270-274, Table 12, Figs, 4,5, 17.

1909 Nais pardalis, PIGUET, Rev. suisse Zool., 17:206-209, Table 3, Figs 14-16.

1948 Nais pardalis (partim), SPERBER, Zool. Bidr. Uppsala, 28:124-126, Fig. 13 N-P.

Frontal lobe is rounded. Eyes are present.

Dorsal tufts beginning in Segment VI contain 1 (2) hairlike and 1 (2) forked chaetae. Ventral tufts in Segments II to V contain 2-3 chaetae, and only rarely Segments II and III contain 4 chaetae. Segment VI and several subsequent segments contain 2, more rarely 3, ventral chaetae per tuft, Segments XIII to XVIII contain 3-4 chaetae, and in the following segments the number of ventral chaetae gradually decreases to 2. Ventral chaetae in Segments II to V have an upper serration which is 1.8 times as long as the lower narrow and erect serration, which forms an acute angle with the upper serration. Segment VI and several subsequent segments have, in older individuals, ventral chaetae with an upper serration twice

[44]

as long as the lower serration which is positioned perpendicularly to the chaetal axis. The difference in the length of the serrations gradually decreases and in the segments behind the fission zone both serrations are equal in length. Even here the lower serration is twice as thick as the upper serration, and due to the optical illusion, the upper serration appears to be shorter than the lower.

Individuals, which shortly before death separated from the parent individual, have chaetae in Segment VI and in several subsequent segments, which have serrations of equal length as do all ventral chaetae in the last segments of the parent individual; the chaetae formed when the individual was still attached to the parent individual, and the chaetae are positioned closer to the median line. Chaetae which grew after the separation of the new individual are closer to the lateral line, and they have an upper serration which is perceptibly longer than the lower serration. In segments in front of the fission zone, that is, in Segments XIII to XXI, chaetae with serrations of equal length, or which have an upper serration only slightly longer than the lower one, regularly appear in tufts in addition to ventral chaetae with a long upper serration. The segments behind the fission zone contain only ventral chaetae which have serrations of equal length. In the individuals which I studied, ventral chaetae were 85-97 μm long in Segment II, 80-90 μm in Segment V, 65-80 μm in Segment VI, and 68-73 μm in Segment X. The mean diameter of the central part of the ectal section of the chaeta was 2 μm in Segments II to V, 3 μm in Segment VI, and 3.4-4 μm in Segments VII and X.

The narrow esophagus suddenly expands to form a stomach in Segment VIII. The epithelial cells inside the stomach around the opening of the esophagus only partially touch each other, and their apical ends freely extend into

the stomach cavity. In contrast to the epithelial cells of the stomach and esophagus, they lack cilia, but in mature individuals they are covered by a brown secretion which is insoluble in alcohol and in xylol. The brown secretion is visible even in crushed individuals sealed in glycerol gel. I was unable to find the channel through these cells which was described by M a r c u s (1943:32, Fig.18), not even on cross sections.

A single individual consists of 13 to 21 segments, and chains of zooids consist of 19 to 32 segments and reach a maximum length of 7 mm.

England, France, Switzerland, Federal Republic of Germany, Sweden, Finland, Poland, USSR, Japan, USA, Brazil.

Bohemia: Doksy (SCHUSTER, 1915), Vltava downstream from Prague (WOLF, 1928), Central Labe Region (LIŠKOVÁ, 1976).

Moravia: pond near Holásky in Brno, Kacíř Pond near Studenec, Říčka Reservoir near Lišeň (HRABĚ, 1965 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1939).

28. Nais stolci sp. n.

Table 6, Figs. 1-5

Frontal lobe is rounded. Eyes are present.

Dorsal tufts starting in Segment VI contain 1 hairlike and 1 forked chaeta, and sometimes 2 chaetae. Ventral tufts have 3-5 chaetae in Segment II, 4-5 chaetae in Segment III, 3-4 chaetae in Segments IV to V, and 2-3 chaetae in Segment VI and in several subsequent segments. Starting

in Segment X, there may even be 4 (5) ventral chaetae per tuft; this number of chaetae per tuft occurs frequently in the central segments. Ventral chaetae in Segments II to V have an upper serration which is twice as long as the narrow erect lower serration, which forms an acute angle with the upper serration. In Segment VI and in all subsequent segments until the last segment, the upper serration is always much longer than the lower one; that is, in Segment VIII it is 4 times longer, 2.5 times longer in Segment XV, and 1.9 times longer in Segment XXVIII. In Segments II to VI the ventral chaetae are 90-107 μm long, 86-102 μm long in Segment V, 81-107 μm long in Segments VI and VII, 86-113 μm long in Segment VIII, 80-102 μm long in Segment X, and 70-85 μm long in Segment XV. In Segments II to V the ventral chaetae are thinner (1.7 μm) than those in Segment X (5 μm). Forked chaetae are serrated into 2 very long serrations (5 μm) and are 65 μm long. Hairlike chaetae are thin and 147-212 μm long.

The esophagus gradually expands in Segment VIII to form a stomach.

Bohemia: Ploučnice (ROSOL, 1976 leg.).

Moravia: Říčka near Lišeň (Hrabě 1936, 1937, 1976, 1977 leg.),

Jedovnický Stream flowing from the quarry in Býčí Cliff near Adamov (HRABĚ 1976 leg.).

The new species along with Nais christinae, N. bretscheri, and N. pardalis form a separate group among the species with forked chaetae. The species mentioned have an erect lower serration in the ventral chaetae in Segments II to V. The ventral chaetae in Segments II to V are much thinner than chaetae in other segments in these species. The serrations of the forked chaetae are very long. Three other European species with serrated forked chaetae (Nais elinguis, N. communis, and N. variabilis)

have a lower serration in the ventral chaetae in Segments II to V which is perpendicular to the chaetal axis; their ventral chaetae in Segments II to V are almost as thick, or as thick as the chaetae in subsequent segments. The serrations of the forked chaetae in N. communis and N. variabilis are short.

Nais stolci differs from N. christinae and N. pardalis because the ventral chaetae always have an upper serration 2-4 times longer than the lower serration in all segments. In N. christinae, the upper serration is as long as or even shorter than the lower one in ventral chaetae of Segment VI and subsequent segments. Chaetae with serrations of equal length predominate or are the only chaetae present behind the fission zone of N. pardalis. In contrast to N. pardalis, N. stolci does not have any tuft with chaetae which have serrations of different lengths. [The meaning of this sentence is inconsistent with previous description - translator's note]. Nais stolci has considerably longer hairlike chaetae than N. pardalis and N. bretscheri; in N. stolci they are 147-212 μm long, in N. pardalis they are up to 147 μm long, and in N. bretscheri they are at most 135 μm long.

29. Nais barbata O. F. MÜLLER, 1773

Table 6, Figs. 7-15

1773 Nais barbata MÜLLER, Verm. terr. fluv., 1 (2):23-24.

1883 Nais obtusa, GERVAIS, Bull. Ac. Belg., 5:17.

1906 Nais obtusa, FIGUÉ, Rev. suisse Zool., 14:234-237, Table 11, Fig. 5,
Table 12, Fig. 8.

1948 Nais barbata, SPERBER, Zool. Bidr. Uppsala, 28:116-118.

1950 Nais barbata, SPERBER, Zool. Bidr. Uppsala, 29:62, Fig. 12 A-C.

The body of living individuals is gray, the dorsal side of the anterior segments is rust-coloured, and the ventral side of the anterior segments is greenish-blue. Frontal lobe is rounded. Eyes are present.

Dorsal tufts starting in Segment VI have 1-5 hairlike and 2-5 needlelike chaetae. Ventral tufts have 2-5 serrated chaetae. Needlelike chaetae have a long and sharp ectal end which protrudes conspicuously above the surface of the body. The ectal part of the chaeta above the nodule is only slightly shorter than the ental part (in the ratio 1 : 1.2-1.3). Hairlike chaetae are slightly bent, they are rigid, and they differ from the delicate hairlike chaetae of other species of the genus Nais by their sabre-like shape and by their thickness; they are up to 288 μm long and they are 2-3 times longer than the 89-132 μm long needlelike chaetae. Ventral chaetae in Segments II to V are thinner and longer than chaetae of subsequent segments. Their upper serration is only slightly longer than the lower serration which is perpendicular to the chaetal axis. Segment VI and subsequent segments always have an upper serration of the same length as the lower one; the base of the upper serration is 2-3 times thinner than the base of the lower serration. In Segment II it is 96-140 μm long, and in Segments III and IV, it is 90-130 μm long. Their maximum diameter at the center of the ectal portion in Segments II to V of mature individuals is 1.9-2.4 μm , and 3.5-5 μm in Segments VI to VII. In individuals who are not yet fully mature and who have 1-2 ventral chaetae in Segments II to V, the ventral chaetae are thinner (1.8-2.2 μm), and in Segment VI their diameter is only 2.7 μm ; therefore, the difference in the thickness of the chaetae mentioned above is not as apparent as in completely mature individuals who have a larger number of chaetae in Segments II to V.

The alimentary tract suddenly expands in Segment VII to form

a stomach.

Swim by rotating in a spiral manner.

A single individual has 11 to 19 segments, and chains of zooids are up to 6 mm long and consist of 25 to 33 segments.

England, France, Switzerland, Italy, Denmark, Sweden, Finland, Poland, Bulgaria, USSR, USA.

Czechoslovakia: species very abundant in the waters of Czechoslovakia.

30. Nais pseudobtusa PIGUET, 1906

Table 6, Figs. 16-19

1906 Nais obtusa GERVAIS var. pseudobtusa PIGUET, Rev. suisse Zool., 14:238-241, Table 11, Figs. 4,6,7, Table 12, Fig. 9.

1909 Nais pseudobtusa, PIGUET, Rev. suisse Zool., 17:193-195, Table 3, Fig. 8.

1948 Nais pseudobtusa, SPERBER, Zool. Bidr. Uppsala, 28:118-119.

1950 Nais pseudobtusa, SPERBER, Zool. Bidr. Uppsala, 29:63, Figs. 12 D,E,F.

Frontal lobe is rounded. With eyes.

Dorsal tufts beginning in Segment VI have 1-3 hairlike and needlelike chaetae. Ventral tufts in Segments II to V have 2-5 serrated chaetae and subsequent segments have 2-6 serrated chaetae. Needlelike chaetae are 57-75 (104) μm long and very pointed. Their ectal section is 2.5 to 2.8 times shorter than the slightly bent ental section. The hairlike chaetae are thin and up to 300 (-370) μm long. Ventral chaetae in Segments II to V are thinner and longer than those of Segment VI and subsequent segments.

The upper serrations of hairlike chaetae are $1\frac{1}{2}$ - $1\frac{1}{8}$ times longer than the lower, only somewhat erect, serration; serrations subtend an angle of 35° . The base of the upper serration is approximately 1.5 times thinner than the base of the lower serration; in Segment VI and in subsequent segments the upper serration is generally 1.3-1.5 times longer and 2-3 times thinner than the lower one. Chaetae are 71-90 μm long in Segment II, 65-82 μm long in Segment V, and 53-65 μm long in Segment VI. SPERBER gives the following lengths: 71-88 (115) μm , 70-71 μm , and 54-71 (85) μm , respectively. The thickness of the chaetae in the center of the ectal section above the nodule is 1.9-2 μm in Segments II to V, and 2.2-2.9 μm in Segment VI; according to SPERBER, the thicknesses are 1.2-1.3 μm and 1.7 μm , respectively. [47]

The esophagus suddenly expands to form a stomach.

A single individual consists of 12 to 17 segments, and chains of zooids with 15 to 28 segments are up to 6 mm long.

They swim in a spiral manner.

England, France, Switzerland, Italy, Denmark, Sweden, Federal Republic of Germany, Poland, Roumania, Bulgaria, USSR, Africa, USA.

Czechoslovakia: species very abundant in the waters of Czechoslovakia.

31. Nais simplex PIGUET, 1906

Table 6, Fig. 20, Table 7, Figs. 1-6

1906 Nais variabilis var. simplex PIGUET, Rev. suisse Zool., 14:260-266,

Table 11, Figs. 22, 24, Table 12, Figs. 1-3, 14.

- 1909 Nais simplex, PIGUET, Rev. suisse Zool., 17:202-204, Table 3, Fig. 12.
1948 Nais simplex, SPERBER, Zool. Bidr. Uppsala, 28:110-112, Fig. 11 A-C, 26 E.
1950 Nais simplex, SPERBER, Zool. Bidr. Uppsala, 29:61, Fig. 11 A-C.

Frontal lobe is rounded. With eyes.

Dorsal tufts beginning in Segment VI contain 1-2 needlelike and hairlike chaetae. Ventral tufts in Segments II to V contain 2-4 (6) chaetae, and Segment VI and subsequent segments contain 2-4 chaetae. Needlelike chaetae are 60-80 μm long with a blunt end; the slightly arched ectal section is present in 1/3 of the chaeta. Only rarely are some chaetae serrated at the ectal end into 2 very small serrations. Hairlike chaetae are thin and up to 262 μm long. Ventral chaetae in Segments II to V are straight, thinner (1.8-1.9 μm), and longer (80-110 μm) than in other segments. Their upper serration is 1.6 times longer than the lower one, and the base of the upper serration is narrower than the base of the lower serration which is almost perpendicular to the chaetal axis. Segment VI and all subsequent segments (even the posterior segments) have ventral chaetae with an upper serration only slightly longer than the lower one (1.25 times longer), and the lower serration has a base which is 2-3 times wider than the base of the upper serration. The diameter of the ventral chaetae, which are 86-95 μm long, in Segments VI to VII is 2.7-3.3 μm .

The esophagus suddenly expands to form a stomach in Segment VII.

A single individual has 14 to 22 segments, and chains of zooids with 18 to 37 segments are up to 8 mm long. They swim by rotating in a spiral manner.

England, France, Switzerland, Federal Republic of Germany, Sweden,

Poland, Roumania, Bulgaria, USSR, USA.

Moravia: Svatka in Brno-Bystrc, stream flowing into the Kníničská Reservoir near Sokolovské Beach (HRABĚ 1976 leg.).

Nais simplex differs from Nais barbata and N. pseudobtusa because the needlelike chaetae are blunt at the ends and do not have a sharp point. In Nais simplex the male funnels are small, the atrial ampullae are pear-shaped, and the sperm ducts after Dissepiment 5/6 have prostatic cells; in Nais pseudobtusa the male funnels are particularly large, the atrial ampullae are spherical, and the sperm ducts are covered by prostatic cells along their entire length.

One individual which I found in the Svatka River had one needlelike chaeta in Segments X and XII which was serrated at the end to form 2 slight serrations. In his Ph. D. thesis (1906:261), PIGUET mentioned that he found these chaetae in Nais simplex, but in the study of subsequent material (1909:203), similar chaetae were not observed.

32. Nais alpina SPERBER, 1948

Table 9, Figs. 7-9

1948 Nais alpina SPERBER, Zool. Bidr. Uppsala, 28:113-116, Figs. 11 D-F, 12 A.

1950 Nais alpina, SPERBER, Zool. Bidr. Uppsala, 29:61, Fig. 11 D-F.

Frontal lobe is rounded. With eyes.

Dorsal tufts have 1-2 hairlike and needlelike chaetae. Segments II to V have 4-7 ventral chaetae, and subsequent segments have 3-7 chaetae.

Needlelike chaetae have blunt ends and their ectal section is 2.5-4.5 times shorter than the ental section; they are up to 90 μm long, and according to SPERBER, they are 60-81 μm long. Hairlike chaetae are thin and up to 220 μm long. Ventral chaetae in Segments II to V are longer and thinner than in other segments. These chaetae are 90-120 μm long in Segment II, 83 - 115 μm long in Segment V; according to SPERBER, the chaetae are 119-120 μm long in Segment II, 102-103 μm long in Segment V, and in extreme cases, they are 102-135 μm long in Segments II to V. The lower serration of these chaetae is erect and forms a very acute angle with the upper serration. In Segment VI and in subsequent segments, the upper serration is twice as long as the lower serration, which is perpendicular to the chaetal axis. In Segments VI to VII the ventral chaetae are shorter than in the preceding segments; I recorded lengths of 74-93 μm , and SPERBER recorded lengths of 87-93 μm .

The esophagus suddenly expands to form a stomach in Segment VII.

A single individual consists of 17 to 19 segments (14 to 18 segments in the material which I collected), and chains of zooids are at most 3.8 mm long. They swim by rotating in a spiral manner.

England, Sweden, Yugoslavia, Poland, USSR.

Bohemia: Ploučnice (ROSOL, 1971 leg.).

Moravia: Bečva near Zubří (ROSOL, 1974 leg.), near Rožnov (HRABĚ, 1979 leg.), Svratka in Bystrc near Brno, Říčka near Lišer, Křepťovský Stream near Doubravník (HRABĚ, 1976 leg.).

It is probable that "form E" of the species Nais variabilis, which was described by PIGUET (1906:266), is identical to Nais alpina. It has needlelike chaetae with a short ectal section (1906, Table 12, Fig. 15),

and an upper serration on ventral chaetae which is always twice as long as the erect lower serration (1906, Table 12, Fig. 15 b,c).

The ventral chaetae in Segments II to V which have an erect lower serration are a distinguishing trait of Nais alpina; in this way, Nais alpina differs from N. barbata, N. pseudobtusa, and N. simplex, which also have needlelike chaetae, but these 2 traits are also found in young individuals of Nais behningi which still have 2-4 ventral chaetae in the head segments.

33. Nais behningi MICHAELSEN, 1923

Table 7, Figs. 10-14

1923 Nais behningi MICHAELSEN, Arb. biol. Wolga-Stat., 7:34-37.

1941 Nais behningi, HRABĚ, Práce morav. přír. spol., 13(12):19-20, Figs. 1-7.

1948 Nais behningi, SPERBER, Zool. Bidr. Uppsala, 28:119-120, Fig. 12 B.

1950 Nais behningi, SPERBER, Zool. Bidr. Uppsala, 29:63, Fig. 13.

Frontal lobe is rounded. With eyes.

Dorsal tufts beginning in Segment VI have 1-2 needlelike and hairlike chaetae. Segments II to V have 4-7 ventral chaetae per tuft, and subsequent segments have (2) 3-7 chaetae. Needlelike chaetae are only 60-85 μm long and they have a blunt point on the ectal section which extends for one quarter of the length of the chaeta. Hairlike chaetae are thin, 180-200 (308) μm long, and somewhat shorter than the body diameter. Ventral chaetae in Segments II to V are 120 μm long and thinner than in subsequent segments. Their upper serration is very thin, slightly bent,

[49]

unusually long, and is 3 times as long as the lower serration. The lower serration is like a thin board and closely abuts the upper serration. In individuals with a smaller number of ventral chaetae in Segments II to V, that is, in individuals not yet fully mature, the long and narrow lower serration subtends a very acute angle with the wider upper serration as is the case with Nais bretscheri, N. pardalis, N. stolci, and N. alpina. In addition to these chaetae, the tufts also contain chaetae where the lower serration closely abuts to the upper serration. In Segment VI and in subsequent segments the ventral chaetae are 80-90 μm long and have an upper serration which is twice as long as the lower, and whose base is as thick as the base of the lower serration which is perpendicular to the chaetal axis.

The esophagus suddenly expands in Segment VII to form a stomach.

France, Poland, Bulgaria, USSR, USA.

Bohemia: Ploučnice (ROSOL leg.).

Moravia: Morava River near Kroměříž (HRABĚ, 1934 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941), Orava River (Obr, 1973 leg.).

In the paper dealing with worms in the Danube (1941:20), I stated that one individual had in Segment V only one chaeta with an upper serration characteristic for the species Nais behningi, whereas the other 2 chaetae in Segments II to V resembled the ventral chaetae in the head segments of several other species of the genus Nais. In addition to the rare typical individuals of Nais behningi found in the sample from the Orava River, there were also some individuals which had both types of chaetae in Segments II to V, and the majority had chaetae of the type found on

N. alpina. I was unable to find other differences between the young individuals of N. behningi and N. alpina, and therefore I do not know, whether both of these species are found in the Orava River, or if they are exclusively individuals of the species N. behningi at different stages of development.

Slavina VEJDOVSKÝ, 1883

1883 Slavina VEJDOVSKÝ, S. B. k. böhm. Ges. Wiss. (mat.-naturw. Kl.) 1883:219.

Frontal lobe is rounded and short. The body is usually covered by a thick layer of clumped secretion with attached foreign particles. The surface of the body has one, and, starting in Segment VI, two transverse rows of sensory papillae. The dorsal chaetae begin in Segment VI (in South-American species in Segment IV), and the tufts contain hairlike and needlelike chaetae. Coelemocytes float in the body cavity.

34. Slavina appendiculata (D'UDEKEM, 1855)

Table 7, Figs. 15-18

1855 Nais appendiculata d'UDEKEM, Bull. Ac. Belg. (Cl. Sci.), 22:552, Fig. 3.

1884 Slavina appendiculata, VEJDOVSKÝ, Syst. Morph. Olig.:30, Table 3, Figs. 17-26.

1886 Slavina appendiculata, ŠTOLC, Zool. Anz., 9:503-504.

1948 Slavina appendiculata, SPERBER, Zool. Bidr. Uppsala, 28:133-136,

Figs 15 A, B, 26 B.

With eyes. The entire body is usually covered by a thick layer of secretion with attached foreign particles, which are not found on individuals caught in weeds or on individuals kept in clean water for one or two days.

The anterior 5 segments each have 1 row of transverse sensory papillae, and in Segment VI and subsequent segments, these organs are present in two rows. The anterior row is in the same level as the chaetal tufts, and the second row is farther toward the posterior. Two pairs of particularly large papillae are located on the dorsal side of the body above the dorsal chaetae in the anterior row, and one pair of these papillae is located in the posterior row. Along the sides of the body in the region between dorsal and ventral tufts, there are 2 smaller papillae in the anterior row and only 1 papilla in the posterior row; there are no sensory papillae on the ventral side.

[50]

Ventral tufts contain 2-5 chaetae with an upper serration always longer than the lower. One to three hairlike chaetae in Segment VI are unusually long (800 μm), thin, and straight; in contrast, they are thick, slightly bent, and at most 450 μm long in subsequent segments. In addition to 1-2 hairlike chaetae, the tufts contain 1-2 short (50-70 μm), thin needlelike chaetae, which rapidly narrow toward the ectal end.

England, France, Switzerland, Denmark, Italy, Sweden, Finland, Poland, Bulgaria, Roumania, USSR, Asia, USA, Brazil.

Bohemia: Vičava in Prague (VEJDOVSKÝ, 1884, WOLF, 1926), Opatovický Pond near Třeboň (ŠTOLC, 1886), Doksy (SCHUSTER, 1915), Blatná (LIŠKOVÁ, 1976).

Moravia: stream near Račín close to Nové Město na Moravě (HRABĚ, 1932 leg.),

University Botanical Garden in Brno (HRABĚ, 1969 leg.), Hamerský Stream in Dobrá Voda near Mrakotín (HRABĚ, 1976 leg.).

Vejdovskyella MICHAELSEN, 1903

1903 Vejdovskyella MICHAELSEN, Georg. Verbr. Olig., Berlin:42.

Frontal lobe is short. Dorsal chaetal tufts beginning in Segment VI contain thick hairlike chaetae with long, tightly-abutting serrations, and delicate needlelike chaetae without the nodule. All ventral chaetae have the same shape. Coelemocytes float in the body cavity.

35. Vejdovskyella comata (VEJDOVSKÝ, 1883)

Table 8, Figs. 1-4

1883 Bohemilla comata VEJDOVSKÝ, S. B. k. böhm, Ges. Wiss. (mat.-naturw. Kl.), 1883:218.

1884 Bohemilla comata, VEJDOVSKÝ, Syst. Morph. Olig.:28, Table 2, Figs. 1-7.

1948 Vejdovskyella comata, SPERBER, Zool. Bidr. Uppsala, 28:137-140, Figs. 15 C-F, 26 C.

With eyes. Ventral chaetae have upper serration longer than the lower one. There are 4 ventral chaetae per tuft in Segment II, 3 in Segment III, 0-1 in Segment IV, ventral chaetae are missing in Segment V, and in Segment VI and in subsequent segments there are 3-4 similar chaetae

per tuft. Dorsal tufts beginning in Segment VI have 4-8 sabrelike chaetae with 2 rows of long serrations, and 1-8 thin needlelike chaetae. Sabrelike chaetae are up to 375 μm long, and needlelike chaetae are at most 90 μm long. The lower ental end of sabrelike chaetae is not blunt but it is pointed. Coelemocytes are oval and flattened.

England, France, Switzerland, Denmark, Sweden, Poland, USSR, USA.

Bohemia: fountains with unfiltered water from the Vltava River (VEJDOVSKÝ, 1883), Vltava in Prague (MAULE, 1906; WOLF, 1928), Golčův Jeníkov (MAULE, 1906), Doksy (SCHUSTER, 1915), Slapská Reservoir (LIŠKOVÁ, 1976), Ploučnice near Strážce downstream from Ralsko (ROSOL, 1971 leg.).

Moravia: Svratka near Nevědice (KUBÍČEK, 1965 leg.).

36. Vejdovskyaella intermedia (BRETSCHER, 1896)

[51]

Table 8, Fig. 5-7

1896 Macrochaeta intermedia BRETSCHER, Rev. suisse Zool., 3:509-510.

1928 Vejdovskyaella intermedia, PIGUET, Bull. Soc. neuchatel. Sci. nat., (N.S.), 1:86-87.

1948 Vejdovskyaella intermedia, SPERBER, Zool. Bidr. Uppsala, 28:140-141.

Without eyes. Segments II to V have 2-4 serrated ventral chaetae with an upper serration longer than the lower one. Segments VI to VIII (X) have 1 particularly large chaeta with a wide lower serration and 2-3 thin upper serrations in place of tufts with a larger number of ventral chaetae. Dorsal tufts contain 4-9 hairlike chaetae, bent in a sabrelike manner,

with tightly abutting serrations which are evident only on the ectal end which has broken off, or on chaetae with a large curvature. Among the sabrelike chaetae, which are up to 240 μm long, there are 4-8 needlelike chaetae at most 66 μm long.

France, Switzerland, Sweden, Poland, USSR, USA.

Böhemia: Vltava River (WOLF, 1928).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Arcteonais PIGUET, 1928

1928 Arcteonais PIGUET, Bull. Soc. neuchâtel. Sci. nat., (N.S.), 1:88-89.

Frontal lobe is extended into a short flagellum. Head end is rounded at the sides and does not have protrusions at the sides which are characteristic for Stylaria lacustris. Dorsal tufts begin in Segment VI and contain numerous hairlike chaetae and fine, short needlelike chaetae which are similar to the hairlike chaetae. Ventral chaetae always have the same shape and have an upper serration longer than the relatively long lower serration.

37. Arcteonais lomondi (MARTIN, 1907)

Table 8, Figs. 8-11

1907 Stylaria lomondi MARTIN, Proc. R. Soc. Edinburgh, 28:25-26, Table 2.

- 1928 Stylaria brevis, WOLF, Int. Rev. Hydrob. 20:396-400, Figs, 7-9.
 1928 Arcteonais lomondi, PIGUET, Bull. Soc. neuchatel. Sci. nat., (N.S.),
 52:88-89, Fig. 4 A-D.
 1945 Arcteonais lomondi, SPERBER, Zool. Bidr. Uppsala, 28:142-143, Fig. 15 G.

Dorsal tufts contain 8-18 hairlike and 9-12 very fine needlelike chaetae. Hairlike chaetae are up to 395 μm long, and needlelike chaetae are up to 68 μm long. Ventral tufts contain 3-7 chaetae with an upper serration longer than the lower serration. In Segment II the chaetae are up to 150 μm long, and in Segment VI and in subsequent segments, they are at most 128 μm long.

The esophagus suddenly expands into a stomach in Segment VIII.

A single individual consists of 32 segments. Chains of zooids with 42-50 segments are up to 10 mm long.

England, Sweden, USSR, USA.

[52]

Bohemia: Vltava downstream from Prague (WOLF, 1928), Labe near Lovosice, Malše near České Budějovice (HRABĚ, 1939), Dolejší Pond in Prague-Řepích, Slapská Reservoir (LIŠKOVÁ, 1976), Vltava in Braník (KUNST, 1947 leg.).

Moravia: Virská Reservoir (ZELINKA, 1958 leg.).

Stylaria LAMARCK, 1816

1816 Stylaria LAMARCK, Hist. nat. anim. sans vert., 3:223.

Frontal lobe is extended into a long flagellum between two lateral

protrusions. Generally with eyes. Dorsal hairlike and needlelike chaetae begin in Segment VI. Ventral chaetae have a minute lower serration. Coelomocytes float in the body cavity. Atrial ampullae and ectal sections of the sperm ducts are covered by prostatic cells.

38. Stylaria lacustris (LINNAEUS, 1767)

Table 8, Figs. 12-15

1767 Nereis lacustris LINNAEUS, Syst. natur., ed. 12:1085.

1816 Stylaria paludosa, LAMARCK, Hist. nat. anim. sans vert. 3:223.

1884 Stylaria lacustris, VEJDOVSKÝ, Syst. Morph. Olig.:30 Table 3, Fig. 27,
Table 4, Figs. 1-31.

1948 Stylaria lacustris, SPERBER, Zool. Bidr. Uppsala, 28:147-149, Fig. 15 L.

With eyes. Long flagellum on the anterior of the body between two lateral protrusions.

Hairlike chaetae have a finely serrate edge; tufts contain 1-2 hairlike and 3-4 needlelike chaetae. Ventral chaetae have a very small lower serration which is 3 times shorter than the upper serration; there are two right-angle bends in the ental half and each tuft contains 4-7 such chaetae. Hairlike chaetae are 600-800 μm long, needlelike chaetae are 75-95 μm long, and ventral chaetae in Segment VI are 175 μm long. In sexually mature individuals the chaetae are considerably longer. SPERBER (1949) found the following maximum chaetal lengths in sexually mature individuals: hairlike up to 1050 μm , needlelike up to 120 μm , ventral in Segments II 213-222 μm , and 213 μm in Segment VI.

Stomach begins in Segment VII or VIII.

England, France, Switzerland, Denmark, Italy, Federal Republic of Germany, Sweden, Finland, Poland, Bulgaria, USSR, Japan, USA.

Czechoslovakia: this species is very abundant in the waters of Czechoslovakia, particularly on water plants.

Ripistes DUJARDIN, 1842

1842 Ripistes DUJARDIN, Proc. Verb. Soc. philom. Paris, 1842:93.

Frontal lobe is extended into a short flagellum. With eyes. Dorsal chaetae begin in Segment VI. Segments VI to VIII have unusually long hairlike chaetae in addition to several shorter ones.

39. Ripistes parasita (SCHMIDT, 1847)

[53]

Table 8, Fig. 16

1847 Stylaria parasita, SCHMIDT, Froniep's Notizen der Heilkunde, (ser. 3),3:321.

1884 Stylaria parasita, VEJDOVSKÝ, Syst. Morph. Olig.:31, Table 2, Figs. 8-12.

1948 Ripistes parasita, SPERBER, Zool. Bidr. Uppsala, 28:143-147,

Figs. 15 H-K, 16, 26 C.

Dorsal tufts in Segments VI to VIII contain 2-16 very long (up to 1700 μm) and 2-6 short hairlike chaetae in addition to 10-18 thin hairlike chaetae up to 96 μm long. In subsequent segments there are 1-3 hairlike and 1-3 needlelike chaetae per tuft; hairlike chaetae are 180 μm and

needlelike chaetae are 80 μm long. In Segments II to III there are 2-7 chaetae in the ventral tufts, in Segments IV to V ventral chaetae are missing, and in subsequent segments there are 3-8 chaetae per tuft. Ventral chaetae in Segments II and III are thinner than in other segments, and the upper serration is longer than the lower one. In Segment VI and in subsequent segments the upper serration is shorter than the lower one. In Segment II the ventral chaetae are 93-99 μm long, in Segment III they are 67-78 μm long, and beginning in Segment VI, they are 66 to 72 μm long.

A single individual consists of 14 to 21 segments, and chains of zooids with 23 to 30 segments are up to 7.5 mm long.

England, France, Sweden, Poland, USSR.

Bohemia: Vltava in Prague, Opatovický Pond near Třeboň, pond near Stráž in Southern Bohemia (VEJDOVSKÝ, 1884), Dolno-Počernický Pond, Kačležský Pond (FRIČ-VÁVRA, 1895), Doksy (SCHUSTER, 1915), Vltava downstream from Prague (CORI, 1923), Vltava-Čertovka (KUNST, 1953 leg.), Blatná (KUNST, 1947 leg.).

Moravia: pond near Žďár na Moravě (JANČAŘÍK, 1940 leg.).

Ripistes parasita builds a mucous pouch for itself from which it extends the anterior segments with very long hairlike chaetae which it uses to agitate the water and thus attracts food which adheres to the long chaetae. The food is then wiped off the long chaetae with the ventral chaetae of Segments II and III and swallowed (Cori 1923). It also uses the giant chaetae to float in the water. FRIČ and VÁVRA (1895:95) repeatedly observed this species in plankton samples; this was later verified by SCHUSTER (1915).

Haemonais BRETSCHER, 1900

1900 Haemonais BRETSCHER, Rev. suisse Zool., 8:16-18.

Without eyes. After the new individual separates from the parent individual, the dorsal tufts beginning in Segment II contain 1 short hairlike and 1 serrated chaeta; later the dorsal chaetae in the anterior 18 to 20 segments fall out. The ventral chaetae in approximately the 15 anterior segments differ completely by their thickness and length of serrations from the chaetae in subsequent segments in fully mature individuals. Coelemocytes float in the body cavity. Male funnels lack prostatic cells.

40. Haemonais waldvogeli BRETSCHER, 1900

Table 8, Figs. 17-19

1900 Haemonais waldvogeli BRETSCHER, Rev. suisse Zool., 8:16-18.

1948 Haemonais waldvogeli, SPERBER, Zool. Bidr. Uppsala, 28:154-155,
Figs. 16 C, 27 B.

1962 Haemonais waldvogeli, ČEKANOVSKAJA, Opr. faun. SSSR, 78:194,
Fig. 110 B (XL-segm.).

The body is red-brown, flexible, and is able to contract considerably.
With eyes.

In fully developed individuals the dorsal chaetae begin in
Segments XVIII to XX. Tufts contain 1 short hairlike and 1 serrated chaeta

with 2 long serrations of which the upper is longer than the lower; the serrations subtend an acute angle. Ventral tufts in Segments II to XV contain 2-4 thin ($2\ \mu\text{m}$) serrated chaetae with an upper serration somewhat longer than the lower. Starting in approximately Segment XV to XX, the ventral chaetae are thicker ($3\text{-}4.5\ \mu\text{m}$) than in the preceding segments, and they have an upper serration which is shorter than the lower.

The alimentary tract is covered by red-brown chloragogenic cells beginning in Segment V.

Switzerland, Poland, Roumania, USSR, India, Africa, USA.

Bohemia: Central Labe Region (LIŠKOVÁ, 1976).

Piguetiella SPERBER, 1939

1939 Piguetiella SPERBER, Ark. Zool., 31 B, No. 7:1-3,5.

Frontal lobe is rounded. With eyes. Hairlike and serrated dorsal chaetae in tufts beginning in Segment VI, but hairlike chaetae may be absent entirely. Ventral chaetae are always of the same shape. Coelemocytes float in the body cavity. In Segments I to V the blood vessels do not form a network, they do not anastomose. Sperm ducts lead to the atrium at its top (SPERBER, 1948:251, Fig. 27 E). Atrial ampullae are covered by prostatic cells. Spermathecal modified chaetae resemble the end of a spoon and they are located in sacs surrounded by glandular cells.

41. Piguetiella blanci (PIGUET, 1906)

Table 8, Figs. 22-23

1906 Nais blanci PIGUET, Rev. suisse Zool., 14:231-234.1939 Piguetiella blanci, SPERBER, Ark. zool., 31 B. No. 7:1-3,5.1941 Piguetiella blanci, HRABĚ, Práce mor. přír. spol., 13, No. 12:4, Figs. 8-12.1948 Piguetiella blanci, SPERBER, Zool. Bidr. Uppsala, 28:151-153,

Figs. 17 A-D, 27 E.

Dorsal tufts contain at most 3 short hairlike chaetae, which in some individuals may be partly or completely missing, and 2-6 serrated chaetae. Ventral tufts contain 3-9 chaetae with an upper serration equally long, or slightly longer, than the lower serration. Hairlike chaetae are short, only 84-120 μm long, and dorsal chaetae are serrated, 72-87 μm long. Ventral chaetae in Segment II are 84-96 μm long, and in subsequent segments they are 75-93 μm long.

A single individual consists of 24 to 42 segments, and chains of zooids are up to 7 mm long. They do not swim.

England (?), Switzerland, Sweden, Poland, USSR.

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Hairlike chaetae are frequently missing in many or all dorsal tufts in Piguetiella blanci. Such individuals then resemble the species Uncinais uncinata because some important diagnostic characteristics are similar, but the latter species may be easily recognized by its enlarged frontal lobe.

1939 Specaria SPERBER, Ark. Zool., 31, No. 7:3-5.

Without eyes. Frontal lobe is rounded.

Hairlike and serrated chaetae are present in dorsal tufts starting in Segment VI. Ventral chaetae always have the same shape. Segments I to V have a complex network of anastomosed blood vessels. Coelemocytes float in the body cavity. Spermathecae have lateral openings in Segment V. Sperm ducts lead to atrial ampullae directly above the atrial outlet. Prostatic cells are present only on the sperm ducts.

41. Specaria josinae (VEJDOVSKÝ, 1883)

Table 8, Figs. 20-21

1883 Nais josinae VEJDOVSKÝ, S.B.k. böhm. Ges. Wiss., 1883:215.

1884 Nais josinae, VEJDOVSKÝ, Syst. Morph. Olig., 29, Table 2, Figs. 25-28, Table 3, Figs. 1,2,4.

1939 Specaria josinae, SPERBER, Ark. Zool., 31., No. 7:3-5, Fig. 2.

1941 Specaria josinae, HRABĚ, Práce mor. přír. spol., 13, No. 12:4, Figs. 13-15.

1949 Specaria josinae, SPERBER, Zool. Bidr. Uppsala, 28:95-98, Figs. 9 A,B, 26 D.

Dorsal tufts contain 2-6 hairlike and serrated chaetae with equally long serrations. Ventral tufts contain 5-10 serrated chaetae of nearly the same shape with an upper serration considerably longer than the lower serration. Hairlike chaetae are 135-180 μ m long, serrated dorsal

chaetae are 72-85 μm long, and serrated ventral chaetae are 69-88 μm long.

The anterior 5 segments have a very dense and irregular network of blood vessels. Ampullae of the spermathecae are very small and spherical. Do not swim.

A single individual consists of 11 to 27 segments, and chains of zooids consist of 14 to 63 segments and they are up to 10 mm long.

England, France, Switzerland, Finland, Poland, USSR, USA.

Bohemia: Čertovo Lake in Šumava (VEJDOVSKÝ, 1884), Doksy (SCHUSTER, 1915), Vltava downstream from Prague (WOLF, 1928), Pustý Pond near Hamr in Northern Bohemia, and in Ploučnice (ROSOL leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Bratislavia KOŠEL, 1976

1976 Bratislavia KOŠEL, *Biologia*, 31:31:105.

Without eyes. Frontal lobe is rounded. Dorsal chaetae begin in Segment III. Coelemocytes float in the body cavity. Spermathecae are in Segment V and atria are in Segment VI. Atrial ampullae are covered by prostatic cells. Modified penial chaetae have a special shape. Paratomical reproduction was not observed. Do not swim.

43. Bratislavia elegans FINOGENOVA, 1966

[56]

1966 Pristina elegans FINOGENOVA, *Gidrob. izuc. ozer kraj. severa SSSR*, 63-70.

1973 Pristina napocensis, POP, *Stud. univ. Babes-Bolyai, (Biol.)*, 1:79-89.

1976 Bratislavia elegans, KOŠEL, *Biologia*, 13:105-108.

Dorsal tufts beginning in Segment III contain 1-2 hairlike and 1-3 forked chaetae. Hairlike chaetae are smooth and 160-320 μm long. Forked chaetae are 68-78 μm long and they have 2 very long parallel serrations of which the upper is somewhat longer than the lower. Ventral tufts in the anterior segments contain 4-6 serrated chaetae with serrations of equal length, and behind the clitellum there are (4) 5-6 (7) of these chaetae. Posterior segments have 2-4 chaetae per tuft.

The esophagus gradually expands into a stomach. Chloragogenic cells cover the alimentary tract from Segment VI.

Roumania, USSR.

Slovakia: Jurský šur near Bratislava (KOŠEL, 1972).

Dero OKEN, 1815

1815 Dero OKEN, *Lehrb. Naturgesch.*, 3 (1):363.

Without eyes. Dorsal chaetae start in Segment VI (in Dero dorsalis in Segment IV), and the tufts generally have 1 hairlike and 1 forked chaeta with 2 short serrations (in some species found outside of Europe, the forked

chaetae have several intermediate serrations). Ventral chaetae in Segments II to V are longer and thinner than in subsequent segments; they have an upper serration which is longer than the erect lower serration, and the serrations subtend a very acute angle. In subsequent segments the difference in the length of the serrations decreases, but the subtended angle increases. The stomach extends from Segment IX to Segment XI. Coelemocytes are missing. The posterior of the body ends with a sucker which is wider than the posterior segments; the sucker has at least 2 pairs of cylindrical or leaflike gills. The sucker and gills can contract considerably, and when excited (therefore even during fixation) they contract, which frequently makes the classification of preserved material difficult. Prostatic cells are not present in European species.

44. Dero dorsalis FERRONIERE, 1899

1899 Dero dorsalis FERRONIERE, Bull. Soc. Sci. nat. Ouest. Nantes. 9:255-257.

1915 Dero tubicola SCHUSTER, Int. Rev. Hydrob., 7 Biol. Suppl. 2:18-24, 67.

1948 Dero dorsalis, SPERBER, Zool. Bidr. Uppsala, 28:162-165.

Dorsal chaetae begin in Segment IV. Hairlike chaetae are up to 308 μm long, and forked chaetae are up to 108 μm long. Segments II to V have (3) 4-5 (7) ventral chaetae, and in subsequent segments their number decreases. These chaetae are up to 135 μm long in Segment II, 125 μm long in Segment VI, and 100-115 μm long in subsequent segments.

The posterior edge of the gill sucker is slightly concave and has 5 pairs of gills of which the anterior pair is much smaller than the others.

A single individual consists of 18 to 53 segments, and chains of zooids consist of 23 to 150 segments and are up to 30 mm long.

France, Federal Republic of Germany, Austria, USSR, India.

Bohemia: Doksy (SCHUSTER, 1915), Vltava (WOLF, 1928), Central Labe Region, and Slapská Reservoir (LIŠKOVÁ, 1976).

45. Dero digitata (O. F. MÜLLER, 1773)

Table 9, Figs. 1-7

1773 Nais digitata, MÜLLER, Verm. terr. fluv., 1 (2):22-23.

1852 Dero limosa, LEIDY, Proc. Ac. mat. sci. Philad., 5:226-227.

1885 Dero digitata, ŠTOLC, S. B. k. böhm. Ges. Wiss., (mat.-naturw. Kl.),
1885:310-340, Tables 1, 2, Figs. 1-23.

1909 Dero incisa, MICHAELSEN, Brauer's Susswasserf., 13:24, Fig. 37.

1948 Dero digitata, SPERBER, Zool. Bidr. Uppsala, 28:165-178, Figs. 19 A-E, 27 A.

Dorsal chaetae start in Segment VI. Hairlike chaetae are up to 380 μm long, and forked chaetae are up to 120 μm long and they have an upper serration which is 1-2 times longer than the lower one. Segments II to V have 3-6 ventral chaetae, and Segment VI and subsequent segments have 2-5 chaetae. These chaetae have an upper serration 1.5-2 times longer than the lower one in Segments II to V, and in subsequent segments it is only slightly longer. Ventral chaetae in Segment II are 157-165 μm long, and in Segment VI and in subsequent segments they are 110-123 μm long.

Stomach is in Segments IX to X or in Segments X to XI.

The sucker on the body posterior has 4 pairs of gills. On live individuals with an open gill apparatus, the first pair of small cylindrical gills lies perpendicularly to the sucker, Pair II somewhat resembles the human ear lobe and forms the edge of the open sucker, and Pairs III and IV are platelike with a wide base tapering toward the apex. Pair III is inclined at a 45° angle and Pair IV is perpendicular to the sucker.

I observed live individuals of Dero digitata for several weeks under a binocular microscope. The individuals matured sexually in the culture in June 1977, and while buried in the detritus, they extended a part of their body from the detritus and opened their gill apparatus; I never observed the gill apparatus to be as open as was illustrated by ŠTOLC (1885, Table 1, Fig. 3). On fixated individuals, one pair of gills is generally hidden under the retracted sucker edge and the other 3 pairs resemble 3 pairs of parallel plates. When the edge of the sucker (particularly the posterior edge) is illuminated by an electric light, it becomes iridescent in live individuals.

A single individual consists of 12 to 34 segments, and chains of zooids with 20 to 105 segments are up to 36 mm long. They swim.

England, France, Switzerland, Italy, Denmark, Sweden, Finland, Poland, Roumania, Bulgaria, USSR, Africa, USA.

Bohemia: Prague (ŠTOLC, 1885), Doksy (SCHUSTER, 1915), Vltava downstream from Prague (WOLF, 1926), Vltava upstream from Krumlov, Labe near Roudnice and downstream from Lovosice, Ohře near Radonice and Levousy (HRABĚ, 1939), Brandýs nad Orlicí (KUNST, 1953 leg.).

Moravia: Hamerský Stream near Dobrá Voda u Mrakotína (1972),
Vrbinec Pond (HRABĚ, 1977 leg.).

46. Dero obtusa D'UDEKEM, 1855

Table 9, Fig. 8

1855 Dero obtusa d'UDEKEM, Bull. Ac. Belg., (Cl. Sci.), 22:549-550, Fig. 1.

1948 Dero obtusa, SPERBER, Zool. Bidr. Uppsala, 28:180-184, Fig. 19 F, 20 A.

Dorsal chaetae start in Segment VI. Hairlike chaetae are up to 182 μm long and forked chaetae are 45-75 μm long. Segments II to V have 2-5 ventral chaetae and subsequent segments have 3-6 chaetae. In the 4 anterior segments the ventral chaetae are 95-120 μm long, and in subsequent segments their length decreases from 82 to 57 μm .

The gill sucker has 3 pairs of gills: 2 pairs of cylindrical gills and the anterior platelike gills formed by the anterior edge of the sucker.

A single individual consists of 18 to 29 segments and chains of zooids with 21 to 35 segments are up to 17 mm long. They swim.

England, France, Federal Republic of Germany, Sweden, Finland, Poland, Roumania, Bulgaria, USSR, Palestine, China, North and South America.

Bohemia: Běchovický Pond near Prague (VEJDOVSKÝ, 1884; ŠTOLC, 1885), Doksy (SCHUSTER, 1915), Vltava downstream from Prague (WOLF, 1928), pond in Blatná (LIŠKOVÁ, 1976).

Moravia: pool near Strachotín (HRABĚ, 1958 leg.), outflow from Pouzdřanský Pond (HRABĚ, 1978 leg.).

Aulophorus SCHMARDA, 1861

1861 Aulophorus SCHMARDA, Neue wirbellose Tiere, 1 (2):9.

Without eyes. Dorsal chaetae from Segments IV, V, or VI have 1-3 hairlike and forked or platelike chaetae. Gill sucker with 2-4 pairs of gills has 1 pair of long cylindrical projections on the posterior edge. Prostatic cells cover the atrial ampullae.

47. Aulophorus furcatus (O. F. MÜLLER, 1773)

Table 9, Figs. 9-13

1773 Nais furcata MÜLLER, Verm. terr. fluv., 2:23.

1948 Dero (Aulophorus) furcatus, SPERBER, Zool. Bidr. Uppsala, 28:191-194, Figs. 20 B-D.

Dorsal tufts starting in Segment V contain 1 hairlike and 1 forked chaeta with a somewhat longer lower serration than the upper one. Hairlike chaetae are 85-200 μm long, and forked chaetae are 45-62 μm long. Segments II to V have 2-5 ventral chaetae per tuft with an upper serration longer than the lower, from Segment VI both serrations are initially of equal length, and in the posterior segments the upper serration is shorter than the lower; in Segment II the chaetae are 54-73 μm long, and in Segment VI they are 53-68 μm long.

The gill sucker has 3 pairs of gills and 2 tail projections of different lengths and without cilia.

[59]

A single individual consists of 11 to 25 segments, and chains of zooids with 35 to 82 segments are up to 20 mm long.

England, France, Switzerland, Sweden, Poland, Roumania, Bulgaria, USSR, India, Africa, USA.



Fisheries
and Oceans

Pêches
et Océans

TRANSLATION
SERIES NO.(S) 4856

2 of 3

Bohemia: Vltava downstream from Prague (WOLF, 1926), Central Labe Region (LIŠKOVÁ, 1976).

Moravia: water purification plant in Uherské Hradiště (OBRDLÍK, 1977 leg.).

Pristininae LASTOČKIN, 1921

1921 Pristininae LASTOČKIN, Izv. Ivan-Vozn. politech. Inst., 3:201-213.

Without eyes. Hairlike and needlelike dorsal chaetae starting in Segment II. Epithelium in the stomach has intracellular ducts. Coelemocytes float in the body cavity. Testes and spermathecae are in Segment VII, and ovaries and atria are in Segment VIII. There are 7 head segments. Only one genus: Pristina.

Pristina EHRENBURG, 1828

1828 Pristina EHRENBURG, Symbol. phys. animal. evert.:112.

1847 Naidium O. SCHMIDT, Notizen Forriep 3(3):321.

Frontal lobe in some species is extended to form a flagellum. Dorsal tufts contain hairlike, needlelike, or forked chaetae frequently with long serrations. Some species have prostatic cells on sperm ducts. They do not swim.

48. Pristina longiseta EHRENBURG, 1828

1828 Pristina longiseta EHRENBURG, Symbol. phys. animal. evert.:112 under the line.

1884 Pristina longiseta, VEJDOVSKÝ, Syst. Morph. Olig.:31, Table 2, Figs. 13-15.

1948 Pristina longiseta, SPERBER, Zool. Bidr. Uppsala, 28:236-237.

Frontal lobe with long flagellum.

Dorsal tufts have 1-4 hairlike and 2-5 needlelike chaetae. Hairlike chaetae in Segment III are smooth, unusually long (600-800 μm); in other segments they are only 120-285 μm long. Needlelike chaetae are 47-60 μm long. Ventral tufts have 3-9 chaetae, in Segment II they are 57-75 μm long, in Segment III they are 59-70 μm long, and in subsequent segments they are 50-61 μm long. In Segments II to III the upper serration is twice as long as the lower serration, and in other segments it is only 1/3 to 1/2 longer than the lower serration.

A single individual consists of 13 to 18 segments, and chains of zooids with 20 to 23 segments are up to 5.5 mm long.

England, France, Switzerland, Sweden, Finland, Poland, Roumania, Bulgaria, USSR, India, Japan, USA, Brazil.

Bohemia: Vltava in Prague, ponds in Třeboň (VEJDOVSKÝ, 1884), Central Labe Region and Blatná (LIŠKOVÁ, 1976), pool near Mašše in České Budějovice (HRABĚ, 1939).

Moravia: pool under Kolby near Pouzdřany (1976), pond in Brno-Holásky (HRABĚ, 1976 leg.), Kníničská Water Reservoir (HRABĚ, 1977 leg.).

49. Pristina aequiseta BOURNE, 1891

Table 9, Figs. 14-16

1891 Pristina aequiseta BOURNE, Q. J. mier. Sci. (N.S.), 32:352-353.

1948 Pristina aequiseta, SPERBER, Zool. Bidr. Uppsala, 28:230-232, Fig. 24.

Frontal lobe with flagellum.

Dorsal tufts have 1-2 hairlike and forked chaetae. Finely serrate hairlike chaetae are 120-270 μm long, and forked chaetae with 2 short serrations are 30-69 μm long. Ventral tufts have 5-8 serrated chaetae. In Segment II they are 54-66 μm long and have an upper serration twice as long as the lower one. In Segments IV to V or in one of them the ventral chaetae are thicker than in subsequent segments, and they have an upper serration more than twice as long as the lower one, which may sometimes be missing. These chaetae are 49-70 μm long. Past Segment VII the ventral chaetae are 45-56 μm long with serrations of equal length, or possibly with the upper serration shorter than the lower one.

A single individual consists of 12 to 23 segments, and chains of zooids with 16 to 23 segments are up to 8 mm long.

England, France, Switzerland, Federal Republic of Germany, Sweden, Poland, Roumania, Bulgaria, USSR, Japan, Africa.

Bohemia: Doksy (SCHUSTER, 1915).

Moravia: pond in Brno-Holásky (HRABĚ, 1977 leg.).

50. Pristina foreli (PIGUET, 1906)

Table 9, Figs. 17-19

1906 Naidium foreli PIGUET, Rev. suisse Zool., 14:222-223, Table 9, Figs. 21, 25, 27, 28.

1948 Pristina foreli, SPERBER, Zool. Bidr. Uppsala, 28:229-230.

Frontal lobe with flagellum.

Dorsal tufts have 1-4 serrate hairlike chaetae and forked chaetae. Hairlike chaetae are 118-430 μm long, and forked chaetae are 23-53 μm long. Forked chaetae have very short serrations which are visible only at a magnification of at least 1000 x. Ventral tufts have 2-8 chaetae; in Segments II to VII the upper serration is longer than the lower, in subsequent segments the serrations are of equal length, and in the posterior segments the upper serration is shorter than the lower.

A single individual consists of 13 to 19 segments and chains of zooids with 20 to 26 segments are up to 6.5 mm long.

England, France, Switzerland, Sweden, Poland, USSR, India, Africa.

Bohemia: Doksy (SCHUSTER, 1915), Ploučnice (ROSOL, 1971 leg.), Labe near Roudnice (HRABĚ, 1939), Česká Třebová (KUNST, 1953 leg.).

Moravia: Říčka near Brno-Líšeň (HRABĚ, 1937 leg.).

51. Pristina rosea (PIGUET, 1906)

Table 9, Fig. 20

1906 Naidium roseum PIGUET, Rev. suisse Zool., 14:223-225, Table 9, Figs. 22-23.

1949 Pristina rosea, SPERBER, Zool. Bidr. Uppsala, 28:209-213.

Frontal lobe is rounded without flagellum.

Dorsal tufts have 1-2 finely serrate and forked chaetae with an upper serration shorter than the lower. Ventral chaetae have an upper serration which is always longer than the lower, and the difference in the length of the serrations gradually decreases; there are 2-5 chaetae per tuft. Serrate hairlike chaetae are 118-270 μm long, forked chaetae are 39-69 μm long, and ventral chaetae are 35-60 μm long.

Switzerland, Sweden, Federal Republic of Germany, Poland, Bulgaria, USSR, Japan, Brazil.

Bohemia: Doksy (SCHUSTER, 1915).

Moravia: Křeptovský Stream in Tišnovsko Region (HRABĚ, 1937 leg.).

52. Pristina bilobata (BRETSCHER, 1903)

1903 Naidium bilobatum BRETSCHER, Rev. suisse Zool., 11:11-12, Table 1, Fig. 1.

1906 Naidium bilobatum, PIGUET, Rev. suisse Zool., 14:217, Table 9, Figs. 24, 29.

1948 Pristina bilobata, SPERBER, Zool. Bidr. Uppsala, 28:216-217.

Frontal lobe without flagellum.

Dorsal tufts have 1-2 hairlike and forked chaetae. Finely serrate hairlike chaetae are up to 300 μm long, forked chaetae with 2 equally long serrations are 25-50 μm long.

A single individual consists of 18 to 20 segments and chains of zooids with 34 segments are 4 mm long.

France, Sweden, Poland, Bulgaria, USSR.

Czechoslovakia: species not yet found in Czechoslovakia.

Tubificidae VEJDOVSKÝ, 1884

1884 Tubificidae VEJDOVSKÝ, Syst. Morph. Olig.:42-46.

Without eyes. Various numbers of chaetae are contained in 2 dorsal and 2 ventral tufts always in Segment II and in subsequent segments. Ventral tufts generally contain serrated chaetae whereas dorsal tufts in front of the clitellum contain hairlike and fanlike chaetae. In some genera or species the hairlike chaetae are missing and the fanlike chaetae are replaced by serrated chaetae. In sexually mature individuals, Segment X has modified spermathecal chaetae in place of the ventral chaetae, and Segment XI has penial chaetae.

One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. One pair of spermathecae has openings in Segment X. Spermathecae are filled with clumps of sperm or with spermatozeugmata; only the genus Bothrioneurum is without spermathecae and the sperm, contained in special spermatophores, is attached to other individuals near the unpaired male opening. One pair of male funnels is in Segment X on Dissepiment 9/10. One pair of male openings and atria is in Segment XI. One pair of female funnels generally of insignificant dimensions is in Segment XI on Dissepiment 11/12. The anterior unpaired sac, resulting from the bulging of Dissepiment 9/10, is in Segment IX, and the posterior sac extends from Dissepiment 10/11 to Segment XI and to several subsequent segments. Egg sac, the bulge of Dissepiment 11/12, extends several segments farther than the sperm sac extending into it. The length of the sacs depends on the number of sexual products.

The sexual apparatus of species reproducing mainly asexually (by architomy) is shifted by several segments toward the anterior end. A similar shifting of sexual organs points to the regeneration of the anterior segments and of the sexual apparatus after injury or after architomical reproduction. Paratomy does not occur in Tubificidae; it is common in the families Aeolosomatidae and Naididae.

In Czechoslovakia, the genera of the following subfamilies of Tubificidae are found: Rhyacodrilinae, Bothrioneurinae, Aulodrilinae, Tubificinae, and Branchiurinae.

Rhyacodrilinae HRABĚ, 1963

1963 Rhyacodrilinae HRABĚ, Bol. Soc. Portug. Ciene. Nat., 10 (2 ser.):54.

Numerous spherical coelemocytes, similar to the coelemocytes of Naidids, float in the body cavity. Dorsal pores are in Segments IV and V. Atria are covered by a diffuse prostate, and penises and penial sheaths are missing; only the genus Moraviodrillus does not have a prostate. Spermathecae have openings in Segment X near the anterior Dissepiment 9/10. Nephridia with postseptale. During ovogenesis, morulae of ovocytes are formed as in Naidids. Sperm are in spermathecae in clumps and spermatozeugmata do not form.

Rhyacodrilus BRETSCHER, 1901

1901 Rhyacodrilus BRETSCHER, Rev. suisse Zool., 9:204.

Atria are spherical to pear-shaped (in Rh. altaianus Mich. it is long and tubelike), covered by a diffuse prostate (in Rh. simplex BENH. the prostate is missing). Modified penial chaetae, 2-5 per tuft, are in Segment XI.

53. Rhyacodrilus coccineus (VEJDOVSKÝ, 1875)

Table 10, Figs. 1-10

1875 Tubifex coccineus VEJDOVSKÝ, S. B. k. böhm. Ges. Wiss. (mat.-naturw. Kl.), 1875:193.

1884 Tubifex rivulorum var. coccineus, VEJDOVSKÝ, Syst. Morph. Olig.:46.

1888 Ilyodrilus coccineus, ŠTOLC, Rozpr. k. čes. spol. nauk (line 7), Vol. 2:28, 38, Table 1, Figs. 1-2, Table 2, Figs. 1-4, 7-9, Table 3, Figs. 1-3, Table 4, Figs. 4-5, 12-13 c,d.

1909 Taupodrilus coccineus, MICHAELSEN, Brauer's Susswasserf., 13:32.

1919 Rhyacodrilus coccineus, PIGUET, Naturwiss. Unters. Sarekgebirges, 4:786.

The body consists of 65-80 (100) segments. The length of fixated individuals is 15-25 mm, and the body diameter is 0.5-0.8 mm.

Dorsal tufts in front of the clitellum have 4-8 hairlike and 3-7 fanlike chaetae, and behind the clitellum their number gradually decreases; in Segment XXX there are frequently only 2 hairlike and 2-3 serrated chaetae. Ventral tufts in front of the clitellum have 5-8 (10) serrated chaetae, and Segment XI has 3-5 modified penial chaetae. Behind the clitellum the number of ventral chaetae also decreases. The fanlike chaetae in front of the clitellum have 2 equally long and wide serrations and numerous

intermediate serrations; behind the clitellum the serrations are still equally long, but the lower is approximately twice as wide as the upper serration. These chaetae are 80-135 μm long in front of the clitellum. The ventral chaetae in the anterior segments have an upper serration which is twice as long and only somewhat narrower than the lower serration; after the clitellum the difference in the length of the serrations also decreases; and in the posterior segments the upper serration is noticeably shorter and narrower at the base than the lower serration. Penial chaetae in Segment XI are 120-150 μm long; at the beginning of sexual maturity of the individual, the chaetae are serrated with a minute upper serration which disappears in the next generation of chaetae and the lower serration becomes slightly bent.

One pair of spermathecal openings is in Segment X in line with the ventral chaetae at the Intersegmental Notch 9/10. One pair of male sexual openings is closer to the lateral line than to the line of ventral chaetae and is slightly in front of the Intersegmental Notch 11/12 in Segment XI.

Dissepiment 3/4 and subsequent dissepiments are generally thin.

Segments IV and V have one dorsal pore in the median line in the intersegmental notch between the anterior narrow and posterior wide ring into which the segments are divided. The skin around the pore folds into the body cavity. After fixation, the skin ruptures at similar locations even in other segments, and at the same time coelemocytes pass from the body cavity through the openings.

Coelemocytes are very abundant particularly in the anterior segments; they are spherical, and fully developed ones are up to 20 μm in diameter. In the center they have a large nucleus and they have numerous granules

in the protoplasm. They are formed, as I observed, under the dorsal blood vessel beginning in Segments V to VI by mitotic division of special cells with a darkly coloured protoplasm. Cross sections show the formation and progressive transformation of the coelemocytes, differing from spermatophags, which take part in the resorption of sex cells and organs as was studied by ČERNOSVITOV (1930) in Tubifex tubifex. Coelemocytes do not originate in the dorsal blood vessel (de BOCK, 1900), or in the peritoneum as was assumed by STOLTE (1933-1969:384-399 and 1327-1330).

One pair of nephridial funnels is located on the anterior side of Dissepiment 6/7; behind it in Segment VII there is a large postseptalium from which there is a duct of complicated structure. Similar nephridia are also located in other segments except for segments with gonads.

One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is on Dissepiment 10/11 in Segment XI. Groups of ovocytes of equal dimensions separate from the ovaries in the form of blastulae, which float in the cavity of Segment XI or they are in the egg sac. According to VEJDOVSKÝ (1884:145-146) and ŠTOLC (1888:27-28), only one cell in the morula develops into an egg and the contents of other cells are resorbed by the growing egg.

Spermathecae with a large spherical ampulla and not connected to the esophagus are covered by flat epithelium, but around the openings into the outlet duct the flat epithelium progressively changes to tall cylindrical epithelium. The outlet duct is initially covered by cylindrical epithelium which gradually becomes flat and changes to cubic epithelium. Fine muscular tissues are present on the surface of the spermathecae. Spermathecal ampullae in mature individuals are filled with clumps of sperm. I did not observe their resorption in the epithelial covering of the ampullae.

One pair of large male funnels is on Dissepiment 10/11 and has openings leading into the cavity of Segment X. Each sperm duct is ciliated on the inside, has a considerable diameter (35 μm), forms several loops in Segment XI, and leads to the atrial ampulla near its apical end. The atrial ampulla is generally egg-shaped in completely mature individuals and is covered by prostatic cells. Penis is missing.

England, France, Italy, Federal Republic of Germany, Denmark, Finland, Poland, USSR, USA.

Bohemia: around Mšeno (VEJDOVSKÝ, 1895), Čelákovice (HRABĚ always in spring 1923-1927 leg.), Labe near Liběchov, Roudnice, downstream from Lovosice, Chrudimka near Pardubice, Ohře near Levousy and Břežany (HRABĚ, 1939), Vltava in Prague, Labe near Roudnice (ŠTOLC, 1886, 1888).

Moravia: spring pool under Kolby near Pouzdřany (HRABĚ, 1927-1976 leg.), Mušov (HRABĚ, 1936 leg.), Morava River near Kroměříž (HRABĚ, 1934 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941), tributary of the Roudava near Levary (HRABĚ, 1961 leg.).

54. Rhyacodrilus falciformis BRETSCHER, 1901

Table 10, Figs. 11 and 12

1901 Rhyacodrilus falciformis BRETSCHER, Rev. suisse Zool., 9:205,

Table 14, Figs. 4 and 5.

1935 Rhyacodrilus[†] falciformis, HRABĚ, Spisy přír. fak. univ., Brno,

209:8-11, Figs. 10-14.

The body is long, up to 10 mm, in Segment XX it is 0.2 mm in diameter, and consists of 38 to 45 segments. Frontal lobe is rounded.

Dorsal tufts in front of the clitellum have 2-4 serrated chaetae, and subsequent segments have 2 similar chaetae. Hairlike and fanlike chaetae are missing. Ventral tufts contain (2) 3-4 (6) serrated chaetae in front of the clitellum, and 2 after the clitellum. In sexually mature individuals, Segment XI has 1 penial chaeta on each side, 128-140 μm long, bent like a sickle in the ectal half, in place of the ventral chaetae. Serrated chaetae nearly always have the upper serration twice as long as the lower one.

One pair of spermathecae has openings in Segment X directly under the lateral line between the first and second third of the segment. One pair of male sexual openings is in Segment XI laterally from the penial chaetae.

Numerous coelemocytes 16-20 μm in diameter float in the body cavity. Dorsal pores are located in the median line in the intersegmental notch in Segments IV and V.

One pair of testes is in Segment X and one pair of ovaries is in Segment XI. Spermathecae have a spherical ampulla and short outlet, and they are not connected to the esophagus by a duct. The male sexual opening starts by a bell-shaped funnel on Dissepiment 10/11; behind it is a narrow sperm duct, approximately 15 μm in diameter, which in Segment XI leads directly to the lower part of the atrial ampulla, penetrates between the muscular and epithelial layers, and empties into the atrial cavity near the apical end of the ampulla. One pair of small female funnels on Dissepiment 11/12 has openings above the line of ventral chaetae.

France, Switzerland, Yugoslavia, Federal Republic of Germany, Poland.

Bohemia: spring between Milešovka and Kostomlaty (HRABĚ, 1939)

Moravia: pool between Vranovice and Pouzdřany (HRABĚ, 1934-1937 leg.),

Moravský Kras: Říčka downstream from Liščí díra, and also in the outflow [65]
from Cave No. 1443 (HRABĚ, 1937 leg.).

Slovakia: stream near Hrboltová in the Lower Tatra Mountains
(ČERNOSVITOV, 1930 b).

Moraviodrillus HRABĚ, 1935

1935 b Moraviodrillus HRABĚ, Spisy přír. fak. univ. Brno, 209:4-9.

Atria are long and wide, cylindrical, and without external prostatic cells. Egg-shaped glandular ampulla behind the sperm duct is missing. Penial chaetae are missing.

55. Moraviodrillus pygmaeus HRABĚ, 1935

Table 10, Fig. 13

1935 b Moraviodrillus pygmaeus, HRABĚ, Spisy přír. fak. univ., Brno,
209:4-9, Figs. 1-9.

The body is up to 20 mm long, in the clitellum region it is 0.3-0.4 mm in diameter, and consists of 55 to 62 segments. Frontal lobe is rounded.

Dorsal tufts in front of the clitellum have 2-3 hairlike and 3-4 fanlike chaetae; in the central segments there are 1-2 hairlike and 2-3 serrated chaetae, the ventral tufts of head segments and central segments have (3) 4-5 serrated chaetae per tuft and posterior segments have 1 chaeta less. Smooth hairlike chaetae as long as or shorter than the diameter of the segment are found in dorsal tufts of the anterior 25 to 30 segments. Fanlike chaetae in the anterior half of the body have 2 equally long serrations and fine intermediate serrations. In the posterior half of the body the upper serration of dorsal and ventral chaetae is shorter than the lower; only in the anterior segments is the upper serration of ventral chaetae frequently longer than the lower one. Sexual chaetae are missing.

One pair of spermathecae has openings in Segment X immediately behind the Intersegmental Notch 9/10 in the line of ventral chaetae. One pair of male sexual openings is in Segment XI in place of the ventral chaetae which have fallen out.

Numerous coelemocytes up to 15 μ m in diameter float in the body cavity.

Dorsal pores in Segments IV and V are present as in the species of the genus Rhyacodrilus.

One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11.

Spermathecae with a small spherical ampulla and short outlet are present. The funnel of each male sexual opening is on Dissepiment 10/11, and a short sperm duct empties into the apical section of the long and wide atrium, covered by glandular epithelium. The male opening ends by a short ectal section, which extends like a pseudopenis during copulation;

this is indicated by numerous muscular tissues which are attached at the opposite end to the body wall. Prostatic cells on the surface of the ampulla are missing. The anterior sperm sac is formed by the bulging of Dissepiment 9/10 into Segment IX, and the posterior sac extends from Dissepiment 10/11 into Segment XV.

Poland, Yugoslavia (Pag Island, Vlašiči Stream, SKET, 1970 leg.).

[66]

Moravia: pool between Vranovice and Pouzdřany (HRABĚ, 1935), Dyje near Dolní Věstonice (HRABĚ, 1969 leg.), outflow of Jedovnický Stream in the quarry near Býčí Cliff near Adamov (HRABĚ, 1974 leg.), Svatka in Brno-Bystrc (HRABĚ, 1977 leg.).

ČERNOSVITOV (1939) found another species of this genus in Lake Titicaca and in two other mountain lakes in South America. He missed my paper about Moraviodrillus pygmaeus and classified the species antipodum into the genus Epirodrillus. The male opening of the South American species antipodum and the Moravian pygmaeus differ considerably by the absence of the egg-shaped glandular ampulla, which is characteristic for the Greek species Epirodrillus michalseni, and therefore I consider the independence of both genera to be justified, and I am classifying the species antipodum under the genus Moraviodrillus and not under the genus Epirodrillus.

Bothrioneurinae ŠTOLC, 1888

1888 Bothrioneurinae ŠTOLC, Rozpr. k. čes. spol. nauk. (Line VII), 2:42.

The body cavity contains numerous coelomocytes which are similar

to the coelemocytes of the subfamily Rhyacodrilinae and the family Naididae. With dorsal pores. Nephridia with postseptale. Sperm ducts are slightly shorter than the long and relatively narrow tubelike atrial ampullae covered by a diffuse prostate. The outlet duct located behind the ampulla is joined by a small pear-shaped sticky gland (according to ŠTOLC) or paratrium (according to VEJDOVSKÝ, 1884). The outlet duct extends like a pseudopenis. Both outlet ducts empty in Segment XI or VIII via a common opening into the depression in the median line on the ventral side of the body. Penises and spermathecae are missing. Ovocytes do not separate from the ovaries in the shape of morulae. Sperm cells of a peculiar shape are in spermatophores and are attached around the male opening.

Bothrioneurum ŠTOLC, 1886

Description of the genus corresponds to the description of the subfamily.

56. Bothrioneurum vej dovskyanum ŠTOLC, 1886

Table 10, Figs. 14-16, Table 11, Figs. 1-4

1886 Bothrioneuron (!) Vej dovskyanum ŠTOLC, Zpr. zas. kr. Čes. spol. nauk, 1885:144.

1888 Bothrioneuron Vej dovskyanum, ŠTOLC, Rozpr. k. Čes. spol. nauk, (II tr.), 2:5, 11-14, 17-19, 25-27, 34-36, 42-43, Table 1, Figs. 8-9, Table 2, Fig. 5, Table 4, Figs. 6-11, 13 e, 1-2.

1930 Bothrioneurum vej dovskyanum, ČERNOSVITOV, Zool. Jb., Anat., 52:501, 509.

- 1935a Bothrioneurum vej dovskyanum, HRABĚ, Sbor. kl. přír., Brno, 17:13-18, Fig. 1.
 1935b Bothrioneurum vej dovskyanum, HRABĚ, Spisy přír. fak. univ., Brno,
 209:12-19.
 1939 Bothrioneurum vej dovskyanum, HRABĚ, Sbor. kl. přír., Brno, 21:76, 78.

The body is up to 20 mm long, only 0.3 mm in diameter, and consists of up to 150 segments; however, after architomical reproduction it may have as few as 10 segments (HRABĚ, 1935 a). Frontal lobe is rounded with a noticeable sensory pit on the dorsal side of the lobe.

Dorsal and ventral tufts in front of the clitellum contain 3-4 (5) serrated chaetae, and behind the clitellum the number of chaetae per tuft gradually decreases to 2. Hairlike and fanlike chaetae are missing. [67]
 Serrated chaetae in the anterior segments have an upper serration longer than the lower one, and behind the clitellum both serrations are of the same length, but the lower has a wider base than the upper. Ventral chaetae resemble the dorsal chaetae. Sexually mature individuals have in Segments XI or IX 4-6 penial chaetae with an ectal serration bent like a hook and with a tiny lower serration. Penial chaetae extend into the ectal section of the male funnel with their bent ends; they attach themselves to them by muscles which have their other end anchored to the dorsal side of the body wall.

The clitellum is on 1/4 of Segments X to XIII and in individuals formed by asexual reproduction, the clitellum is on 1/4 of Segments VIII to XI. Spermathecae are missing. A single male opening is in the median line on the ventral side of Segments XI or IX. One pair of female openings is in Intersegmental Notch 11/12 or 9/10.

Numerous coelemocytes, up to 18 μ m in diameter, with homogenous

protoplasm and without granules, and with a central nucleus float in the body fluid. Cellular bodies of posterior glandular cells of the esophagus with nuclei are in Segments IV to V. One pair of testes is in Segment X or VIII, and one pair of ovaries is in Segment XI or IX. Blastulae of ovocytes do not form.

The male outlet begins on each side of the body by a funnel attached to Dissepiment 10/11 or 8/9. The sperm duct from each of them passes into Segment XI or IX, returns toward Dissepiment 10/11, but before reaching it, the sperm duct widens into a much longer and wider tubelike atrium, which is covered by a continuous layer of tall cells forming a diffuse prostate. Behind the atrium there is a long ectal outlet covered initially by glandular (?) cubic epithelium with a smooth flat surface and then by epithelium with a ciliated surface. The conical end of the sticky gland leads into the section with the ciliated epithelium. The gland has a layer of muscle tissue on the surface of the hemispherical ental section; inside, it is covered by flat epithelium and filled with a secretion of the glandular cells whose pear-shaped bodies with nuclei are outside the sticky gland. Both ectal sections of the male ducts lead to a common chamber, and exit to the surface of the body via a median opening almost in the center of Segment XI or IX. Each opening may extend independently with the sticky gland and may be designated as a pseudopenis. The sticky gland is an organ sui generis and has nothing in common with the paratrium of Branchiura sowerbyi or with the compact prostate of other Naidids.

The function of the missing spermathecae is taken over by special spermatophores, which are attached around the male opening. They resemble a tall cup, open at the upper end, and with an equally long stem somewhat

widened at the base. Spermatophores are generally filled with sperm cells of a special shape with a cylindrical head and an equally long tail (ŠTOLC, 1888:35; ČERNOSVITOV, 1930, Table 13, Fig. 10).

England, Switzerland, Italy, Roumania, USA.

Bohemia: Vltava in Prague (ŠTOLC, 1888), Vltava from Krumlov to Miřejovice at several locations, Labe from Mělník to Lovosice, Berounka (HRABĚ, 1939).

Moravia: pool in Rudice (HRABĚ, 1929-1932, leg.), Svratka near Vranovice, Morava River near Kroměříž (HRABĚ, 1934), Dyje in Dolní Věstonice (HRABĚ, 1976 leg.).

In addition to sexual reproduction, Bothrioneurum vejdovskyianum [68] also reproduces asexually by architomy (HRABĚ, 1935 a). Among the 39 individuals caught in the Svratka River near Vranovice on May 10, 1934, only 4 individuals with 39 to 105 segments showed no signs of regeneration, but the others started to regenerate either the posterior segments (5 individuals) or the 8 esophagus segments as well as the posterior segments (30 individuals).

Individuals which are formed by sexual reproduction form sexual organs in the same segments as other Naidids reproducing only by amphigony, whereas individuals formed by asexual reproduction have the organs shifted toward the head end by several segments. In this way I can explain the different position of the sexual organs as is stated by ŠTOLC (1888) and as I also found in numerous individuals collected recently as opposed to individuals studied in the thirties (HRABĚ, 1935 b).

Aulodrilinae HRABĚ, 1967

1967 Aulodrilinae HRABĚ, Spisy přír. fak. univ., Brno, 485:348.

Atria with penises and with a compact prostate, which in some species is small or is missing completely. Without coelemocytes in the body cavity. Nephridia without postseptale. Spermathecae have openings closer to the posterior than to the anterior dissepiment. Ovocyte morulae do not separate from the ovaries. Spermatozeugmata do not form, and the spermathecae contain only clumps of sperm. Species of the genus Aulodrilus reproduce by amphigony and asexually by architomy in which case their sexual organs are shifted closer to the head end. The posterior of the body behind the growth zone has an unsegmented section of varying length which is referred to as "gills".

Aulodrilus BRETSCHER, 1899

1899 Aulodrilus BRETSCHER, Rev. suisse Zool., 6:379.

Ventral chaetae are very numerous in some species (up to 10-16 per tuft), serrated, and with an upper serration much shorter than the lower one. Dorsal tufts have very short hairlike chaetae, which may be missing in some species, in addition to serrated (in Aulodrilus japonicus with an intermediate serration) or spoonlike chaetae. Penial chaetae are present in most species. The esophagus suddenly expands to form an intestine in Segments VIII or X. Two to three pairs of testes are in

Segments (IV) V to VI or in Segments (VII) VIII to IX. One pair of ovaries is in Segment VII or X. Spermathecae are in Segments VI or VIII and IX. Male pores are in Segments VIII or X. Sperm duct is at most as long as other sections of the male outlet. Atrium is spherical or spindlelike. The outlet duct ends by a conspicuously developed penis. European species of the genus Aulodrilus do not curl into a spiral in contrast to the species of the subfamily Tubificinae. They build tubes from detritus glued together by mucus secreted by skin cells.

57. Aulodrilus pluriseta (PIGUET, 1906)

Table 11, Figs. 11-15

1906 Naidium pluriseta PIGUET, Rev. suisse Zool., 14:218-219.

1913 Aulodrilus pluriseta, PIGUET, Rev. suisse Zool., 21:118-121, Figs. 1-2.

1914 Aulodrilus pluriseta, KOWALEWSKI, Rozpr. wydz. mat.-przyr. Ak. Um. Krakow, 54, Cz. 2, ser. B.:26-27.

1928 Aulodrilus pluriseta, ČERNOSVITOV, Zool. Jb., Syst., 55:4-5, Table 1, Fig. 1. [69]

1937 b Aulodrilus pluriseta, HRABĚ, Sbor. Kl. přír., Brno, 19:2-4.

Body is very contractile. Worms frequently reproduce by architomy and therefore the body length and the number of segments are variable. Fixated individuals are approximately 10 mm long and at most 0.3 mm in diameter. Among the 22 individuals of one sample collected in Popradské Mountain Lake, 4 individuals had a body consisting of 95-96 segments and others of fewer segments (HRABĚ, 1937). Sexually mature individuals

collected in the vicinity of Vlas near the Sun Coast in Bulgaria had a body composed of 110 to 120 segments and were at most 0.4 mm in diameter. Individuals collected in Svidovec in Carpathian Ruthenia had a body composed of 140 to 150 segments and their diameter was 0.5 mm; while living, the bodies stretched up to 40 mm according to ČERNOSVITOV (1928).

Frontal lobe is short and rounded. The body posterior has a breathing tube in front of which is cellular material for the formation of new segments. Therefore, the breathing tube is not related to the formation of new segments.

Dorsal tufts in front of the clitellum have 8 hairlike and 9 serrated chaetae; in subsequent segments the number of chaetae decreases, but even the posterior segments have 2 hairlike and 2 serrated chaetae per tuft. Ventral tufts in front of the clitellum have 13-16 serrated chaetae, and the posterior segments have 4. Hairlike chaetae are very short (100-250 μm) and are at most 2.5 times longer than serrated chaetae. Dorsal serrated chaetae have an upper serration somewhat shorter than the lower one, and they are 74-105 μm long. Ventral chaetae have an upper serration much shorter than the lower one and they are 66-86 μm long. Modified sexual chaetae are missing.

The clitellum extends from 1/2 of Segment VI to Segment VIII. One pair of spermathecal openings is in Segment VI in front of the ventral chaetae closer to the lateral line than to the line of ventral chaetae.

Esophagus glands are in Segments II to IV. The esophagus suddenly expands in the middle of Segment VIII into an intestine, which in Segment IX and in subsequent segments almost completely fills the body cavity. Low chloragogenic cells cover the alimentary tract from Dissepiment 6/7; in Segments V to VI they appear only as single cells.

Three pairs of testes are located in Segments IV to VI. The first pair is small and may be seen only on cross-sectional cuts. One pair of ovaries is in Segment VII. Spermathecae have long and elongated sacklike ampullae with short outlets and are filled with clumps of sperm. Spermatozeugmata do not form. One pair of male funnels is located on Dissepiment 6/7. Sperm ducts are directed straight back and lead to an oval atrial ampulla from which leads a narrow outlet which is terminated by a conical penis placed in a moderately deep (45 μm) penial sheath. The penises in individuals collected in Svidovec were 90 μm long, and in 2 individuals from Bulgaria they were 70 μm long.

England, France, Switzerland, Italy, Denmark, Poland, Bulgaria, USSR, USA.

Bohemia: the vicinity of Nové Město in Krušné Hory (HRABĚ, 1939), Jamna in Jizerské Hory (HRABĚ, 1930 leg.).

Moravia: pool in Rudice (HRABĚ, 1928 leg.), outflow of Jedovnický Stream near Býčí Cliff near Adamov (HRABĚ, 1933, 1935 leg.).

Slovakia: Popradské Mountain Lake in the High Tatra Mountains (HRABĚ, 1939 b).

58. Aulodrilus japonicus YAMAGUCHI, 1953

[70]

Table 11, Figs. 5-10

1953 Aulodrilus japonicus YAMAGUCHI, Journ. Fac. Sci. Hokkaido Univ. (ser. VI., zool.), 11:298-300.

Frontal lobe is short and rounded. In the anterior segments the body is whitish and from Segment X it is pink. The body of living individuals is up to 20 mm long, very contractile, and in mature individuals it is 0.5 mm in diameter and consists of up to 135 segments. Similarly as other species of this genus (HRABĚ 1937, MARCUS 1944), Aulodrilus japonicus also reproduces asexually by architomy, and therefore individuals with a smaller number of parent segments and with regenerating 9 head segments and posterior segments may also be found.

Ventral tufts of mature individuals have 12-14 serrated chaetae in Segments II to XXV; the chaetae are 80-88 μm long and have an upper serration much shorter than the lower one. Dorsal tufts in the same segments have 5-8 hairlike and 5-10 serrated chaetae which usually have an intermediate serration. In younger individuals the number of chaetae in each tuft is smaller. Hairlike chaetae are bent like a bayonet, they are short, only 120-160 μm , and are at most twice as long as serrated chaetae with which they alternate in the tufts. Serrated dorsal chaetae are 70-88 μm long, and they always have a lower serration of the same length as the upper, but the lower serration is much wider. A single intermediate serration is present between the two serrations and it points forward. When observing chaetae at a magnification of more than 2000 x, a transparent plate which forms another serration may be seen on the dorsal side of the chaeta. Dorsal serrated chaetae in the anterior segments which are the closest to the median line, that is, the oldest chaetae in the tuft, and dorsal chaetae of the last segments do not have an intermediate serration. Modified sexual chaetae are absent, and Segment X has only the usual number of normal chaetae.

The clitellum is formed by very high epithelium extending from

2/3 of Segment IX to Segment XI. Two pairs of spermathecal openings are in Segments VIII and IX in the lateral line in front of the chaetal tufts; rarely a third pair may be present in Segment VII. One pair of male openings at the ends of penises is in Segment X placed laterally from the ventral chaetae.

Pharynx glands are in Segments III to IV. A narrow ciliated esophagus suddenly expands to form an intestine in the posterior half of Segment X. Chloragogenic cells are lower than the intestinal epithelium and they cover the intestine from Segment X.

The dorsal blood vessel freely passes above the pharynx and esophagus in the body cavity of Segments I to IX. In Segment X it passes toward the bottom left side of the segment, and in this position it passes through all subsequent segments. In Segments II to IX there is a complex network of anastomosed blood vessels. Starting in Segment X, the intestinal wall has blood vessels of the perivisceral sinus arranged in horizontal and vertical rows; the unpaired dorsal blood vessel is particularly well developed. The pharynx does not have a perivisceral sinus; its vessels on the intestine are connected to the ventral blood vessel in the middle of each segment by a ventro-intestinal blood vessel. In Segments VIII to IX there are 2 pairs of enormous and very long blood vessels which correspond to the hearts of the subfamily Tubificinae; they connect the dorsal and ventral blood vessels. Each central and posterior segment has one pair of dorsoventral blood vessels which are located near the posterior dissepiment; these blood vessels also connect the dorsal and ventral blood vessels.

[71]

Nephridia without postseptale are present in each segment starting in Segment XI; they are only on the left side of the body.

Two pairs of testes are in Segments VIII to IX on Dissepiments 7/8 and 8/9, and rarely there is also a pair of testes on Dissepiment 6/7 in Segment VII. One pair of ovaries is in Segment X on Dissepiment 9/10.

Spermathecae in Segments (VII) VIII to IX consist of a large sac-like ampulla and a short outlet not clearly separated from the ampulla. The ampullae contain a homogeneous secretion or spherical particles of protoplasm which separated from the ectal ends of epithelial cells lining the ampullae; they are well preserved after fixation with FORMOL-FLEMMING according to NAVASINO. Some ampullae of various pairs of spermathecae are filled with clumps of spermatozooids.

One pair of large bell-shaped male funnels is on Dissepiment 9/10. Sperm ducts, which are 25 μm in diameter, pass toward the rear in Segment X and empty into the ental end of a spindlelike atrial ampulla which is 160-170 μm long and at most 55-70 μm wide, and which is covered by glandular epithelium. A large prostatic gland leads into the middle of the atrial ampulla and there is a sphincter at the entry to the atrium. Past the ampulla there is an almost equally-long outlet lined with cubic epithelium and covered on the exterior by a relatively thick layer of muscle cells. The outlet duct ends by a conical penis approximately 50 μm long and without a cuticular cover. In the relaxed state the penises are turned toward the median line of the individual. The body wall is turned inward in Segment X and forms a depression on the ventral side.

Aulodrilus japonicus also reproduces asexually by architomy, and is characterized by an excellent regenerative ability; after an amputation of 12 to 20 anterior segments, it regenerates 9 head segments within 6 days. Architomical reproduction may also be seen in individuals collected in nature which have 2-4 chaetae in the ventral and dorsal tufts in the

9 anterior segments and 10-14 chaetae in Segment X and in subsequent segments.

Similarly as other species of this genus it builds tubes from the mucus secreted by the skin glands and from detritus which adheres to the mucus. The tubes are not completely submerged in the substrate, but they extend up to 5 mm above it. During respiratory motions the worms extend the posterior portion of their body from the tube and gently vibrate it, but the "gills" do not open significantly. Sometimes when they are building the tube, the worms rapidly rotate the posterior section of their body, touch the substrate with it and attach detritus to the skin, retract into the tube, and the attached detritus is transferred to the end of the tube thereby extending it. I observed this procedure several times when I passed the detritus through a fine sieve, allowed it to settle, and then added the worms which were chased out of their old tubes. The worms rapidly buried themselves in the substrate and after 5-10 minutes they began to build the tubes.

Aulodrilus japonicus, which was known only from Japan until now, was found in 1977 in the Kníničská Water Reservoir and in large numbers in the alluvial deposit of Libochůvka Stream in Dolní Loučky near Tišnov. I obtained several sexually mature individuals and by studying them I was able to describe the sexual apparatus of these worms which has been unknown until now (YAMAGUCHI had only asexual individuals).

The only difference between the individuals from Japan and from Moravia was that according to YAMAGUCHI the intestine suddenly expands in Segment XI, whereas in individuals from Moravia the intestine is already noticeably wider in the posterior half of Segment X than in the anterior half. The Japanese worms are 20-25 mm long when living, and the Moravian

worms also have the same dimensions; however the body of the Japanese individuals consists of 40 segments, whereas the body of Moravian individuals consists of as many as 136 segments.

59. Aulodrilus limnobius BRETSCHER, 1899

1899 Aulodrilus limnobius BRETSCHER, Rev. suisse Zool., 6:379-388.

1914 Aulodrilus limnobius, KOWALEWSKI, Rozpr. wydz. mat.-przyr. Ac. Um. Krakow, 54 (ser. B):25, Table 10, Figs. 1-11, Table 11, Fig. 38 B.

Body is 10-15 mm long. Individuals which are 10 mm long consist of approximately 80 segments.

Dorsal and ventral tufts contain 5-10 serrated chaetae with an upper serration much shorter than the lower one. Chaetae are approximately 40-53 μm long. Hairlike, fanlike, and modified penial chaetae are missing. Chloragogenic cells cover the alimentary tract from Segment VII. Esophagus widens at the beginning of Segment VIII to form an intestine. One pair of hearts is in Segment VI.

Clitellum is in Segments VII to VIII. One pair of spermathecal openings is in Segment VI close to the dorsal tufts. One pair of male openings is in the median ventral depression in Segment VII placed laterally from the ventral chaetae. Two pairs of testes are in Segments V and VI. Testes in Segment V are smaller than those in Segment VI. One pair of ovaries is in Segment VII. Spermathecae have bulbous ampulla with a short outlet somewhat widened at the end. One pair of male funnels is on Dissepiment 6/7. Sperm ducts are longer than the relatively long spindlelike

atrial ampullae. Penises in individuals observed by Kowalewski are deeply retracted in penial sheaths.

France, Switzerland, Finland, Poland, USSR, USA, South America.

Slovakia: Bystrá near Brezno (ČERNOSVITOV, 1930).

60. Aulodrilus pigueti KOWALEWSKI, 1914

1914 Aulodrilus pigueti KOWALEWSKI, Rozpr. wydz. przyr. Ac. Um. Krakow,

54, (ser. B): 25-26, Table 10, Figs. 12-18, Table 11, Figs. 19-39.

1937 Aulodrilus pigueti, HRABĚ, Sbor. kl. přír., Brno, 19:2-3.

The body of sexually mature worms is 5 mm long and consists of 60 segments. KOWALEWSKI observed individuals 6-8 mm long. They reproduce by architomy (HRABĚ, 1937), and therefore among 22 specimens from the lakes of the Lower Povolží and Tinguta River, only 3 specimens consisted of 40 to 50 segments whereas the others had only 7-26 parent segments and new anterior, or possibly still unsegmented posterior sections. The frontal lobe is short and rounded.

Dorsal tufts starting in Segment II have hairlike and serrated chaetae. Serrated chaetae in Segments II to V (VI) have an upper serration shorter than the lower one, and from Segments VI to VII they are replaced in the tufts by up to 4 platelike chaetae which are 60 μ m long. Hairlike chaetae are approximately 1.5 times as long as serrated chaetae and they have an upper serration which is thinner and much shorter than the lower serration; ventral chaetae are up to 60 μ m long and there are 6 of them per tuft. Segment VII in sexually mature individuals has 1-2 sexual chaetae, [73]

which are bent in an S-shape and which have a shallow depression at the ectal end, in place of the ventral chaetae.

The clitellum is in Segments VII to VIII. One pair of large spermathecae has openings in Segment VI at the location of ventral chaetae. One pair of male outlets has openings in Segment VII in an unpaired medial depression on the ventral side of the body placed laterally from the ventral chaetae. One pair of small male funnels is on Dissepiment 6/7. A short sperm duct leads directly to the atrial ampulla. The ampulla is twice as long as the sperm duct, it is cylindrical and gradually widens toward its ectal end; it is lined by high glandular epithelium so that the cavity of the ampulla is very small. A large prostate leads into the side of the ampulla. The ampulla ends by a very short penis, which extends into a very long outlet duct like a circular cilium; the duct is lined with flat epithelium along its inner surface. The sperm duct is 53 μm long and 10 μm in diameter, and the ampulla is approximately 110 μm long and is approximately 42 μm wide at its ental end.

France, Yugoslavia, Finland, Poland, USA.

Czechoslovakia: this species has not yet been found in the waters of Czechoslovakia.

Peipsidrilus TIMM, 1977

1977 Peipsidrilus TIMM, Izv. Ak. nauk. Estonsk. SSR, 26 (Biol.) 4:282-283.

Only serrated chaetae. Coelemocytes and postseptales are missing.

One pair of testicles is in Segment X, and one pair of ovaries is in Segment XI. One pair of spermathecae is in Segment X, and one pair of male openings is in Segment XI. Sperm ducts are longer than the atria. Prostate is very small. Penises are without penial tubes of the Limnodrilus type, and coverings have a thickened cuticle. Spermatozeugmata do not form.

61. Peipsidrilus pusillus TIMM, 1977

1977 Peipsidrilus pusillus TIMM, Izv. Ak. nauk Estonsk. SSR, 26 (Biol.)
4:279-283, Figs. 1-2.

The body is 5-8 mm long, at most 0.35 mm wide, and consists of 33 to 48 segments. The frontal lobe, which is rounded at the end, is approximately as long as it is wide.

Dorsal and ventral tufts contain only serrated chaetae. Segment II has 2 chaetae per tuft, Segment III has 3, Segment IV has 4, Segments V and VI have 5 chaetae, and segments past the clitellum have at most 2 chaetae per tuft. According to TIMM, the largest number of chaetae (6) is in Segment VI. According to TIMM, Segment X has one pair of modified spermathecal chaetae of the Potamodrilus type, however not even one species of this genus studied until now, which is characterized particularly by the shape of the spermathecal chaetae, has chaetae which resemble the incomplete description in TIMM's paper. In 4 sexually mature individuals from Ploučnice I did not find any chaetae in Segment X; they probably fell out before the completion of the sexual cycle. Segment XI has no ventral chaetae. In Segment II the upper serration is slightly shorter and narrower than the

lower one; the serrations subtend a right angle. In Segment III and in all subsequent segments in front of the clitellum the upper serration is slightly longer than the lower one, and the base of both serrations is equally wide and the serrations subtend a right angle. Behind the clitellum the upper serration is again noticeably shorter and thinner than the lower one, and the serrations subtend a right angle. TIMM states that the chaetae are 23-48 μm long with serrations of equal length.

[74]

The clitellum is in Segments XI to XII. One pair of spermathecal openings is in Segment X, according to TIMM above and behind the spermathecal chaeta. One pair of male openings in Segment XI is in place of the ventral chaetae.

The body wall is thin; in Segment IV the muscular skin sac is only 8.6 μm thick on the dorsal side and 12.6 μm thick on the ventral side. All dissepiments are thin, and Dissepiment 6/7 is at most 4 μm thick. The pharynx glands are above the pharynx only in Segments II and III. Chloragogenic cells start in Segment VI. One pair of nephridial funnels is on Dissepiment 7/8, and an extensively-coiled nephridial duct passes through Segments VIII and IX and has an opening in Segment VIII.

One pair of testes is in Segment X and one pair of ovaries is in Segment XI. One pair of small male funnels is on Dissepiment 10/11. Sperm ducts are slightly longer than atria and they are ciliated on the inside along the entire length. Their external diameter at the ental end is 8 μm , the middle section suddenly widens, and before the opening to the atrium they are 11 μm in diameter. Atrial ampullae are elongated and egg-shaped, 43 μm long, and tapering to an outlet which has muscle fibres on the exterior surface. The atrial epithelium has numerous grains of secretion. A compact prostate is very small. TIMM did not observe it. The atrium ends

with a penis in a penial sheath. The penis is 20 μm long, has a conical shape in the ectal half, and rests on a thinner base. The penis is covered by a thin layer of cuticle which cannot be considered as the penial case. Spermathecae consist of a small oval ampulla and a thick-walled shorter outlet with a small inside diameter. According to TIMM the ampulla is 30-50 μm in diameter, the outlet is 24-30 μm long, in the ental section it is 19-24 μm wide, and the inside diameter is 3 μm .

Estonian SSR, Pejpus Lake (Pskovské Lake).

Bohemia: Ploučnice, near Hamr District in a lake near Česká Lípa (ROSOL 1971 leg.).

Clumps of sperm in spermathecae and the absence of spermatozeugmata prevents this genus and species to be classified into the genus Isochaetides of the subfamily Tubificinae, because with these characteristics it belongs among the Aulodrilinae.

Branchiurinae HRABĚ, 1966

1966 Branchiurinae HRABĚ, Spisy přír. fak. univ., Brno, 470:70.

1967 Branchiurinae, HRABĚ, Spisy přír. fak. univ., Brno, 485:353-354.

The posterior region of the body has 1 gill in the median line on the dorsal and ventral side of each segment. A long cylindrical ampulla and pseudopatrium of a similar shape and almost same size are present and have independent outlets which join immediately before entering the pseudopenis. Atrial ampulla and pseudopatrium are covered by a diffuse

prostate. The ectal section of the male outlet, pseudoparatrium, and pseudopenis are in a special coelem sac. Coelemocytes, postseptale and nephridia are missing. Spermathecae have openings behind the ventral chaetae in Segment X near Dissepiment 10/11. Spermatozeugmata do not form.

The subfamily Branchiurinae contains a single genus and species.

62. Branchiura sowerbyi BEDDARD, 1892

[75]

Table 12, Figs. 7-8

1892 Branchiura sowerbyi BEDDARD, Q. J. mier. Sci., (N.S.), 33:325.

1913 Branchiura sowerbyi, KEYL, Z. wiss. Zool., 107:109-308, Fig. 56 in the text, Tables 9-11, Figs. 1-17.

1964 Branchiura sowerbyi, LIŠKOVÁ, Věst. čes. zool. spol., 28:305-311.

Body is 20-50 (185) mm long, 1 mm or more wide, and consists of up to 270 segments.

The posterior 1/6 to 2/5 of the body has one cylindrical gill in the median line on the dorsal and ventral side of each segment. The gills become longer toward the posterior of the body, and they are at most twice as long as the diameter of the respective segment.

Dorsal tufts have 1-3 hairlike and 5-8 serrated chaetae or chaetae with a single point. Serrated chaetae predominate in the anterior section of the body and unserrated predominate in the posterior section. Hairlike chaetae are short and are only 130-164 μm long. The ventral chaetae also have two different shapes, there are 6-8 of them per tuft, they are 120 μm long, and serrated chaetae have a small upper serration.

Dissepiments 5/6 and 9/10 are thickened by muscle fibres.

Clitellum is in Segments X to XII. One pair of spermathecae has openings in Segment X behind the ventral chaetae directly in front of Intersegmental Notch 10/11. One pair of male openings is in Segment XI in place of ventral chaetae. One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. Spermathecae consist of a spherical ampulla and a long tubular outlet.

One pair of large male funnels is on Dissepiment 10/11. Sperm ducts are long, they do not form loops, they enter the atrial ampullae at a certain distance from the ectal end, pass within their wall next to the epithelial lining, and only in the ental end they lead into the cavity of the ampulla. Atrial ampullae are long, cylindrical, lined by cylindrical epithelium on the inside, and covered by muscle fibres on the outside. A thick layer of prostatic cells is on the surface of the ampullae. Beside them are pseudoparatria which resemble the atrial ampullae by their size, shape, and histological structure, but they are not covered by muscle fibres. Atrial ampullae and pseudoparatria lead to 2 narrow outlet ducts, which side by side enter the coelem sac. The coelem sac has an oval shape and is at most 700 μm long and 170 μm wide. The sac wall is 3.5 μm thick (according to KEYL it is 7 μm thick) and consists of very flat epithelium and muscle fibres. The outlet ducts of the atrium and paratrium form several loops within the coelem sac and empty into a pear-shaped pseudopenis whose wall is made up of cubic unciliated epithelium without glandular cells and muscle fibres. During copulation, the pseudopenis extends from the outlet of the atrium and pseudoparatrium. Spermatozeugmata do not form.

England, France, Switzerland, Italy, Federal Republic of Germany,

Roumania, Bulgaria, USSR, USA, Brazil.

Bohemia: Vltava in Praha-Bráník, Central Labe Region (LIŠKOVÁ, 1976).

The apparatus designated as the paratrium is not homologous to the paratrium of the genus Bothrioneurum and therefore I labelled it as pseudoparatrium.

Subfamily Tubificinae EISEN, 1885

[76]

1885 Tubificinae EISEN, Rep. Com. for 1883 U.S. Com. Fish a. Fisher., 11:879-964.

Without coelemocytes in the body cavity and without dorsal pores in Segments IV and V. Nephridia are without postseptales. Atria have compact prostate, which in some species is small or absent. Penises are retracted into a penial sheath, and in some genera or species they have a cuticular penial tube. Spermathecae, if present, have openings closer to the posterior than to the anterior dissepiment. Morulae of ovocytes do not separate from the ovaries. Spermatozeugmata are present in spermathecae.

Potamothrix VEJDOVSKÝ-MRÁZEK, 1902

1902 Potamothrix VEJDOVSKÝ-MRÁZEK, S.B.k. böhm. Ges. Wiss., mat.-naturw. Kl., 24:1-7, Table 1, Figs. 1-6.

1904 Hydrilus MICHAELSEN, Verh. naturwiss. Ver. Hamburg, (3. Folge) 8:66-68.

1953 Eúilyodrillus BRINKHURST, Int. Rev. ges. Hydrob., Syst. Beih., 2:47.

Male sexual outlet consists of a very short sperm duct and a very

long cylindrical atrium which ends with a penis without a penial tube. A very small compact prostate is present at the start of the atrium and may be seen only on cross sections of properly fixated material; in some species it is missing (must not be confused with the ovary!). In all Czechoslovak species with the exception of P. mrazeki the typical spermathecal chaetae are generally in Segment X.

63. Potamothenix moldaviensis VEJDOVSKÝ-MRÁZEK, 1902

Table 12, Figs. 15-19

1902 Potamothenix moldaviensis VEJDOVSKÝ-MRÁZEK, S. B. k. böhm. Ges. Wiss. (mat.-naturw. Kl.), 24:1-7, Table [number not given - translator's note], Figs. 1-6.

1950 Hyodrillus moldaviensis, HRABĚ, Práce mor. slez. Ak. věd přír., 22(9):273-277, Figs. 26-39.

Body is at most 40 mm long, 0.7 mm wide, and consists of up to 95 segments.

Ventral tufts in front of the clitellum have (5) 6-9 serrated chaetae. Hairlike and fanlike chaetae are missing. Serrated chaetae have an upper serration almost as long as the lower one. Intermediate serrations are not present in the dorsal chaetae. In Segment X in sexually mature individuals there is in place of the ventral chaetae one pair of spermathecal chaetae 138-162 μm long of a uniform width along the entire length, which have a troughlike depression in the ectal section with a noticeably curved end which is much longer than the ental section.

Spermathecal chaetae extend from a glandular field. Most sexually mature individuals which have spermatozeugmata in spermathecae and mature eggs in egg sacs have 1 pair of serrated chaetae with an upper serration only slightly longer than the lower serration, or, usually, with an upper serration much longer than the lower serration in place of the ventral chaetae in Segment XI. Finally, 3 individuals out of 39 have penial chaetae in Segment XI of the same shape and size as the spermathecal chaetae of Segment X.

Dissepiments in front of the clitellum are as thick as dissepiments behind the clitellum.

Clitellum extends from 1/n [fraction not understood by translator - [77] translator's note] of Segment X to Segment XII. One pair of spermathecae has openings in front of the spermathecal chaetae in Segment X. One pair of male openings is behind the ventral chaetae in Segment XI. One pair of testes is in Segment X and one pair of ovaries is in Segment XI.

One pair of male funnels is on Dissepiment 10/11. The male outlet of P. moldaviensis and other species of this genus which do not have a prostate somewhat differs from the outlets of species which have a prostate; its short sperm duct (175 μ m) transforms to a wider anterior section of a long tubular atrium, which is lined with high glandular epithelium and which has numerous grains of secretion. The secretion is intensively dyed by eosin. This section is followed by a much longer tubular section frequently even wider than the preceding section, which is lined with a thin epithelium lining, and which has highly vacuolated protoplasm without granular secretion. The ectal end of the atrium frequently extends into Segment XII, returns to Segment XI, and suddenly changes into a narrow apical section of a large bell-shaped penial bulb. The bulb is lined with thick glandular epithelium and the surface is covered by a thick layer of circular muscle fibres. It

terminates by a conical penis without a cuticular case. Prostate is not present on the atria.

England, France, Poland, Bulgaria, USSR, USA.

Bohemia: Vltava near Prague (VEJDOVSKÝ and MRÁZEK, 1902), Labe downstream from Lovosice (HRABĚ, 1939) and upstream from Liběchov (HRABĚ, 1964 leg.).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941), near Gabčíkov (ERTLOVÁ, 1966 leg.).

64. Potamothrix mrazeki (HRABĚ, 1941)

1941 Hydrilus mrazeki HRABĚ, Práce mor. přír. spol., 13 (12):25-27, Figs. 27-28.

The body is approximately 25 mm long, 0.5 mm wide in the clitellum region, and consists of up to 167 segments.

Segments in front of the clitellum generally have 4-5 serrated chaetae and only rarely 3 or 6 chaetae in the dorsal and ventral tufts. Segments with sexual organs have at most 2 normal serrated chaetae and generally only 1 chaeta in the ventral tufts. Subsequent segments have ventral tufts with 3 and dorsal tufts with 2-4 serrated chaetae. Hairlike, fanlike, and modified sexual chaetae are absent. Dorsal chaetae resemble the ventral chaetae and they have an upper serration which is thinner but as long as the ventral serration.

Individual chloragogenic cells cover the alimentary tract in Segment VI and a continuous layer of cells is present in Segment VII and

subsequent segments. Dissepiments 3/4 to 10/11 are considerably thickened by muscle fibres.

The clitellum is not completely formed. One pair of spermathecal openings is in the lateral line in Segment (X) XI (XII). One pair of male ducts has openings in Segment (XI) XII (XIII) immediately adjacent to the line of ventral chaetae. One pair of testes is in Segment (X) XI (XII) and one pair of ovaries is in Segment (XI) XII (XIII). Similarly as in Potamothrix hammoniensis, the male sexual outlet consists of a short sperm duct ciliated on the inside, a very long tubular atrium with a small prostate, and a widened penial bulb terminated by a penis in a penial sheath. Spermathecae have spherical ampullae and a short, well-defined outlet.

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Potamothrix mrazeki also reproduces architomically whereby it regenerates generally 10 to 11 head segments. This explains why the sexual apparatus in this species is shifted farther toward the posterior than in other species of Naidids; the testes are formed in the last newly-formed head segment of individuals who are regenerating the anterior body section, and ovaries are generally formed in the first segment of the original parent body.

[78]

65. Potamothrix danubialis (HRABĚ 1941)

1941 Hyodrilus danubialis HRABĚ, Práce mor. přír. spol., 13, Paper 12:27-28.

The body is 25 mm long, 0.5 mm wide, and consists of 100 or more segments.

The anterior segments have 4-6(7) serrated chaetae per tuft. Hairlike and fanlike chaetae are absent. Segment X has one spermathecal chaeta of the Potamothrix hammoniensis type instead of the normal serrated chaetae.

Dissepiments 3/4 to 9/10 are considerably thickened, and Dissepiment 10/11 and all subsequent ones are again thin.

One pair of spermathecae has openings in the lateral line of Segment X. One pair of male outlets with a small prostate on the beginning of a long tubular atrium as in Potamothrix hammoniensis is present.

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

66. Potamothrix hammoniensis (MICHAELSEN, 1901)

Table 12, Figs. 9-14, Table 13, Fig. 4

1901 Hyodrilus hammoniensis MICHAELSEN, Verh. natwiss. Ver., Hamburg, (3 F.), 8:66-68.

1903 Hyodrilus hammoniensis, MICHAELSEN, Mitt. nat. hist. Mus., Hamburg, 19:188-193, Fig. 10.

The body is 15-25 (40) mm long and at most 0.85 mm wide and consists of 75 segments.

In front of the clitellum the tufts contain 4-6 serrated ventral chaetae with an upper serration longer than the lower one, and behind the clitellum the tufts contain 3-4 chaetae with serrations of nearly equal

length of which the lower serration is much wider than the upper one. Dorsal tufts in the anterior segments contain 1-4 hairlike and 3-5 fanlike chaetae. Anterior hairlike chaetae are up to 650 μm long, and in the posterior segments the hairlike chaetae are much shorter or are missing. Fanlike chaetae in segments in front of the clitellum have 2 serrations of nearly equal length and numerous intermediate serrations. Behind the clitellum the serrations are spaced farther apart and the lower one is somewhat wider than the upper one; in Segment XXX there are still 2-3 intermediate serrations. Instead on ventral chaetae, Segment X has 1 modified spermathecal chaeta, up to 255 μm long, on each side. The spermathecal chaetae have a troughlike depression on the ectal end which has parallel edges; the ectal section is as wide as the ental section and the ental end is cut at an oblique angle. The overall appearance of the ectal section of the spermathecal chaetae considerably differs in the works of various authors depending on how the pictured chaeta was placed (compare, for example, MICHAELSEN, 1909: Fig. 75; PIGUET-BRETSCHER, 1913: Fig. 5 d; and HRABĚ, 1954 a: Fig. 64).

The clitellum extends from 1/5 of Segment X to Segment XII. One pair of spermathecal openings is in Segment X directly in the lateral line. [79] One pair of male duct openings is in Segment XI in the line of ventral chaetae. One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. Spermathecae are spherical or sacklike with a short outlet. One pair of male funnels is on Dissepiment 10/11. Sperm ducts are narrow, short, ciliated on the inside, and approximately 80 μm long. Atria are much wider (100-180 μm in diameter), very long, tubular, sometimes extending into Segment XIII from which they return and have openings in Segment XI; they terminate in a conical penis in a penial sheath. There is a small prostate at the beginning of each atrium.

England, France, Switzerland, Italy, Federal Republic of Germany, Denmark, Finland, Poland, Roumania, Bulgaria, USSR.

Bohemia: Labe near Roudnice (HRABĚ, 1939).

Moravia: very abundant.

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

67. Potamothrix vej dovskyi (HRABĚ, 1941)

1941 Ilyodrilus vej dovskyi HRABĚ, Práce mor. přír. spol., 13, Paper 12: 22-25, Figs. 20-25.

The body is 15-21 mm long, 0.7 mm wide, and consists of 80 to 93 segments.

Segments in front of the clitellum generally have 4-6 serrated chaetae in addition to 2-4 (rarely 5) short hairlike chaetae in the dorsal tufts and 5-8 (10) serrated chaetae in the ventral tufts. The number of chaetae decreases in the tufts behind the clitellum. The serrated chaetae have an upper serration which is as long as or somewhat shorter and always thinner than the lower serration. Intermediate serrations are missing in the dorsal chaetae. Hairlike chaetae are not even twice as long as the serrated chaetae; in Segments III to XXV the serrated chaetae are 109-122 μm long and hairlike chaetae are 143-190 μm long. In Segment X the ventral chaetae are replaced by one spermathecal chaeta on each side of the body in sexually maturing and in mature individuals; the chaetae are 170-200 μm long and are of the Potamothrix hammoniensis type.

The clitellum extends from 1/2 of Segment X to Intersegmental Notch 11/12. One pair of spermathecal openings is in Segment X directly

in the lateral line. In some completely mature individuals the spermathecae are missing as in Tubifex tubifex and Tubifex montanus. One pair of male ducts has openings in Segment XI somewhat laterally from the ventral chaetae. One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. Male ducts have the same structure as those in, for example, Potamothenix hammoniensis.

France, USSR (Kujbyševská Water Reservoir, LJUBIN, leg.), USA (Lake Michigan, HILTUNEN, leg.).

Slovakia: branches of the danube near Čilistov (HRABĚ, 1941).

68. Potamothenix bavaricus (OSCHMANN, 1913)

Table 12, Figs. 20-21, Table 13, Fig. 5

1913 Tubifex (Ilyodrilus) bavaricus OSCHMANN, Zool. Anz., 42:559.

1935b Ilyodrilus bavaricus, HRABĚ, Spisy přír. fak. univ., Brno, 209:11-12.

1936b Ilyodrilus bavaricus, HRABĚ, Izv. Ak. nauk. SSSR, 1936:1271-1273, [80]
1276, Figs. 1-10.

1967 Euiyodrilus bavaricus, HRABĚ, Spisy přír. fak. univ., Brno, 485:353-354,
Fig. 45.

The body is at most 15 mm long, 0.5 mm wide, and consists of at most 80 segments.

Dorsal tufts in front of the clitellum contain 2-4 fanlike and 1-5 hairlike chaetae. Behind the clitellum the number of chaetae decreases, and there are no hairlike chaetae in the posterior half of the body.

Ventral tufts contain 2-4 serrated chaetae. Fanlike chaetae have 2 serrations of equal length and 3-4 intermediate serrations. Behind the clitellum the serrations are farther apart and the upper serration is longer than the lower one; the number of intermediate serrations decreases and in Segment XXX there is only one intermediate serration per chaeta. Hairlike chaetae are as long as the corresponding segment, or slightly shorter than its diameter. In the anterior section the ventral chaetae have serrations of equal length, but behind the clitellum the upper serration is shorter than the lower one. In place of the ventral chaetae in Segment X, there is one spermathecal chaeta of a peculiar shape per tuft. These chaetae are replaced several times during the sexual period, and at that time they change their shape. In the final stage they have a triangular, widely open ectal end, they are 140-152 μm long, and the maximum width of the triangular end is 18 μm .

One pair of male funnels is on Dissepiment 10/11, short sperm ducts (150 μm) suddenly change to wider ones as in other species of the genus Potamothrix, a very long tubular atrium has a similar histological structure as in Potamothrix moldaviensis, and the prostate is also missing. A large spindlelike penial bulb ending in a blunt penis is in a shallow sheath. Spermathecae have a large pear-shaped or elongated egg-shaped ampulla with a short outlet.

England, France, Yugoslavia, Denmark, Finland, Poland, USSR, USA.

Bohemia: Chrudimka near Pardubice, Labe near Roudnice (HRABĚ, 1939).

Moravia: Svratka and pools near Vranovice.

Slovakia: Danube, Čilistovská brána (HRABĚ, 1941).

69. Potamothrix bedoti (PIGUET, 1913)

Table 13, Figs. 1-3, 6

- 1913 Tubifex (Ilyodrilus) bedoti PIGUET, Rev. suisse Zool., 21:124-126, Fig. 4.
 1928 Ilyodrilus bedoti, PIGUET, Bull. Soc. Neuchatel. Sci. nat., (N.S.), 1:97-98.
 1935b Ilyodrilus bedoti, HRABĚ, Spisy přír. fak. univ., Brno, 209:12.
 1967 Euilyodrilus bedoti, HRABĚ, Spisy přír. fak. univ., Brno, 485:353-354, Fig. 46.

The body is 10-18 mm long and consists of 70-90 segments.

Anterior dorsal tufts contain 4 fanlike and 4-5 hairlike chaetae, and ventral tufts contain 5 serrated chaetae. Fanlike chaetae are 102-115 μm long and they have an upper serration only slightly longer and thinner than the lower one. There are several intermediate serrations between the two main serrations which diverge in a sharp angle. Hairlike chaetae in the anterior segments are 360-382 μm long, and behind the clitellum they are shorter. Ventral serrated chaetae are 102-113 μm long and they have an upper serration noticeably longer than the lower one. In place of the ventral chaetae in Segment VIII or, more rarely, in Segments VII and VIII, there are 1 or 2 spermathecal chaetae of the same shape. They are 138-140 μm long and according to PIGUET they resemble a bird's beak when viewed from the side.

One pair of spermathecal openings is in Segment VIII in the lateral line, and in some individuals there is a second pair of spermathecae in Segment VII. One pair of male openings is in Segment IX placed somewhat laterally from the ventral chaetae. One pair of testes is in Segment VIII on Dissepiment 7/8, and one pair of ovaries is in Segment IX on Dissepiment 8/9. One pair of female funnels is on Dissepiment 9/10. Sperm ducts are short, [81

and atria are long, tubular, without a prostate, have a histologically similar structure to the atria of Potamothrix moldaviensis, and they end in a small penis hidden in a deep penial sheath. Spermathecae have large spherical ampullae with short outlets.

England, France, Yugoslavia, Switzerland, USSR, USA.

Bohemia: Ohře near Levousy (HRABĚ, 1941).

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941).

Several individuals from Pag Island in the northern part of the Adriatic Sea (Dr. SKET, leg.) have sexual apparatuses in the normal position: testes, spermathecae, and male funnels in Segment X, and ovaries and atria in Segment XI. This is a similar situation as in Bothrioneurum vej dovskyanum as far as architomy and amphigony is concerned (TIMM, 1972).

70. Potamothrix heuscheri (BRETSCHER, 1906)

Table 12, Fig. 22

1900 Tubifex heuscheri BRETSCHER, Rev. suisse Zool., 8:11-13, Figs. 1-4.

1913 Tubifex (Ilyodrilus) heuscheri, PIGUET, Rev. suisse Zool., 21:127-128, Fig. 4.

The body is 8-15 mm long, 0.5 mm wide in the clitellum region, and consists of 60 segments.

Dorsal tufts contain 3-5 fanlike chaetae and an equal number of hairlike chaetae, and ventral tufts contain 4-5 serrated chaetae. The number of chaetae is smaller behind the clitellum. Dorsal chaetae in front of the clitellum have 2 serrations, of which the upper is somewhat longer than

the lower, and several fine intermediate serrations. Hairlike chaetae are almost as long as the diameter of the body; in Segments IX to X they are 390-480 μm long, and behind the clitellum their length decreases. Ventral chaetae in front of the clitellum have an upper serration which is longer and narrower than the lower one, and the chaetae are approximately 160 μm long. Behind the clitellum the upper serration becomes progressively shorter until both serrations have equal length. In place of ventral chaetae in Segment X there is one pair of spermathecal chaetae 150-175 μm long, which pass through the center of a round glandular area into which 2 groups of glandular cells lead. These chaetae of a very characteristic nature are narrow, barlike, have a troughlike depression in the ectal section, and are slightly bent at the ental end. Segment XI has a smaller number of ventral chaetae than neighbouring segments except Segment X.

The clitellum extends from 1/2 of Segment IX to Segment XII. One pair of spermathecae has openings in Segment X along the lateral line, and one pair of male openings is in Segment XI placed laterally from the ventral chaetae. One pair of testes is in Segment X and one pair of ovaries is in Segment XI. One pair of male funnels is in Segment X on Dissepiment 10/11. Sperm ducts are short, atria are long and tubular without a prostate and they end in a miniscule penis in a deep penial sheath. Spermathecae have large saclike ampullae with short outlets.

Switzerland, Italy, Yugoslavia, Bulgaria, Finland, USSR.

This species has not yet been found in Czechoslovakia.

Ilyodrilus EISEN, 1879

[82]

1879 Ilyodrilus EISEN, Bih. sven. Vet. Ak. Handl., 15(16):11.

Male ducts with a wide sperm duct only as long as the atrium, large compact prostate, and penis with a cuticular penial tube, are present.

71. Ilyodrilus templetoni (SOUTHERN, 1909)

Table 13, Figs. 7-8

1909 Tubifex templetoni SOUTHERN, Proc. R. Irish Ac., 27 B, No. 8:140, Table 8, Fig. 6 a-c.

1919 Tubifex templetoni, KOWALEWSKI, Rozpr. wydz. mat.-przyr. Ak. Um. Krakow, ser. 3, 18 B:41-43.

1966 Ilyodrilus templetoni, HRABĚ, Spisy přír. fak. univ., Brno, 470: 61-65, Figs. 9-20.

The body is 10 mm long and consists of 70 segments.

Dorsal tufts in front of the clitellum contain 3-4 fanlike and 1-4 hairlike chaetae, and ventral tufts contain 3-4 serrated chaetae. In sexually mature individuals the ventral chaetae are missing in Segment X. The number of chaetae decreases in the tufts behind the clitellum. Fanlike chaetae have 2 serrations of equal length and 3-5 intermediate serrations. Hairlike chaetae are up to 350 μ m long. Serrated chaetae in front of the clitellum have an upper serration which is longer than the lower one, and behind the clitellum the upper serration becomes shorter and in the posterior

region the upper serration is shorter than the lower one.

The clitellum extends from Segment XI to Segment XII. One pair of spermathecal openings is placed laterally from and somewhat in front of the ventral chaetae in Segment X. Spermathecae are frequently missing. One pair of male openings is in place of the ventral chaetae in Segment XI. Among 30 individuals in the last phase of sexual reproduction there was only one individual who retained one pair of testes in Segment X on Dissepiment 9/10 and one pair of ovaries in Segment XI on Dissepiment 10/11. One pair of male funnels is in Segment X on Dissepiment 10/11. A wide sperm duct 35-46 μm in diameter ascends toward the dorsal part of the body, and suddenly changes to a short, narrow tube 50 μm long and 15-25 μm in diameter which empties into a much wider atrial ampulla. The long ampulla gradually becomes narrower, and its ectal end is lined with glandular epithelium with eosinophilic granules, and ends in a conical penis 20-45 μm long placed in a shallow penial sheath. The penis is enveloped by a cuticular conical penial tube which gradually becomes narrower toward the ectal end. The tube is 70-80 (175) μm long. Spermathecae have spherical to egg-shaped ampullae with long outlets.

England, France, Switzerland, Italy, Poland, USSR, USA.

Bohemia: Labe near Liběchov, Roudnice, Lovosice (HRABĚ, 1939), Věhlovice (HRABĚ, 1964 leg.).

Individuals caught in July were in the last phase of sexual reproduction at the beginning of the resorption of sexual organs, and therefore the epithelial lining separated in several places from the atria as is shown by HRABĚ (1966: Figs. 17, 18, 20).

1816 Tubifex LAMARCK, Hist. nat. anim. sans vertebr., 3:225.

Species found in Czechoslovakia have hairlike and fanlike chaetae in the dorsal tufts in front of the clitellum. The sperm ducts are narrow, much longer than the atria, ciliated on the inside along their entire length, or consisting of two sections of which the anterior section is narrow, ciliated on the inside, and which suddenly expands into a much longer and wider posterior section which in the species Tubifex tubifex has grooves and no cilia. Atria are generally pear-shaped with a large compact prostate leading into an atrial ampulla near its apical end. The section of the male duct between the atrial ampulla and the penis is relatively short, and not separated into several sections as in the genus Psammoryctides. The penis of some species is in a sheath with a cuticular tube. Spermathecae are frequently missing (Tubifex tubifex) or always missing (Tubifex montanus). Modified sexual chaetae are usually missing, but rarely penial chaetae (Tubifex nerthus), or spermathecal and penial chaetae (Tubifex speciosus zavreli) are present.

72. Tubifex tubifex (O. F. MÜLLER, 1774)

Table 13, Figs. 9-20

1774 Lumbricus tubifex O. F. MÜLLER, Verm. terr. fluv., 1 (2):27.

1816 Tubifex rivulorum, LAMARCK, Hist. nat. anim. sans vertebr., 3:225.

1939 b Tubifex tubifex, HRABĚ, Věst. čs. zool. spol., 6-7:222-223, Figs. 1-2.

The body is 20-85 mm long, pink, without transverse yellow stripes on the posterior segments, and consists of up to 130 segments.

Dorsal tufts in front of the clitellum contain 2-5 fanlike chaetae and the same number of hairlike chaetae. Ventral tufts contain (2) 3-5 serrated chaetae, and a smaller number behind the clitellum. The hairlike chaetae are generally in Segments II to XXX; they are longest in Segments VI to IX (up to 100 μ m), and they are covered by fine barbs which are visible only at a magnification of at least 1000 x. Fanlike chaetae in front of the clitellum have 2 equally long and wide serrations and several fine intermediate serrations. The serrations subtend an angle of 30°, and behind the clitellum the upper serration is somewhat narrower at the base than the lower one, and the angle between them increases to 80°. The number of intermediate serrations decreases, but there are still 1-2 intermediate serrations even in Segment XX. In the central and posterior segments, the dorsal serrated chaetae completely resemble the ventral chaetae of the same segments. The ventral chaetae in front of the clitellum have an upper serration which is noticeably longer and narrower at the base than the lower serration; in Segment XII both serrations are equal in length, the base of the upper serration is twice as narrow as the base of the lower one which forms a right angle with the upper serration. In Segment XXX and in subsequent segments the serrations are shorter than the serrations in front of the clitellum, the upper is 3 times as narrow as the lower one at the base, and the difference in the width of the serrations becomes even greater in the tail segments. Sexual chaetae are missing. Some sexual individuals have only one chaeta instead of the ventral tufts in Segment X, and sometimes the ventral chaetae are completely missing in Segment XI.

The clitellum extends from Segment XI to Segment XII. One pair of spermathecae has openings in Segment X directly in the lateral line. Spermathecae are frequently missing. One pair of male ducts has openings in Segment XI placed only slightly to one side of the line of the ventral chaetae, which are sometimes missing in mature individuals. One pair of testes is in Segment X on Dissepiment 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. One pair of minute female funnels is on Dissepiment 11/12. One pair of male funnels is on the anterior side of Dissepiment 10/11. The sperm duct is 6-7 times longer than the atrium, forms loops, generally enters Segments XII to XIII, and is made up of two parts: the narrow anterior section is ciliated, whereas the posterior section is approximately twice as long and wide as the anterior section, and has transverse grooves on the inside but no cilia. The sperm duct leads into a relatively long pear-shaped atrium. Its lining is thinner in the ental half on the dorsal side than on the ventral side. The ectal section of the atrium has normal cubic epithelium. The penis is generally retracted into a shallow penial sheath. The exterior wall of the penis in the ental section is made up of flat epithelium which changes to the interior lining of the penis, which is made up of special long cells representing the actual glans penis. The ectal section of the penis with cubic or cylindrical epithelium is covered on the surface by a thick layer of granules which may be seen only on cross sections at a high magnification. In native samples this portion of the penis appears as a small dark barrel, and after fixation the dark colouring disappears. It is a case of a special nature which is unknown in other Naidids; it may definitely not be considered as a cuticular tube as was suggested by authors studying Oligochaeta only by looking at live individuals at a low magnification. Spermathecae with [84]

large saclike ampullae and long outlets are frequently missing. Spermatozeugmata are long, gradually tapering toward the posterior end, and they resemble the spermatozeugmata of Tubifex tubifex blanchardi as illustrated by VEJDOVSKÝ (1891). However the illustrations in VEJDOVSKÝ (1884, Table 12, Fig. 16), DIXON (1915, Table 7, Fig. 50), and ČERNOSVITOV (1926, Fig. 5) are incorrect.

Cosmopolitan species.

In addition to Limnodrilus hoffmeisteri, Tubifex tubifex belongs to the most widely-spread Naidids in the waters of Czechoslovakia; they are found in the cleanest Tatra high-mountain lakes above the tree line as well as in very polluted waters. In the summer of 1933 I collected 126 quantitative samples (14 x 15 cm) from 20 lakes in the High Tatra Mountains above the tree line at an elevation of 1800 to 2157 m. Tubifex tubifex was found in 47 samples from 15 lakes, although it was not present in large numbers. In the lowland waters, Tubifex tubifex lives frequently in great numbers, particularly in polysaprobic waters, where it is outnumbered only by Limnodrilus hoffmeisteri. It may therefore be used as an indicator of polluted water only if the number of individuals is considered and not only their mere presence. This species may be easily distinguished from the numerous species of the genus Limnodrilus found in Czechoslovakia by its pink soft body without yellow stripes on the posterior segments, whereas in the species of the genus Limnodrilus the body is dark-red, more rigid, with yellow stripes on the posterior segments; Tubifex tubifex may also be recognized by the hairlike chaetae in the anterior segments which are missing in the genus Limnodrilus.

I have not yet been able to find characteristics which would

enable one to distinguish sexually immature individuals of Tubifex tubifex from other Naidids with hairlike chaetae, particularly from Potamothrix hammoniensis which is also not rare in Moravia. Here we must distinguish the two species only by looking at sexually mature individuals with clitella. In contrast to Potamothrix hammoniensis, Tubifex tubifex does not have modified spermathecal chaetae in Segment X. Their atria are also very different.

73. Tubifex ignotus (ŠTOLC, 1886)

[85]

Table 14, Figs. 1-6

1886 b Lophochaeta ignota ŠTOLC, Zprávy zas. kr. čes. spol. nauk 1885:143 (or 646).

1888 Lophochaeta ignota, ŠTOLC, Rozpr. král. čes. spol. nauk, (VII r),

2:40-41, Table 1, Figs. 4-6, Table 2, Figs. 6, 10, Table 3, Figs. 7-9,

13, Table 4, Figs. 13b 1-5.

1901 Tubifex filum, MICHAELSEN, Verh. natwiss. Ver., Hamburg 1900, (3.F.), 8:68-69.

1962 Tubifex ignotus, HRABĚ, Spisy přír. fak. univ., Brno, 435:301-305,
326-327, Figs. 16-21.

The body is up to 70 mm long, 0.8 mm wide, and consists of up to 170 segments.

Dorsal tufts in front of the clitellum contain 2 hairlike and 2-3 fanlike chaetae, and ventral tufts contain 3-4 serrated chaetae. Ventral tufts behind the clitellum contain first 1-2 hairlike and 2-3 fanlike chaetae, and then 2-3 serrated chaetae. The number of chaetae decreases in the central and posterior segments; hairlike chaetae frequently

fall out in the central segments, and in the posterior segments they are missing. Hairlike chaetae are very long and thin and they have numerous barbs. In the anterior segments they are slightly shorter than the diameter of the segment, and in the central segments they are longer than the diameter of the segments and are 700-900 μm long. Fanlike chaetae have 2 equally-long serrations and 1-2 intermediate serrations. Their supranodular section is bent in a characteristic S-shape, and is 4.5 times shorter than the other part of the chaeta. In Segment LVII the fanlike chaetae still have 1 intermediate serration, but the shape resembles the ventral chaetae; they have serrations of equal length, but the upper serration is narrower than the lower one which is perpendicular to the chaetal axis. In the ventral chaetae the upper serration is slightly longer and narrower than the lower one.

The clitellum extends from Segment X to Segment XI. One pair of spermathecal openings is placed laterally from the ventral chaetae of Segment X. One pair of male openings is located in a similar position in Segment XI. One pair of testes is in Segment X and one pair of ovaries is in Segment XI. One pair of male funnels is in Segment X on Dissepiment 10/11. Long sperm ducts, ciliated along their entire length, become gradually wider from the ental end toward the ectal end. Their diameter at the ental end is 22 μm , and at the ectal end it is 32-40 μm . Sperm ducts lead to the apical end of a small spherical ampulla. A long narrow outlet ends in a small cylindrical penis which is retracted into a deep penial sheath. The penis is covered by thick cuticle, but it is not covered by a true penial tube of a permanent shape. A large prostate leads into the atrial ampulla. Spermathecal ampullae are saclike and gradually change to an outlet.

England, France, Switzerland, Italy, Yugoslavia, Federal Republic of Germany, Denmark, Finland, Poland, Roumania, USSR, USA.

Bohemia: Vltava near Prague, stream near Hrdlořezy and Běchovice, Hlinsko, Mariánské Lázně (ŠTOLC, 1888), Central Labe Region (LIŠKOVÁ, 1976), Labe near Liběchov, Roudnice, Lovosice, Vltava near Vyšší Brod, Rožmberk, Hluboká, Libšice, and Miřejovice, Chrudimka near Pardubice, Malše in České Budějovice, Krušné Hory: Bílý Stream (HRABĚ, 1939), Berounka (ČERNOSVITOV leg.).

Moravia: Křtinský Stream near Adamov, Jihlava River near Templštýn, Radostín, Cikhaj na Černomoravské vysočině (HRABĚ, leg.).

Slovakia: Štrbské pleso, Štrba (HRABĚ, 1939), branches of the Danube near Čilistov (HRABĚ, 1941).

74. Tubifex nerthus MICHAELSEN, 1908

[86]

Table 14, Figs. 7-16

1908 Tubifex nerthus MICHAELSEN, Arch. Naturgesch., 74 I: 155-159,
Table 3, Figs. 15-20.

The body is approximately 15 mm long, at most 0.7 mm wide, and consists of 50 segments.

Dorsal tufts in front of the clitellum contain 3-5 fanlike and 2-4 hairlike chaetae, generally with intermediate serrations. The ventral tufts of Segment X contain 3-4 (5) normal serrated chaetae. Segment XI has 1-2 penial chaetae per tuft. The number of chaetae decreases behind the clitellum. Dorsal fanlike chaetae in the anterior segments have main

serrations of nearly equal length and 4-6 intermediate serrations of varying length. In Segment XII and in subsequent segments the two edge serrations are noticeably shorter than in the preceding segments, they subtend a right angle, and they are equally thick at the base. The hairlike chaetae of many individuals studied are also covered by a layer of fine barbs which are visible at a magnification of at least 1000 x (MICHAELSEN, 1908, Table 3, Fig. 19). The ventral chaetae in the anterior segments have an upper serration which is at most 1.5 times longer than the lower one, in subsequent segments in front of the clitellum its length rapidly decreases, and in Segment XII it is shorter and much narrower at the base than the lower serration. Three individuals which I studied had most of the anterior ventral chaetae with serrations of different lengths. In Segment XI there were 1-2 penial chaetae with an unserrated, sharp, erect ectal end in place of the ventral chaetae. One sexually mature individual had on one side of the body in Segment XI 3 chaetae of different age: one had an unserrated bent ectal end, the second, not yet fully mature, was serrated with a tiny upper serration, and the third, still only half-developed, had an ectal end identical to the neighbouring ventral chaetae. This individual was probably at the end of the reproductive period and at the start of the reduction of sexual organs. The penial chaeta with a bent ectal end forms the transition stage between the unserrated penial chaeta, 120 μm long and 5 μm in diameter, which was illustrated by MICHAELSEN (1908, Fig. 18 in Table 3), and the normal ventral chaeta.

One pair of spermathecal openings is placed laterally from the ventral chaetae in Segment X. One pair of male ducts has openings located in a similar position with respect to penial chaetae in Segment XI. One pair

of testes is in Segment X, and one pair of ovaries is in Segment XI. One pair of male funnels is on Dissepiment 10/11. Sperm ducts are relatively short, ciliated along their entire length, and each leads to the apical end of a pear-shaped atrial ampulla. A tubelike outlet section ends by a conical penis in a small, nearly spherical penial sheath. The penis is covered by cuticle which is thicker than on the surface of the body. Penial tubes are missing. A compact prostate leads into the atrial ampulla. Spermathecae have a large, saclike ampulla and a short tubelike outlet which is visibly separated from the ampulla.

England, Federal Republic of Germany, Denmark, Finland.

Bohemia: Ploučnice, downstream from Horecká Water Reservoir (ROSOL, 1971 leg.).

75. Tubifex montanus KOWALEWSKI, 1919

[87]

Table 14, Figs. 17-22

1919 Tubifex montanus KOWALEWSKI, Rozpr. wydz. mat.-przyr. Ak. Um., Krakow, (ser. 3), 18 B.

1939 b Tubifex montanus, HRABĚ, Věst. čes. zool. spol., 6-7:223-227, Figs. 3-8.

The body is 8-12 mm long, at most 0.7 mm wide, and consists of 40 to 50 segments.

Dorsal tufts in front of the clitellum contain 2-3 fanlike and 2-3 hairlike chaetae, and ventral tufts contain initially 3-4 (5) serrated chaetae, in Segment XI the ventral chaetae are missing, and behind the

clitellum the number of chaetae decreases. Fanlike chaetae have 2 nearly equally long serrations and several intermediate serrations, and behind the clitellum the upper serration is longer than the lower one. Hairlike chaetae along one side have barbs, and in front of the clitellum these chaetae are as long as or only slightly shorter than the body diameter. Ventral chaetae in front of the clitellum have an upper serration almost twice as long as the lower one, they subtend a right angle, and behind the clitellum the upper serration is shorter than in front of the clitellum, but it is still longer than the lower serration.

The clitellum extends from the chaetae in Segment X to Intersegmental Notch 12/13. One pair of male openings is in the place of ventral chaetae in Segment XI. Spermathecae are missing. One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. One pair of male funnels is on Dissepiment 10/11. Sperm ducts are ciliated on the inside along their entire length, they are nearly 1.5 times longer than the atria, and they form numerous loops in Segment XI but they do not enter Segment XII. Atrial ampullae are asymmetrical, pear-shaped as in *Tubifex tubifex*, and they gradually become narrower toward the ectal end. A large compact prostate empties into the atrial ampulla near the sperm duct outlet. The penises in the sheath are surrounded by a funnel-like, somewhat bent cuticular tube, 180 μm long and 60-68 μm in diameter at the ental end.

Slovakia: West Tatra Mountains, Ráčkova plesa (KOWALEWSKI, 1912), High Tatras Mountains, Pleso nad Skokom (HRABĚ, 1939).

In individuals caught in Pleso nad Skokom from July to October, the clitellum, male funnels, and sperm ducts were developed, but the atrial ampullae and the entire ectal section of the male duct was resorbed, and only in individuals collected on June 21, 1934 was the entire male outlet properly developed.

76. Tubifex speciosus zavreli (HRABĚ, 1942)

Table 16, Figs. 5-11

1942 Peloscolex zavreli HRABĚ, Sbor. kl. přír., Brno, 24:23-25, 29, Figs. 1-10.1979 Haber zavreli, HOLMQUIST, Zool. Ser. 8:52.

The body is at most 12 mm long, 0.3 mm wide, and consists of 50 to 68 segments. The skin is wrinkled in the anterior half of the body, and congealed secretion with attached foreign particles collects in shallow grooves which are well visible in the last few segments in front of the clitellum and in several segments behind it. In individuals from Vesela and from Valašske Meziříčí, the wrinkled skin is without the secretion.

Dorsal tufts generally contain 1 hairlike and 1 fanlike chaeta, and only in some segments there are 2. The ventral tufts on the anterior contain 2-3 serrated chaetae, and always 2 chaetae behind the clitellum. Segments X and XI have 1 sexual chaeta on each side. Hairlike chaetae are covered by barbs which are well visible at a magnification of 1000 x; they are erect and not bent, in Segment III they are 280 μm long, in Segment V they are 448 μm long, and in Segment IX the chaetae are 420 μm long. Fanlike chaetae are on the anterior section of the body as well as on the central and posterior segments. The chaetae end by 2 narrow, curved serrations of equal length and several (approximately 8) intermediate serrations. The ventral chaetae along the entire length of the body have a conspicuously long upper serration, which is almost twice as long as the lower serration in the anterior segments; the serrations subtend an acute angle. The sexual chaetae have the same shape, and the spermathecal chaetae in Segment X have an ectal section which extends to the surface

[88]

of the body. The penial chaetae extend into a special sac which opens into the penial sheath. The ectal end of the sexual chaetae is erect, has troughlike depressions, and is slightly wider than the other parts of the chaeta. The sexual chaetae are shorter by one third than the ventral chaetae of neighbouring segments; they are 62-67 μm long, whereas ventral chaetae in Segment XII are 90 μm long.

The clitellum extends from Segment X to Segment XII. One pair of spermathecae has openings in Segment X directly in the lateral line. One pair of male openings is in Segment XI in the line of the ventral chaetae, one pair of testes is in Segment X, and one pair of ovaries is in Segment XI. One pair of long sperm ducts is narrow in the ental half, ciliated on the inside, and the ectal half is twice as wide and without cilia. Each sperm duct empties into a spindlelike atrium with granular secretion in the interior lining. Behind the glandular atrial ampulla there is a narrow outlet ending by a cylindrical penis in a pear-shaped sheath into which opens a voluminous sac with a sexual chaeta. The penis is covered by a cuticular tube 67 μm long, 17 μm wide at the ental end, and which has a bend edge at the ectal end. Spermathecae have long ampullae passing through several segments. Very long spermatozeugmata which are wound like a spiral are present in the spermathecae. Until now it is known only from wells.

Poland (KASPARZAK, 1973 c).

Moravia: Veselá near Valašské Meziříčí (ROSOL, 1970 leg.).

Slovakia: Rajec nad Rajčankou (HRABĚ, 1942).

Individuals from the well in Rajec nad Rajčankou have stipes of secretion with detritus on the body; in 1942 I classified them into the genus Peloscolex.

In 1962 I described a new species Alexandrovia from Oněžské Lake, which belongs into the family Telmatodrilidae; the body is covered by secretion with detritus as in members of the genus Peloscolex, and therefore the secretion mixed with detritus is not characteristic only for the genus Peloscolex.

Individuals from Rajec have the male sexual openings and modified sexual chaetae in Segments X and XI as do individuals of the species Tubifex speciosus from Ochrid Lake and members of its subspecies monfalconensis; they differ from each other, not considering the secretion, by the shape of the fanlike chaetae, and therefore I consider them to be only a subspecies of the species speciosus in contrast to HOLMQUIST (1979), who considers them to be independent species of the special genus Haber. I do not agree with this, because then the genus Tubifex would have to be divided into a large number of monotypical genera, which would not be very useful.

Isochaetides HRABĚ, 1966

1966 Isochaetides HRABĚ, Spisy přír. fak. univ., Brno, 470:74-75.

1967 Isochaetides, HRABĚ, Spisy přír. fak. univ., Brno, 485:352.

Dorsal tufts contain only serrated chaetae which are similar to ventral chaetae. Sperm ducts are long. Penises have cases which differ from the penial tubes of the genus Limnodrilus. Atrial ampullae have a large compact prostate.

77. Isochaetides michaelseni (LASTOČKIN, 1937)

Table 14, Figs. 23-26, Table 15, Figs. 1-3

1937 Limnodrilus michaelseni LASTOČKIN, C. R. Ac. Sci. URSS, 17:233, Fig. 1.1941 Limnodrilus michaelseni, HRABĚ, Práce mor. přír. spol., 13, Paper 12: 28-30, 33-34, Figs. 29-41.1966 Isochaetides michaelseni, HRABĚ, Spisy přír. fak. univ., Brno, 470:75.

The body is at most 25-33 mm long, 0.6 mm wide, and consists of up to 118 segments.

The frontal lobe is small and conical. Segments II to X rapidly increase in size, and after the clitellum they gradually decrease in size toward the posterior. All chaetae are serrated. Dorsal tufts in front of the clitellum have 4-7 chaetae, in Segment IX they have 3, in Segment X they have 2, in Segment XI they have 1 chaeta, and in subsequent segments they have 3-4 chaetae. Ventral tufts have 5-6 chaetae in Segments II to VII, 4 in Segment VIII, 1 modified sexual chaeta in Segments IX, X, and XII in sexually mature individuals, no chaetae in Segment XI, and 3-4 normal ventral chaetae in Segment XIII and in all subsequent segments. In several anterior segments the upper serration is much shorter than the lower one, but even in some segments in front of the clitellum the length of the lower serration decreases although the length of the upper serration remains constant. In all segments after the clitellum the upper serration is only slightly shorter than the lower one, and its base is much wider than that of the lower one. Sexual chaetae in Segments IX, X, and XI have an upper serration which is twice as long as the lower one. In individuals caught in the Danube the sexual chaetae are 86-100 μm long (125-145 μm long

in individuals caught in the USSR), whereas normal ventral chaetae are, for example in Segment VII, 104 μm long.

A saddlelike clitellum begins behind the chaetae in Segment X and ends in Intersegmental Notch 12/13. One pair of spermathecae has openings laterally in front of the sexual chaetae in Segment X. One pair of male openings is in place of the ventral chaetae in Segment XI.

Dissepiments in the anterior segments are thickened, particularly between Segments V and IX, where Dissepiment 7/8 is at most 38 μm thick; dissepiments past Dissepiment 9/10 have normal thickness. Chloragogenic cells begin in Segment V, where as well as in the next two segments they are up to 119 μm long, whereas the diameter of the alimentary tract is only 75 μm ; in other segments the chloragogenic cells are shorter. Segments II to VII have one pair of very long, developed, unforked dorso-ventral blood vessel.

One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Spermathecae have a large egg-shaped ampulla and a very short outlet. One pair of large male funnels is on Dissepiment 10/11 in the cavity of Segment X. Sperm ducts are long, they sometimes pass into Segment XII, and they are ciliated on the inside along their entire length. The atrial ampullae are elongated and pearshaped, their outlets are long and narrow, and they have cylindrical penises at the ends. A large compact prostate leads into the atrial ampulla near the sperm duct junction. Penises are covered by a thick layer of cuticle on the medial side as well as on the side turned toward the anterior, however Isochaetides michaelsoni does not have penial tubes.

Bulgaria, USSR.

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Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941), Danube near Kováčov (HRABĚ, 1946 leg.).

Peloscolex LEIDY, 1851

1851 Peloscolex LEIDY, Proc. Ac. nat. Sci. Philad., 5:124.

1978 Peloscolex, Embolocephalus, Spirosperma, Orientodrilus, Baikalodrilus,
HOLMQUIST, Zool. Scr. 7:205-206.

The skin secretes a secretion which hardens, and when mixed with detritus, it covers the body in a thin layer or forms on it papillae of the same or different size. The frontal lobe may be retracted with special muscles into Segment II. Sperm duct is long. Atrium is generally spindlelike with a compact prostate in the middle. Fanlike chaetae are generally fine and they are hidden among hairlike chaetae. Sexual chaetae are generally missing.

78. Peloscolex ferox (EISEN, 1879)

Table 15, Figs. 10-21, Table 16, Fig. 1

1879 Spirosperma ferox EISEN, Bih. Svensk. Ac., 5, No. 16:10.

1903 Tubifex (Peloscolex) ferox, MICHAELSEN, Mitt. nathist. Mus. Hamburg,
19:196-202.

1962 Peloscolex ferox, HRABĚ, Spisy přír. fak. univ., Brno, 435:308, Figs. 25-35.

1964 Peloscolex ferox, HRABE, Spisy přír. fak. univ., Brno, 450:110.

The body is generally gray or rust-coloured, and is covered by papillae from hardened secretion and detritus. The rusty colour of the papillae and thus of the entire body is caused by iron compounds found in

the substrate. The skin cells are flat with elongated nuclei and on the surface they are covered by cuticle which is sometimes shed, so that the cuticular covering, which may reach a thickness of up to 5 μm is much thinner after shedding. Secreted papillae are as transparent as glass and they contain various particles of detritus: grains of sand, fragments of Diatom shells, various crystals, etc. The Peloscolex ferox papillae are approximately 25 μm high, and when viewed from the side, their shape resembles cubes and polyhedrons with rounded edges, or they may also be conical. Papillae of the secretion are shed with the cuticle, and therefore in some individuals the body is covered, as already stated, by a very thin cuticle with only a small amount of secretion and detritus not yet forming papillae. It should however be pointed out, that in some individuals fully developed papillae may be found even on a thin cuticle. In preparing permanent specimens, the papillae frequently fall off, particularly if the individuals are encased in Canadian balsam. In sexually mature individuals the clitellum has a thick layer of secretion and detritus which is not differentiated into papillae. The clitellum of live individuals as well as of individuals preserved in formalin is white.

In addition to papillae of secretion, the surface of individual segments has conical sensory papillae in two transverse rows: the anterior row is behind the imaginary intersegmental notch, and the second row is between the tufts of the respective segment. The dorsal side of the body has 3-4 sensory papillae, 2-3 papillae are present on each side between the dorsal and ventral chaetal tufts, and 2 papillae are present in the region between the chaetal tufts on the ventral side of the body. The number and more accurate placement of the papillae fluctuates; sometimes there are 2 papillae side by side, and at other times they are spaced apart.

The frontal lobe is generally retracted into Segment II.

Dorsal tufts in front of the clitellum have 3-5 hairlike and 1-3 fanlike chaetae, behind the clitellum there are initially 3-4 hairlike and 1-2 fanlike chaetae, and there are fewer chaetae in the posterior segments. Ventral tufts in Segments II to VI (IX) have 3 serrated chaetae, 2 in immature individuals, and subsequent segments always have 2 chaetae. In sexually mature individuals the ventral chaetae of Segment XI are missing. Hairlike chaetae in the anterior segments are conspicuously thick, bent in a sabrelike manner, and covered by numerous barbs. Fanlike chaetae in the segments in front of the clitellum have 2 serrations of equal length and several intermediate serrations, and they are hidden among the hairlike chaetae. Behind the clitellum the fanlike chaetae have 2 edge serrations which are much shorter than those of preceding segments, they subtend an acute angle, and intermediate serrations are also present.

The clitellum extends from Segment X to Segment XI. One pair of spermathecae has openings in Segment X in front of the ventral chaetae. One pair of male openings is in the place of ventral chaetae in Segment XI which have fallen out. One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Spermathecae have a large saclike ampulla and a separate outlet. The ental section of the outlet is lined with high epithelium, whereas the ectal section is lined with cubic epithelium, and the exterior surface is covered by a thick layer of muscles. One pair of male funnels is on Dissepiment 10/11 and the funnels open into the cavity of Segment X. Sperm ducts are long ciliated on the interior along their entire length, always have a constant diameter (25-32 μm), and each duct leads to the ental end of an elongated spindlelike atrial ampulla. The ampulla has a long and narrow outlet which ends with a penis in a very

deep penial sheath. Elongated penis is covered by a thick layer of elastic cuticle in the ental half, which should not be confused with the loose penial tube of other Naidids. A large prostatic gland enters the middle of the atrial ampulla and is surrounded by a very large sphincter at the base.

England, France, Switzerland, Italy, Federal Republic of Germany, Denmark, Sweden, Finland, Roumania, Bulgaria, USSR, USA.

Bohemia: Vltava near Prague (ŠTOLC, 1888), Labe near Roudnice, downstream from Lovosice, Ohře near Radonice and Libochovice, Malše in České Budějovice, small stream near Ruda near Třeboň (HRABĚ, 1939), Švarcenerská Canal (ŠTOLC, 1888).

Moravia: in various locations.

Slovakia: Popradské pleso (HRABĚ, 1929).

Peloscolex ferox does not occur as abundantly in the waters of Czechoslovakia as do other Naidids; only in Popradské pleso in the High Tatra Mountains was I able to collect large quantities of this worm of limited mobility. In 13 quantitative samples (14 x 15 cm) taken from a depth of 14-15 m, there were 1185 individuals in the sample collected on September 8, 1932, and 591 individuals in 15 samples collected on June 10, 1938 (HRABĚ, 1942).

79. Peloscolex velutinus sarnensis (PIERANTONI, 1906)

Table 16, Figs. 2-4

1879 Saenuris velutina GRUBE, J. B. schles. Ges. veterl. Kult., 56:116.

- 1892 Embolocephalus velutinus, RANDOLF, Jena. Zeit. Natwiss., 27:463-469, Tables 17-18.
- 1906 Tubifex sarmensis PIERANTONI, Arch. zool., Napoli, 2:223, Figs. 1-4.
- 1964 Peloscolex velutinus, P. fontinalis; HRABĚ, Spisy přír. fak. univ., Brno, 450:110-111, Figs. 16-19, 22-24.
- 1973 Peloscolex velutinus velutinus, P. velutinus sarmensis (=fontinalis), HRABĚ, Biol. Vest., Ljubljana, 21:24.

The body is at most 18 mm long and covered by papillae of secretion of various size: small papillae (20-35 μm high), which are similar to the papillae of, for example, P. ferox, cover the entire body of the individual except for the last segments, whereas the large papillae are present on each segment in 1 or 2 transverse rows; only young or older individuals who shed the cuticle have initially only small papillae. The large papillae of secretion are on the dorsal side from Segments IV to V to Segment IX in one row between the two tufts of dorsal chaetae, and in segments after the clitellum they are in 2 rows between the first and second quarter of the segment and also in the plane of the dorsal and ventral chaetae. The large papillae on the sides and on the ventral side are slightly smaller than the papillae on the dorsal side. In the anterior segments the large papillae are 47-56 x 20-22 μm , and behind the clitellum the papillae in the front row are as large as the papillae in the anterior segments, whereas the papillae in the second row are generally larger. The largest papillae in the second row are 40-70 x 20-35 μm and with their height they extend beyond the neighbouring papillae by 20-30 μm .

Dorsal tufts in front of the clitellum have 3-5 hairlike and 1-2 very small chaetae which are difficult to see; the small chaetae change

to a very thin flagellum at the ectal end (the serrated end is broken off?). Dorsal tufts behind the clitellum have 2-4 hairlike chaetae. All ventral tufts in the subspecies sarnensis have 2 chaetae always with an unserrated ectal end. The ventral chaetae in individual tufts are of different thicknesses, and in the anterior segments the ectal end is bent less than in the central and posterior segments. Segment X has 1 spermathecal chaeta per tuft instead of the ventral chaetae; the spermathecal chaeta is 145 μm long, has a straight and sharp ectal end, and a bent ental end. In the ectal section these chaetae have a troughlike depression and they pass through a glandular area into which glandular cells lead.

The clitellum extends from Segment X to Segment XI. One pair of spermathecal openings is in Segment X in line with the ventral chaetae in front of the opening with the sac containing the spermathecal chaeta. One pair of male sexual openings is in Segment XI in place of the ventral chaetae which have fallen out. One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Male funnels are on Dissepiment 10/11, they continue in a narrow (30-35 μm) sperm duct which is ciliated on the inside along its entire length, and which is much longer than the other section of the male duct. A spindlelike atrial ampulla becomes a narrow duct at the ectal end which ends in a large conical penis. The penis is in a deep penial sheath without a cuticular case. A large compact prostate leads into the atrium. Spermathecae have a very long outlet consisting of two sections and a very long ampulla, and they extend sometimes as far as Segment XIII. The ampulla contains long spermatozeugmata which are wound in a spiral manner.

Italy, Switzerland (Aesch), Yugoslavia, Bulgaria (Danube, RUSEV leg.), Roumania.

This species has not yet been found in Czechoslovakia.

Peloscolex velutinus velutinus has one serrated and one unserrated ventral chaeta in the tufts in the anterior segments.

Psammoryctides HRABĚ, 1964

- 1875 Psammoryctes VEJDOVSKÝ, S. B. k. böhm. Ges. Wiss. (mat.-naturw. Kl.),
1874:191. NB. nomen occup. for 1835 Psammoryctes (Rodentia) POEPPIG.
1964 Psammoryctides HRABĚ, Spisy přír. fak. univ. Brno, 450:107.

Sperm duct is long, a small pear-shaped atrial ampulla continues in a very long duct divided into 3 well-defined sections: non-glandular section, glandular section, and penial bulb with a penis retracted into a penial sheath. A large compact prostate leads into the atrial ampulla.

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80. Psammoryctides barbatus (GRUBE, 1861)

Table 16, Figs. 12-17, Table 17, Figs. 1-7, 22

- 1861 Saenuris barbata GRUBE, Ein Ausflug nach Triest. Berlin, 75:129, 152,
Table 4, Fig. 10.
1876 Psammoryctes umbellifer, VEJDOVSKÝ, Z. wiss. Zool., 27:137, Table 8,
Figs. 1-5, 7-12.
1964 Psammoryctides barbatus, HRABĚ, Spisy přír. fak. univ., Brno, 450:107.

The body is up to 70 mm long, at most 0.8 mm wide, and consists of approximately 90 segments.

Dorsal tufts in Segments II to XI (XII) have 4-8 fanlike and 1-2 hairlike chaetae, and in subsequent segments there are only 2 serrated chaetae per tuft. The ventral tufts have initially 3-4 serrated chaetae, and 2 serrated chaetae behind the clitellum. In individuals who have reached complete sexual maturity the dorsal chaetae are missing in Segments X to XI, and the ventral chaetae in Segment X are replaced by spermathecal chaetae, and in Segment XI the ventral chaetae are missing. Hairlike chaetae have distinct barbs. Fanlike chaetae in the anterior 10 to 11 (12) segments are very typical for this species, and the chaetae have both edge serrations narrow, spaced widely apart, and there is a large number of intermediate serrations between them. The ectal end of these chaetae is slightly bent like a trough. I found fanlike chaetae to be as far as in Segment XI in 8 out of 10 individuals, and only in 2 individuals as far as in Segment X or XII. Following the segments with these chaetae, there are dorsal tufts with a short and narrow upper serration and a long lower serration which is wide at the base. These serrated chaetae have 1-2 intermediate serrations in one or two segments following Segments X to XII. In ventral chaetae in Segment II to III the upper serration is longer and narrower than in subsequent segments. Behind the clitellum the upper serration is much shorter and narrower than the wide and long lower serration. Spermathecal chaetae in Segment X are barlike, 220-254 μm long, they have a trough on the ectal end, and the ental end is bent. The ventral chaetae in the anterior segments are much shorter than in subsequent segments. The same is true in Segments X and XI in old individuals who have only gonads without spermathecae and male openings. In such individuals the chaetae are 100 μm long in Segment II, 125 μm in Segment III, 230 μm in Segment IV, 114 μm and 120 μm in Segment X, 110 μm in Segment XI, and 230 μm in Segment XII. Hairlike

chaetae are up to 700 μm long, and fanlike chaetae in Segment VII are 200 μm long.

The clitellum extends from Segment X to Segment XI. One pair of spermathecae has openings in Segment X in the line of ventral chaetae. One pair of male openings is in the same position in Segment XI. One pair of large male funnels is on Dissepiment 11/12. Very long sperm ducts lead to a small atrial ampulla, which in some individuals is as far as in Segment XV, into which ducts of glandular cells lead at the opposite side; these cells form a voluminous prostate. At the location where the ductuli enter the atrial ampulla they are surrounded by a sphincter. Some of the ductuli flare out at the end inside the ampulla and form the main component of its lining. The majority of the ductuli pass into a non-glandular section which is lined with flat epithelium. Here the ductuli pass in several bundles under the flat epithelium into the glandular section which is wider than the preceding section, and form part of its lining; at the end they become wide in an ampullar manner as in the atrial ampulla. A large conical penial bulb follows the glandular section. It is lined with a syncytium of epithelial cells with nuclei at their bases. Approximately in the center of the bulb the syncytium separates forming a dome-like cavity. When the penis is extended (Fig. 7 in Table 17), the lower half of the syncytium forms the lining of the tube, covered by cuticle on the exterior, and the upper half represents the actual glans penis. The duct in the lower half of the syncytium is narrow, and in contrast to the duct in the upper half, it is lined with thick cuticle, which covers not only this section of the male duct, but the penial sheath as well, and it also becomes the covering of the skin of the body. Spermathecae have a very long ampulla which occupies several segments. In the middle of its long

and narrow outlet, the wall bulges out and forms a glandular sac; the ectal end of the spermathecal chaeta passes through the center of the sac. Up to 6 small glands lead to the sac.

England, France, Switzerland, Italy, Yugoslavia, Federal Republic of Germany, Denmark, Finland, Poland, Roumania, Bulgaria, USSR.

Czechoslovakia: this species is very abundant in clean waters, particularly in regions with a sandy bottom.

81. Psammoryctides albicola (MICHAELSEN, 1901)

Table 16, Figs. 18-23, Table 17, Fig. 8

1901 Lophochaeta albicola MICHAELSEN, Verh. naturw. Ver., Hamburg, 3 Folge, 8:69-70.

1903 Lophochaeta albicola, MICHAELSEN, Mitt. naturh. Mus., Hamburg, 19:202-206, Figs. 5-7.

The body is 25-35 mm long, 0.9 mm wide in the clitellum region, and consists of 70 to 98 segments.

The dorsal tufts in front of the clitellum contain 2-3 serrated and 1-2 long hairlike chaetae with barbs, and behind the clitellum there are 1-2 hairlike and 1 serrated chaetae per tuft. Long hairlike chaetae occur even as far back as the sixtieth to eventyeth segments although they fall out in many segments. Ventral tufts in Segments II to VIII have 3 serrated chaetae, 2 chaetae behind the clitellum, and 1 chaeta in the posterior segments. Dorsal serrated chaetae in Segments II to XV have an

upper serration which is much shorter than the wide lower serration, and they have 2-3 intermediate serrations; in other respects the dorsal serrated chaetae resemble the ventral chaetae as far as size and overall appearance are concerned. Ventral chaetae in Segments II to III are smaller than in subsequent segments, they have an upper serration which is noticeably longer than the lower one, and in subsequent segments, the upper serration is noticeably shorter than the lower one. In sexually mature individuals, dorsal chaetae in Segments X to XI are missing, ventral chaetae in Segment X are replaced by spermathecal chaetae, and ventral chaetae in Segment XI are missing. Barlike spermathecal chaetae are 200 μm long, and by their shape they resemble the modified chaetae of Ps. barbatus and Ps. moravicus.

The clitellum extends from Segment XI to Segment XII. One pair of spermathecae has openings in Segment X in place of the ventral chaetae. One pair of male openings is in a similar position in Segment XI, one pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Spermathecae and male ducts have a similar configuration as in Psammoryctides barbatus, but the penis is shorter than in barbatus but longer than in moravicus.

England, Italy, Federal Republic of Germany, Finland, Poland,
Roumania, Bulgaria, USSR.

[95]

Moravia: downstream from Kolby near Pouzdřany (HRABĚ, 1928-1937 leg.), Hlohovečský Pond near Lednice (1928), Šatava near Iváň (HRABĚ, 1961 leg.).

Slovakia: tributary of Rudava near Leváry (HRABĚ, 1961 leg.).

82. Psammoryctides moravicus (HRABĚ, 1934)

Table 16, Figs. 24-25, Table 17, Figs. 9-10

1934 Tubifex (Psammoryctides) moravicus HRABĚ, Zool. Anz., 107:33-39, Figs. 1-10.

Live individuals are approximately 30 mm long, 0.9 mm wide in the clitellum region, and consist of 80 to 95 segments. Frontal lobe is short and conical.

Dorsal tufts in front of the clitellum have 4-5 hairlike and 2-3 fanlike chaetae, in Segment XI chaetae are missing, and behind the clitellum each tuft has 1 serrated chaeta and up to Segment XX there may also be an additional short hairlike chaeta. Ventral tufts in front of the clitellum generally have 3, and rarely 2 or 4 serrated chaetae, in Segment X they have 1 spermathecal chaeta, in Segment XI chaetae are missing, and behind the clitellum there are initially 2 chaetae per tuft and then there is only one. Hairlike chaetae have barbs which are visible at a higher magnification. Fanlike chaetae in Segments II to XIII (XIV) have 2 large serrations of equal length and generally 4-5 intermediate serrations between them. From Segment XV the fanlike chaetae are replaced by simple serrated chaetae which have an upper serration shorter and thinner than the curved lower serration. Ventral chaetae resemble the dorsal serrated chaetae, but in the anterior segments they have an upper serration which is much longer than the lower one. Chaetae in Segments II to III are considerably shorter than chaetae in other segments. Spermathecal chaetae in Segment X are barlike as in Psammoryctides barbatus, they have a trough on the ectal end, they are bent at the ental end, and they are 193-215 μ m long.

The clitellum extends from the posterior half of Segment X to

Intersegmental Notch 12/13. The ventral side of Segments XI to XII bulges inward and lacks the clitellum glandular cells. One pair of spermathecal openings is in place of the ventral chaetae in Segment X. One pair of male ducts has openings in a similar position in Segment XI. One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. The male duct apparatus is similar in structure to that of Psammoryctides barbatus. It is very long and sometimes extends as far as into Segment XV, but the penis is shorter than in both preceding species. Spermathecae consist of a very long ampulla, which sometimes extends as far as into Segment XVII, and a short outlet. A chaetal sac with 1 spermathecal chaeta and several glands leads into the side of the outlet. The outlet extends, and therefore the end of the spermathecal chaeta extends to the surface of the body in some specimens. One pair of inconspicuous female funnels is on Dissepiment 11/12. One unpaired sperm sac, formed by the bulging of Dissepiment 9/10 in Segment IX, sometimes extends as far as Segment VII. A second sperm sac starts on Dissepiment 10/11 and frequently extends as far as Segment XXII.

Yugoslavia (HRABĚ, 1973).

Moravia: Hlohovecký Pond near Lednice, Dyje near Mušov (HRABĚ, 1934 leg.), Dyje near Šakvice (HRABĚ, 1960 leg.), Morava near Hodonín (HRABĚ, 1931 leg.), pool near Pouzdřanský Pond (HRABĚ, 1978 leg.). [96]

Slovakia: branches of the Danube near Čilistov (HRABĚ, 1941 leg.).

Limnodrilus CLAPARÈDE, 1862

1862 Limnodrilus CLAPARÈDE, Mem. Soc. Phys. Hist. nat., Genève, 16 II, 243.

Dorsal tufts contain only serrated chaetae which have the same shape as ventral chaetae. Sperm ducts are much longer than atria. Atrial ampullae are spindlelike with a compact prostate in the middle. Penises are in characteristic cuticular tubes which widen like a funnel at the ectal end. The body is firm, dark red, and the posterior segments generally have yellow pigment cells in transverse rows. Limnodrilae secrete a strong tube from mucus and detritus in which they remain even after being washed through a sieve in contrast to Tubifex tubifex (MRÁZEK, 1926:7), which is a Naidid equally abundant in the waters of Czechoslovakia.

83. Limnodrilus udekemianus CLAPARÈDE, 1862

Table 17, Figs. 11, 17

1862 Limnodrilus udekemianus CLAPAREDE, Mem. Soc. Phys. Hist. nat., 16 II: 243-247, Table 1, Figs. 4-5, Table 3, Fig. 13, Table 4, Fig. 1.

1884 Limnodrilus udekemianus, VEJDOVSKÝ, Syst. Morph. Olig.: 47, Table 8, Figs. 18-21, Table 9, Fig. 20, Table 10, Fig. 19-20.

1966 Limnodrilus udekemianus, HRABĚ, Spisy přír. fak. univ., Brno, 470:74, Figs. 30-32.

The body is up to 70 mm long and consists of at most 160 segments.

Dorsal and ventral chaetae in segments in front of the clitellum have a very long curved serration, and behind the clitellum the upper serration gradually becomes shorter until it is as long as the lower one. Even in individuals only 5 mm long, these chaetae, characteristic for this species, are present. Tufts in the anterior segments contain 3-8 serrated

chaetae, and in subsequent segments the number of chaetae decreases. Chloragogenic cells with numerous chloragosomatae cover the alimentary tract only from Dissepiment 5/6.

Penial tubes are 160-200 μm long, and they are approximately 4 times as long as the diameter of their ental end.

Cosmopolitan species.

Czechoslovakia: species very widely spread.

84. Limnodrilus helveticus PIGUET, 1913

Table 17, Figs. 13, 16, 18

? 1873 Limnodrilus profundicola VERRILL, Amr. J. Sci., (ser. 3), 2:451.

1913 Limnodrilus helveticus PIGUET, Rev. suisse Zool., 21:134, Figs. 8-10.

The body is up to 50 mm long and consists of 50 to 65 (90) segments. [97]

Dorsal and ventral chaetae have serrations of nearly equal length.

Anterior segments have tufts with 5-9 chaetae, and behind the clitellum there are fewer chaetae.

Chloragogenic cells cover the alimentary tract as in Limnodrilus udekemianus also only from Dissepiment 5/6.

Penial tubes, 194-300 μm long, are approximately 5 times longer than the diameter of their ental end.

England, Switzerland, Finland, Poland, Roumania, Bulgaria, ?USA.

Czechoslovakia: this species is not as widely spread as other species of this genus.

85. Limnodrilus hoffmeisteri CLAPPARÈDE, 1862

Table 17, Figs. 14, 19

1862 Limnodrilus hoffmeisteri CLAPPARÈDE, Mem. Soc. Phys. Hist. nat.

Genève, 16 II:248-252, Table 1, Figs. 1-3, Table 3, Fig. 12, Table 4, Fig. 6.

1884 Limnodrilus hoffmeisteri, VEJDOVSKÝ, Syst. Morph. Olig.:47, Table 8,
Figs. 13-17, Table 11, Fig. 4.

The body is 20-60 mm long and consists of 50 to 95 segments.

Dorsal chaetae have serrations of nearly equal length as the lower serrations. Anterior segments have 4-8 chaetae per tuft, and segments behind the clitellum have fewer chaetae.

Chloragogenic cells cover the alimentary tract from Dissepiment 4/5.

Penial tubes are 450-600 μm long, bent near the ectal quarter, and 8-14 times longer than the diameter of their ental end.

Cosmopolitan species which is abundant in polluted waters.

86. Limnodrilus hoffmeisteri f. parva (SOUTHERN, 1909)

Table 17, Fig. 15

1909 Limnodrilus parvus SOUTHERN, Proc. R. Irish Ac., 27 B, No. 8: 137-138,

Table 8, Fig. 5 D.

The body is 12-15 mm long and consists of 40-60 segments.

Dorsal and ventral tufts have 3-5 chaetae. Anterior segments have chaetae with an upper serration shorter than the lower one.

Chloragogenic cells cover the alimentary tract from Dissepiment 4/5.

Penial tubes are 300-500 μm long, and they are 8-12 times longer than the diameter of their ental end.

England, USSR, South America.

Czechoslovakia: very widely spread species, abundant in polluted waters, and perhaps they are individuals of the species Limnodrilus hoffmeisteri just sexually maturing.

87. Limnodrilus claparedeanus RATZEL, 1868

[98]

Table 12, Figs. 12, 20, 21

1868 Limnodrilus claparedianus RATZEL, Z. wiss. Zool., 18:590, Table 42, Fig. 24.

1884 Limnodrilus Claparedianus (!), VEJDOVSKÝ, Syst. Morph. Olig.: 48, Table 8, Figs. 22, 23, Table 11, Figs. 5-8.

The body is 30-60 mm long and consists of up to 120 segments.

Dorsal and ventral chaetae in front of the clitellum have an upper serration which is longer than the lower one, but not to such a large extent as in Limnodrilus udekemianus, behind the clitellum the upper serration becomes shorter, and in the posterior segments both serrations are equal in length. The anterior segments have up to 9 chaetae per tuft.

Chloragogenic cells cover the alimentary tract from Dissepiment 4/5.

Penial tubes are very long, fully developed ones are up to 1300 μm long, and they are up to 33 times longer than the diameter of their ental end. In individuals with a developing sexual apparatus the growing penial

tubes are shorter than in fully mature individuals, and in contrast to Limnodrilus hoffmeisteri, the tubes are never bent in the ectal section.

England, France, Switzerland, Federal Republic of Germany, Denmark, Poland, Roumania, Bulgaria, USSR, USA.

Czechoslovakia: species common in the waters of Czechoslovakia.

Family Lumbriculidae VEJDOVSKÝ, 1884

1884 Lumbriculidae VEJDOVSKÝ, Syst. Morph. Olig.:16, 50.

Eight chaetae are present in 2 dorsal and 2 ventral pairs in each segment except in Segment I and several growing posterior segments. Chaetae are unserrated or serrated with a very small upper serration. Hairlike, fanlike, and modified sexual chaetae are missing. Alimentary tract is without a ruminant stomach. In some genera the central and posterior segments have 1-2 pairs of lateral blood vessels with numerous blind-end blood vessels, but in other genera these lateral blood vessels are not present in this section of the body, or they are only partially developed. In genera which reproduce sexually, the number and distribution of the individual components of the reproductive apparatus does not vary in contrast to genera which reproduce asexually by architomy. In the latter genera the sexual apparatus is shifted toward the head end by several segments when compared with genera reproducing by amphigony, which is related to the limited number of regenerated head segments. In addition, the number of individual components of the reproductive organs fluctuates and is

variable; this is caused by the "disharmony" during their regeneration.

In the annelid genera found in Czechoslovakia, there are generally 2 pairs of testes in Segments IX and X on Dissepiments 8/9 and 9/10, and one pair of ovaries in Segment XI on Dissepiment 10/11. Spermathecae are either in front of the segments which contain atria or behind them. Most genera have 2 pairs of male funnels in the preatrial and atrial segment, but the genus Dorydrilus, not yet found in Czechoslovakia, has only one pair of anterior male funnels in the segment preceding the atrial segment. The genera Lampodrilus and Lumbriculus have 2 (posterior) male funnels on the posterior dissepiment in the atrial segment. Atria are covered by a diffuse prostate. The posterior pair of sperm ducts in annelids with 2 pairs of these organs passes through the dissepiment into the adjacent segment and returns to the atrial segment where it leads into the atria, which must be considered to be an atavistic phenomenon proving that the male ducts of annelid ancestors occupied 2 segments as in all other Oligochaeta: one segment contained the male funnels and the following segment had the sperm duct openings. Such male ducts (that is, with anterior male funnels) are still found in the genus Dorydrilus, whose classification under the family Lumbriculidae cannot be disputed because it has in all segments except Segment I 4 pairs of chaetae and a diffuse prostate. In the species of the genus Lampodrilus (if they have been studied in this respect), the sperm ducts also pass into an adjacent segment as a reminder of the old configuration, and then return into the atrial segment, and therefore STEPHENSON's opinion (1930:706) concerning the antiquity of this genus with differently structured male ducts (only with posterior funnels) is erroneous as are the systems of Oligochaeta developed from this incorrect viewpoint in the papers of YAMAGUCHI (1953:335) and BRINKHURST (1971:170). The family Lumbriculidae certainly is not an ancestral group of the other families of Oligochaeta.

Stylodrilus CLAPARÈDE, 1862

1862 Stylodrilus CLAPARÈDE, Mem. Soc. Phys. Hist. nat., Genève, 16 II:262-263.

Serrated chaetae have a very short upper serration which may be missing in the anterior segments. Central and posterior segments do not have lateral blood vessels with numerous blind ends. Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, respectively. One pair of ovaries is in Segment XI on Dissepiment 10/11. One pair of spermathecae is in Segment IX. One pair of male ducts has openings in Segment X. Two pairs of bell-shaped male funnels are freely positioned in the cavity of Segments X and XI or at the beginning of the second and third pairs of sperm sacs; male funnels are not attached to Dissepiments 9/10 and 10/11. In the Czechoslovak species, the posterior pair of sperm ducts passes into Segment XI, returns into Segment X, and enters the apical half of the atrial ampulla into which it empties.

88. Stylodrilus heringianus CLAPARÈDE, 1862

Table 18, Figs. 1-4

1862 Stylodrilus heringianus CLAPARÈDE, Mem. Soc. Phys. Hist. nat., Genève, 16 II:263-266, Table 3, Fig. 11, Table 4, Figs. 2, 13-17.

1884 Stylodrilus gabrètae, VEJDOVSKÝ, Syst. Morph. Olig.:53, Table 11, Figs. 9-16.

1924 Stylodrilus heringianus, KHOMOVÁ, Spisy přír. fak. Karl. univ., 1924, No. 12: 3-18, Figs. 1-8.

1926 Stylodrilus heringianus, MRAZEK, Věst. kr. čes. spol. nauk, (II tr.), 1926, sep. 1-13.

- 1929 Stylodrilus heringianus + gabretae + zschokkei + hallissy + vejdvskyi,
 HRABĚ, Zool. Anz. 84:14-15.
- 1970 Stylodrilus heringianus, HRABĚ, Spisy přír. fak. univ., Brno,
 515:287, Figs. 1-2.

The body is 25-60 mm long, 0.5 mm wide, and consists of 70 to 110 segments. The red dorsal blood vessel and the yellow pigmentation of the chloragogenic cells on the alimentary tract may be seen through the thin body wall. The anterior and central segments are divided by intrasegmental notches into two rings: the anterior is three times as thin as the posterior one. [100]

Serrated chaetae have an upper serration which is much shorter than the lower one. The upper serration is frequently worn down, particularly in several anterior segments.

The clitellum extends from Segment X to Segment XII. One pair of spermathecal openings is in Segment IX, and one pair of male ducts is in Segment X.

Dorsoventral blood vessels connect the dorsal and ventral blood vessels in Segments II to XXI. Only in the last 30 (?) segments do 2 pairs of very short lateral blood vessels without blind ends branch off from the dorsal blood vessel in each segment according to KHOMOVÁ. These blood vessels are sometimes slightly forked at the end (KHOMOVÁ, 1924, Fig. 8 c) (see also SOUTHERN, 1909:143-144, plate 9, Fig. 8 G. F.).

Excretory apparatus has various configurations. KHOMOVÁ did not find even two specimens with an identical nephridial arrangement. According to the author, one pair of nephridial funnels was on Dissepiment 6/7. Their duct passed through 7 segments. A second pair of funnels was behind

the sexual organs on Dissepiment 11/12 or 12/13 with a very long outlet duct as in the first and several other pairs. Only in the central segments were the outlet ducts shorter, they passed through only 2-3 segments, in many segments the nephridia were missing, and only in the posterior section of the body was there 1 pair of nephridia only in 2 segments: the funnel was in one segment, and the excretory duct was in the other. Nephridia were missing in the last 11 segments regardless of the length of the individual.

Two pairs of testes are in Segments IX and X. One pair of ovaries is in Segment IX. Two pairs of bell-shaped male funnels are positioned freely in the body cavity near Dissepiments 9/10 and 10/11, and they lead into the cavity of Segment IX and X or into the II and III pair of sperm sacs. Two pairs of sperm ducts, 20-40 μm wide, lead into the atrial ampulla near its apical end. Atrial ampullae are egg-shaped or pear-shaped and they are covered by prostatic cells. Penises are 175-300 μm long, they are slender and conical, and they are located on the surface of the body behind the ventral chaetae in Segment X. I found sperm cells in a small quantity on the male funnels and in spermathecae only in individuals fixated in May and June although mature eggs were present in the egg sacs even in other months. The anterior pair of sperm sacs is in Segment VIII and is formed by the bulge of Dissepiment 8/9, and the second pair is formed by the bulge of Dissepiment 9/10, and is either entirely in Segment X or it extends into the III pair of sacs on Dissepiment 10/11. The third pair extends into Segments XV to XVI, and egg sacs extend from Dissepiment 11/12 into Segment XVIII; sperm sacs are inserted into them.

Spermathecae have a large pear-shaped ampulla which tapers to form a well-defined narrow and short outlet. In individuals in the first stage

of sexual maturity the ampulla is lined with cylindrical epithelium; later the epithelium spreads out at the apical end of the ampulla and contains numerous vacuoles. Resorption of sperm in spermathecae was not observed in Stylodrilus heringianus. Spermathecae contain up to 9 crystals of calcium oxalate of various sizes; they have a tetragonal structure and according to KHOMOVÁ they are a combination of a tetragonal prism and a tetragonal bipyramid.

This species lives in tubes made from mucus (KOWALEWSKI, 1914:110 MRÁZEK, 1926:7).

[101]

England, France, Switzerland, Italy, Yugoslavia, Federal Republic of Germany, Denmark, Sweden, Finland, Poland, Bulgaria, USSR, USA.

Czechoslovakia: Stylodrilus heringianus is found in clean streams and rivers with a sandy bottom, is abundant in mountain lakes, and according to MRÁZEK (1926:10), this species is found in Bohemia even in meadow pools which dry up in the summer. I did not have an opportunity to verify this observation.

89. Stylodrilus brachystylus HRABĚ, 1929

Table 18, Fig. 6

1929 Stylodrilus brachystylus HRABĚ, Zool. Anz., 84:10-14, Figs. 1-4.

The body is up to 20 mm long, 0.5 mm wide, and consists of 65 to 75 segments. The segments of the anterior and central body region are divided by intrasegmental notches into 2 rings.

Serrated chaetae have an upper serration which is much shorter than the lower one, but in Segments II to IV the chaetae have a simple spike without serrations.

The clitellum extends from 1/2 of Segment IX to 1/2 of Segment XII. One pair of spermathecal openings is in Segment IX, and one pair of male ducts empties through penises in Segment X. One pair of female funnels is on Dissepiment 11/12 and they have openings in Intersegmental Notch 11/12. All sexual openings are on the ventral side in line with the chaetae but behind them.

The nephridia do not have a regular segmental arrangement and are thus similar to other species of this genus. Pair I is on Dissepiment 6/7 and its ducts enter Segment VIII in some individuals, Pair II is on Dissepiment 12/13, Pair III, for example, is on Dissepiment 17/18, etc.

Two pairs of testes are in Segments IX and X. One pair of ovaries is in Segment XI. Two pairs of bell-shaped male funnels are in Segments IX and X near Dissepiments 9/10 and 10/11. Atrial ampullae are egg-shaped or short and cylindrical, and they taper at the ectal end: their muscular layer becomes the musculature of domelike penial bulbs ending in penises which are 10-40 μm long and are retracted in shallow penial sheaths. Atrial ampullae are covered by long prostatic cells. Sperm and egg sacs are similar to those of Stylodrilus heringianus. Egg sacs elongate into Segments XV to XVII. I did not find any mature sperm in sperm sacs or spermathecae in individuals caught in spring and autumn although the egg sacs contained mature eggs. In individuals with a resorbing sexual apparatus the testes contained cells with gigantic nuclei.

Poland, USSR.

Bohemia: pool near the railroad bridge across the Labe near Jiřina near Čelákovice, Říčany, Mokropsy (HRABĚ, 1929).

Moravia: pool under Kolby near Pouzdřany, and in Rudice (HRABĚ, 1928-1932 leg.).

90. Stylodrilus parvus (HRABĚ-ČERNOSVITOV, 1927)

Table 18, Fig. 5

1927 Anastylus parvus, HRABĚ-ČERNOSVITOV, Zool. Anz., 71:203-207, Figs. 1-4.

1929 Stylodrilus parvus, HRABĚ, Zool. Anz., 84:16.

The body is 10-15 mm long, at most 0.4 mm wide, and consists of 54 to 68 segments. Segments from Segment V are divided into two rings: the anterior is 4 times thinner than the posterior one. [102]

Chaetae are generally serrated with an upper serration which is much shorter than the lower one. The excretory apparatus resembles the nephridial apparatus of other species of the genus Stylodrilus found in Czechoslovakia.

The clitellum extends from 1/2 of Segment IX to Segment XII. The sexual openings are behind the ventral chaetae and in line with them. One pair of spermathecae has openings in Segment IX. One pair of male openings is in Segment X. One pair of female funnels has openings in Intersegmental Notch 11/12. Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, one pair of ovaries is in Segment XI on Dissepiment 10/11, and two pairs of male funnels are on Dissepiments 9/10 and 10/11. Atria are nearly spherical, they are covered by prostatic cells, and they have

openings without penises directly on the surface of the body. Spermathecae in Segment IX consist of an oval ampulla and a short and narrow outlet. Almost in the middle the ampulla is somewhat constricted and thus divided into two sections: apical and basal. The lining of the apical section consists of high epithelium in which we found resorption of sperm which was unknown in Oligochaeta until that time (HRABĚ-ČERNOSVITOV, 1927, Fig. 4). Sperm sacs are similar to those of Stylodrilus heringianus, and egg sacs extend as far as into Segment XVIII.

Yugoslavia, USSR, USA.

Bohemia: Krkonoše, Rudohoří, Černé Lake and Čertovo Lake in Šumava, Novohradské Mountains, Nuzarov u Domažlic, Vltava near Vyšší Brod and Rajov (HRABĚ, 1939).

Moravia: Vranovice, Pohořelice, outlet of the Jedovnický Stream in the quarry near Býčí Cliff near Adamov, Sýkoří u Tišnova (HRABĚ, 1930-1939 leg.), Kralický Sněžník (HRABĚ, 1938 b).

Slovakia: Hrboltova (ČERNOSVITOV, 1930 b). I did not find this species in the High Tatra Mountains; instead I found Stylodrilus heringianus and Tubifex tubifex, which is the most abundant Oligochaet in those waters, in the high mountain lakes.

Genus Bythonomus GRUBE, 1880

1880 Bythonomus GRUBE, Jb. schles. ges. vaterl. Kult., 57:228.

Chaetae are generally unserrated or serrated in the Asiatic species.

Central and posterior segments of most species have 2 pairs of lateral blood vessels with numerous dead end branches which may be missing in some species, or they are divided only into 2 branches. Two pairs of testes are in Segments IX and X, one pair of ovaries is in Segment XI, one pair of spermathecae is in Segment IX, one pair of male openings is in Segment X, and two pairs of male funnels are attached to Dissepiments 9/10 and 10/11. Sperm ducts enter the wall of the atrium in its ectal half. Atria are generally tubular, long, and more rarely, egg-shaped. One pair of female funnels is in Segment XI on Dissepiment 11/12.

91. Bythonomus lemani (GRUBE, 1879)

Table 18, Figs. 7-10

1862 Lumbriculus variegatus (partim); CLAPARÈDE, Mem. Soc. Phys. Hist. nat. Geneve, 16 II:255-262, Table 3, Figs. 1-5, 14, Table 4, Fig. 4.

1877 Lumbriculus lankesteri VEJDOVSKÝ, (nom. nud.). Čas. Čes. Mus., 51:464.

[103]

1879 Bathynomus lemani GRUBE, Jb. schles. Ges. vaterl. Kult., 56:116.

1880 Bythonomus lemani, GRUBE, Jb. schles. Ges. vaterl. Kult., 57:228.

1884 Claparedilla lankesteri and C. meridionalis, VEJDOVSKÝ, Syst. Morph. Olig.:53-55, Table 11, Figs. 20-25, Table 12, Figs. 2, 10-15.

1970 Bythonomus lemani, HRABĚ, Spisy přír. fak. univ., Brno, 515:298-302, Figs. 24-37.

The body is 25-40 mm long, 1 mm wide, and consists of 50 to 65 segments. Frontal lobe is rounded. Segments starting with Segment V are divided into 2 rings.

Chaetae are generally unserrated, pointed at the ectal end, and slightly bent.

In classifying this species, CLAPARÈDE also observed several individuals of the true Lumbriculus variegatus GRUBE species, and therefore states (1862:256), that the chaetae are "très-exceptionnellement légèrement bifides". This error in the description of Bythonomus lemani is also repeated by PIGUET (1913:154) and later by COOK (1971:242). VEJDOVSKÝ (1883:14) first pointed out the error made by CLAPARÈDE.

The clitellum extends from 1/2 of Segment IX to Segment XIII. One pair of spermathecae has openings in Segment IX behind the ventral chaetae, and one pair of male openings is in a similar position in Segment X.

In the anterior 12 segments the dorsal blood vessel is connected to the ventral blood vessel in each segment by one pair of dorso-ventral blood vessels. Behind the clitellum in Segments XVIII to XX one (anterior) pair of unbranched lateral blood vessels branches away from the dorsal blood vessel; a second (posterior) pair of similar blood vessels first appears in Segment XXI. Starting in Segment XXVI the lateral blood vessels have numerous dead end branches. Their number varies in the different parts of the body, and their size depends on the contraction and dilatation of the blood vessel system in individual groups of segments (the dorsal blood vessel gradually contracts along its length). The anterior pair of lateral blood vessels communicates with the perivisceral sinus but not with the ventral blood vessel; the posterior pair has dead ends.

One pair of nephridial funnels is on Dissepiment 6/7, the second pair is on Dissepiment 12/13, the third pair is on Dissepiment 16/17, and

in subsequent segments the nephridia may sometimes be missing.

Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, respectively, one pair of ovaries is in Segment XI on Dissepiment 10/11, and two pairs of male funnels are on Dissepiments 9/10 and 10/11. The posterior pair of sperm ducts passes through the dissepiment, enters the anterior third of Segment XI, and returns into Segment X. Both sperm ducts lead to the lower half of atrial ampullae. Atria are cylindrical, up to 380 μm long, 65-73 μm wide, and they are covered by a continuous layer of prostatic cells. They end in 30-47 μm long cylindrical penises which are conical in the ectal third, and which are retracted in penial sheaths. Spermathecae have a large elongated ampulla with a long spindlelike outlet. One pair of sperm sacs in Segment VIII is formed by a bulge in Dissepiment 8/9, Pair II is in Segment X starting at Dissepiment 9/10, and Pair III extends from Dissepiment 10/11 into Segment XV. One pair of female funnels is on Dissepiment 11/12.

France, Switzerland, Italy, Yugoslavia.

Moravia: Hlohovecký (middle) Pond near Lednice (HRABĚ, 1970), pool near Vranovice, Šatava between Pouzdřany and Ivání (HRABĚ, 1960-1970 leg.).

Slovakia: tributary of the Rudava near Leváry (HRABĚ, 1961 leg.).

92. Bythonomus absoloni HRABĚ, 1970

Tabl 18, Figs. 11-12

1970 Bythonomus absoloni HRABĚ, Spisy přír. fak. univ., Brno, 515:302-308, Figs. 38-45.

[104]

The body is approximately 50 mm long, at most 1 mm wide, and consists of as many as 105 segments. While living, the body is pinkish. The frontal lobe is rounded. The anterior segments are divided by a secondary notch into 2 rings: the anterior one is narrow, and the posterior ring is wide.

Chaetae are in 4 pairs and they are generally unserrated.

Clitellum extends from Segment IX to Segment XIII (XIV). One pair of spermathecal openings is in Segment IX somewhat medially behind the ventral chaetae, one pair of male openings is in Segment X also behind the ventral chaetae, and one pair of female funnels has openings in Intersegmental Notch 11/12.

The dorsal blood vessel divides into two branches in the frontal lobe which merge in Segment V to form the ventral blood vessel. Starting in Segment XVII or XVIII 2 pairs of short lateral blood vessels without dead ends branch away from the dorsal blood vessel in each segment; these lateral blood vessels are not connected with the perivisceral sinus.

Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, one pair of ovaries is in Segment XI on Dissepiment 10/11, one pair of spermathecae with an egg-shaped 280 μm long ampulla and well defined outlet is in Segment IX, and two pairs of large male funnels are on the anterior side of Dissepiments 9/10 and 10/11. Sperm ducts of the posterior pair of male funnels pass into Segment XI and empty in Segment X together with sperm ducts of the anterior funnels into the basal part of the atrial ampulla. The atria consist of an oval ampulla, at most 300 μm long and 100 μm wide, and a short and narrow outlet, which ends in a short and conical penis. Mature eggs in egg sacs are in Segments XVIII and XIX. One pair of small female funnels is on Dissepiment 11/12. In B. subcarpathicus the atria are 640-1180 μm long.



Fisheries
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Moravia: 1. Punkva in Macocha Gorge, 2. tributary of the Křtinský Stream approximately 500 m south-east of Býčí Cliff (HRABĚ, 1970).

Tatriella HRABĚ, 1936

1936 Tatriella HRABĚ, Spisy přír. fak. univ., Brno, 227:11, 12, 17, Fig. 8.

1939 Tatriella, HRABĚ, Věst. čs. spol. zool., 6-7:229.

Chaetae are unserrated. A single male sexual opening is in the ventral medial line in Segment X. Generally the spermathecae are missing, and only rarely some individuals have a single spermatheca in the ventral medial line in Segment VIII. Two pairs of testes are in Segments IX and X, one pair of ovaries is in Segment XI, and two pairs of male funnels are on Dissepiments 9/10 and 10/11. Four sperm ducts lead into a common atrium. The atrial ampulla is large, egg-shaped to tubular, and the outlet is narrow, longer than the ampulla. Prostatic cells cover only the ental half of the outlet, and they are missing on the ampulla.

93. Tatriella slovenica HRABĚ, 1936

[105]

Table 18, Fig. 14

1936 Tatriella slovenica HRABĚ, Spisy přír. fak. univ., Brno, 227:11, 12, 17, Figs. 8, 17.

1939 Tatriella slovenica, HRABĚ, Věst. čs. spol. zool., 6-7:229-235, Figs. 9-14.

The body is 15-28 mm long, at most 0.65 mm wide, and consists of 65 to 85 segments. The frontal lobe is rounded. Segments III to VII are divided by an intrasegmental notch into 2 rings of which the anterior is 4 times as narrow as the posterior ring.

The chaetae are unserrated, and in the anterior segments they are shorter and thinner than in the central and posterior segments.

An unpaired male opening is precisely in the ventral medial line in Segment X. Spermathecae are generally missing, only 4 individuals out of 50 individuals observed had an unpaired spermatheca in Segment VIII which has an opening in a similar position as the male duct.

The anterior segments each have one pair of dorsoventral blood vessels which are missing behind the clitellum.

Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10. Two pairs of male funnels are on Dissepiments 9/10 and 10/11. Sperm ducts are very narrow, and the posterior pair does not enter the following Segment XI but always remains in Segment X. The atrium consists of an egg-shaped or tubular ampulla and a longer and narrow outlet which ends in a small conical penis. Long prostatic cells lead only into the ental half of the outlet duct, but they are not present on the ampulla. Spermathecae have a spherical or egg-shaped ampulla with a narrow outlet. One pair of female funnels is in Segment XI on Dissepiment 11/12.

Slovakia: Popradské pleso, Velké Bílé Kežmarské pleso, Nové Štrbské pleso, Mlynice Stream near Nové Štrbské pleso (HRABĚ, 1936).

Trichodrilus CLAPARÈDE, 1862

1862 Trichodrilus CLAPARÈDE, Mem. Soc. Phys. Hist. nat. Genève, 16 II:267.

Chaetae are unserrated, and only Trichodrilus strandi has chaetae with a small upper serration. Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, one pair of ovaries is in Segment XI on Dissepiment 10/11, and two pairs of male funnels on Dissepiments 9/10 and 10/11 empty into one pair of atria which have openings in Segment X. Posterior sperm ducts pass into Segment XII, but in Trichodrilus tatrensis they remain in Segment X. One pair of spermathecae has openings in Segment XI or two pairs have openings in Segments XI and XII. In Trichodrilus strandi the entire sexual apparatus is shifted by one segment toward the head end.

94. Trichodrilus allobrogum CLAPARÈDE, 1862

Table 19, Figs. 1-2

1862 Trichodrilus allobrogum CLAPARÈDE, Mem. Soc. Phys. Hist. nat., Genève,

16 (2):227, 267-270, Table 3, Figs. 6-9, 15, Table 4, Fig. 3.

1954 Trichodrilus allobrogum, HRABĚ, Zool. Anz., 153:187, Figs. 6-7.

The body is 20-25 mm long and consists of 70 segments. Individuals fixated with formalin are 12-15 mm long, and 0.4-0.5 mm wide in Segments XI to XII. Frontal lobe is elongated, conical, and it is separated from the metastomium by a groove running from the corners of the mouth to the

dorsal side of Segment I. Segments are divided by an intrasegmental notch into 2 rings of which the anterior is 3 times as thin as the posterior ring in the anterior end of the body, and only 2 times as thin as the posterior ring in the posterior end of the body. Intersegmental notches are also deep. Chaetae are fine and generally unserrated.

The clitellum extends from 1/4 of Segment IX to Segment XIII. One pair of male openings is in Segment X behind the ventral chaetae, two pairs of spermathecal openings are in Segments XI and XII in a similar position, and one pair of female funnels has openings in Intersegmental Notch 11/12.

The dorsal blood vessel divides in Segment I into 2 branches which merge in Segment IV to form the ventral blood vessel. Segments II to XI (XII) each have one pair of dorsoventral blood vessels. From Segment XXVI to the last segment there are 4-6 pairs of lateral blood vessels which branch away from the dorsal blood vessel; there are fewer lateral blood vessels toward the anterior than there are toward the posterior, and the blood vessels do not have dead end protrusions. Three unpaired blood vessels connect the perivisceral sinus with the ventral blood vessel in each segment from Segment IX or X.

Two pairs of testes are in Segments IX and X, and one pair of ovaries is in Segment XI. Two pairs of male funnels are on Dissepiments 9/10 and 10/11 and they have openings in the cavity of Segments IX and X. Their wide (16 μm) sperm ducts lead into the atrial cavity near its apical end. The posterior sperm ducts enter Segment XI. Atrial ampullae are spherical with an exterior diameter of 96 μm , and they are lined with flat epithelium. The muscle layer is thin (10 μm). A small number of prostatic cells is present on the surface of the ampullae. The outlets are 60 μm long, lined with

cylindrical epithelium, and they lead directly to the surface of the body so that they do not end in penises. Spermathecae have small spherical ampullae and narrow short outlets.

Individuals caught in March and May have fully developed eggs with eosinophilic yolks in the egg sacs; some eggs undergo reductive division. Sperm on male funnels, which are abundant in individuals caught in March and April, are present only in 3 out of 14 individuals caught in May.

Switzerland.

Bohemia: Prague, concrete tank in the courtyard of the Zoological Institute of Charles University near Karlov (HRABĚ, 1926 leg.).

Moravia: Hlohovecký Pond near Lednice (HRABĚ, 1954 b), small pool under Kolby (HRABĚ, 1961), outlet of the Jedovnický Stream in the quarry near Býččí Cliff near Adamov (HRABĚ, 1968, 1969 leg.).

95. Trichodrilus pragensis VEJDOVSKÝ, 1875

Table 19, Fig. 7

1875 Trichodrilus pragensis VEJDOVSKÝ, S. B. k. böhm. Ges. Wiss., 1974:196.

1876 b Phreatothrix pragensis, VEJDOVSKÝ, Z. wiss. Zool., 27:541, Table 39.

1884 Phreatothrix pragensis, VEJDOVSKÝ, Syst. Morph. Olig.:54-55, Table 11, Figs. 17-19.

1971 Trichodrilus pragensis, HRABĚ, Věst. čs. zool. spol., 35:205-208, Figs. 1-3.

The body is 30-40 mm long according to VEJDOVSKÝ; and at most 22 mm long according to HRABĚ. It is 0.6-0.7 mm wide according to the former

author and 0.38 mm wide according to the latter author. The number of segments according to VEJDOVSKÝ is 70 to 80, and as many as 95 according to HRABĚ. The frontal lobe is twice as long as its width. Segments III to VII are divided into two rings.

Chaetae are unserrated. Chloragogenic cells cover the alimentary tract from Segment VII. Pharynx glands extend into Segment VIII or IX. [107]

One pair of nephridial funnels is on Dissepiment 6/7, the second pair is on Dissepiment 12/13, and in subsequent segments the excretory system is irregularly distributed and individual nephridia have various length (VEJDOVSKÝ, 1884:124).

Dorsoventral blood vessels are in Segments II to XII, and in segments behind the clitellum the lateral blood vessels are missing.

Two pairs of testes are in Segments IX and X, one pair of ovaries is in Segment XI, and two pairs of male funnels are on Dissepiments 9/10 and 10/11. Posterior sperm ducts pass into Segment XI near Dissepiment 10/11. Both pairs of sperm ducts lead to opposite sides of atrial ampullae. One pair of atria in Segment X has an elongated egg-shaped or spherical ampulla and a short outlet with a very short penis at the end. Penial sheaths are missing. Only one pair of spermathecae is in Segment XI; their large ampullae take up the cavity of Segment XI and XII. One pair of female funnels is on Dissepiment 11/12.

Bohemia: wells in Prague (VEJDOVSKÝ, 1884, ŘEHÁČKOVÁ, 1951 leg., HRABĚ-ROSOL, 1970 leg.).

Moravia: Oslavany (HRABĚ, 1971).

96. Trichodrilus moravicus HRABĚ, 1938

Table 19, Fig. 3

1938 Trichodrilus moravicus HRABĚ, Zool. Anz., 121:74-80, Fig. 1-8.

The body is 10-21 mm long, 0.26-0.56 mm wide, consists of 48 to 67 segments, and while living, it extends to a length of 30 mm. The frontal lobe is elongated, rounded at the end, and almost twice as long as it is wide.

Chaetae are unserrated, and the dorsal chaetae are shorter than the ventral chaetae.

The clitellum extends from Segment X to Segment XII (XIII). One pair of male openings is in Segment X behind the ventral chaetae; the openings are at the ends of small conical penises. Two pairs of spermathecae have openings behind the ventral chaetae in Segments XI and XII.

Chloragogenic cells cover the alimentary tract from Segment VIII. Pharynx glands are as far as in Segment VIII.

Segments II to XII each have one pair of dorsoventral blood vessels. Six of the anterior pairs branch from the dorsal blood vessel in Segments II to VI and in the following segment they merge with the ventral blood vessel, whereas in Segments VIII to XII, the blood vessels merge with the ventral vessel in the same segment that they branch away from the dorsal blood vessel. In segments behind the clitellum the lateral blood vessels are not present.

Two pairs of testes are in Segments IX and X, and one pair of ovaries is in Segment XI. Two pairs of male funnels are in Segments IX and X on Dissepiments 9/10 and 10/11. The posterior sperm ducts, 13-22 μ m

in diameter, are as wide as the anterior sperm ducts, they pass into 1/3 of Segment XI, return to Segment X, and enter the apical half of the atrial ampulla opposite to the junction of the anterior sperm ducts. The atrial ampullae are small, spherical or oval in shape, and they have a short and narrow outlet. The penises at the ends of the outlets are barely perceptible. The muscle layer in the atrial ampullae is very thin (only 5 μ m). Prostatic cells are pear-shaped and large. Two pairs of spermathecae are in Segments XI and XII; their spherical or oval ampullae do not extend [108] into the following segment. One pair of female funnels is on Dissepiment 11/12.

Moravia: Říčka near Lišeň (downstream from the caves), Obří komín in Býčí Cliff near Adamov (HRABĚ, 1938), Kralický Sněžník, Tvarožné Holes (HRABĚ, 1938 b).

Slovakia: Luková Lake in the Low Tatra Mountains (HRABĚ, 1942).

97. Trichodrilus tatrensis HRABĚ, 1937

Table 19, Fig. 4

1937 Trichodrilus tatrensis HRABĚ, Bull. Mus. Hist. nat. Belg., 13, No. 32:20.

1942 Trichodrilus tatrensis, HRABĚ, Sbor. kl. přír., Brno, 24:26-28, 30, Figs. 11-14.

1960 Trichodrilus tatrensis, HRABĚ, Spisy přír. fak. univ., Brno, 415:246, 274-276, Figs. 27-28.

Individuals are at most 10 mm long, their width does not exceed 0.3 mm, and they consist of 50 to 60 segments. The frontal lobe is rounded

at the end and it is wide. Intersegmental notches on the anterior portion of the body are very distinct.

Chaetae have an unserrated, somewhat bent ectal end.

The clitellum extends from Segment X to Segment XI. One pair of male sexual openings is in Segment X behind the ventral chaetae, approximately half way between the chaetae and Intersegmental Notch 10/11. The openings of two spermathecae are in a similar position in Segment XI.

Chloragogenic cells cover the alimentary tract from Segment VI.

Segments behind the clitellum do not have lateral blood vessels except for the blood vessels of the perivisceral sinus which lie on the side of the alimentary tract.

Two pairs of testes are in Segments IX and X, and one pair of ovaries is in Segment XI. Two pairs of male funnels open into the body cavity on Dissepiments 9/10 and 10/11. Sperm ducts have a uniform thickness along their entire length, and their external diameter is 9-15 μm . Sperm ducts of the posterior pair always remain in Segment X; they do not pass into Segment XI. Atria are long and pear-shaped, and they have a very long and narrow outlet and a very short penis. In some individuals the penis is retracted into a small sheath, in others the penial sheath bulges out and extends beyond the surface of the body like a conical "porophore" with a penis at its apex. Spermathecae consist of a spherical or oval ampulla, which sometimes extends into Segment XII, and a shorter narrow outlet duct. One pair of female funnels is on the anterior side of Dissepiment 11/12.

Slovakia: High Tatra Mountains, Upper Wahlenberg Mountain Lake and spring under Vážecká Cave, West Tatra Mountains, spring in Končistý Slope, "Jezero" Spring under Surný Hrádek, Pribylina River at the entrance to Ráčkovy Valley (HRABĚ, 1942).

98. Trichodrilus strandi HRABĚ, 1936

Table 19, Figs. 5-6

1936 Trichodrilus Strandii HRABĚ, Festschr. Prof. Dr. E. Strand. Riga.

I:404-407, Figs. 1-4.

1942 Trichodrilus strandi, HRABĚ, Sbor. kl. přír., Brno, 24:28.

The body is approximately 10 mm long, 0.76 mm wide, and consists of 60 segments.

Chaetae are generally serrated with an upper serration much shorter and narrower than the lower one. [109]

The clitellum is not developed in the individuals studied. One pair of male ducts has openings in Segment IX, and one pair of spermathecae is in Segment X. All sexual openings are behind the ventral chaetae and in line with them.

Central and posterior segments do not have lateral blood vessels.

Two pairs of testes are in Segments VIII and IX on Dissepiments 7/8 and 8/9. One pair of ovaries is in Segment X on Dissepiment 9/10. Two pairs of male funnels are on Dissepiments 8/9 and 9/10. Sperm ducts are 22-34 μm wide. The posterior pair passes into Segment X, remains in the vicinity of Dissepiment 9/10, and returns into Segment IX. One pair of small atria is in Segment IX; the atria have a spherical ampulla and a distinctly defined narrow outlet which is slightly longer than the ampulla. Muscle layer on the ampulla wall is thin and prostatic cells are small. In one individual the atrial ampullae were 60 μm long, 56 μm wide, and the outlet ducts were 70 μm long and 25 μm wide. One pair of spermathecae is in Segment X; the spermatheca consists of a long oval ampulla which

penetrates into Segment XII, and a 145 μ m long outlet. One pair of female funnels is in Segment X on Dissepiment 10/11.

Italy (HRABĚ, 1936).

Slovakia: Low Tatra Mountains, spring in Ladová Cave in Demänovské Valley (HRABĚ, 1942).

Lampodrilus MICHAELSEN, 1901

1901 Lampodrilus MICHAELSEN, Bull. Ac. Imp. Sci. St. Petersburg, 15, No. 2:150.

All chaetae are serrated. Following the segment (or last segment) containing testes, atria, and male funnels on the posterior dissepiment, there is a segment with ovaries and female funnels, and following it there is a segment containing spermathecae. Male ducts consist of a funnel on the posterior dissepiment of the atrial segment, sperm duct, and a long cylindrical atrium ending in a penis in a penial sheath. The sperm duct forms a loop in the cavity of the following segment, and the anterior pair of male funnels is missing. Species of the genus Lampodrilus reproduce by amphigony, and Lampodrilus mrazeki reproduces mainly by architomy in cysts.

99. Lampodrilus mrazeki HRABĚ, 1928

1913 Claparedeilla sp. MRAZEK, Biol. Cbl., 33:558-566.

1929 Lampodrilus mrazeki HRABĚ, Zool. Jb., Syst., 57:197-214, Fig. 5 in the text, Table 1, Figs. 1-5.

1937 Lampodrilus mrazeki, HRABĚ, Sbor. kl. přír., Brno, 19:1-7, Fig. 1.

The body is 25-40 mm long and approximately 1 mm wide, and consists of 60 to 70 (105) segments. Regeneration, induced by architomical reproduction, causes a very distinct different colouration of the dark brown parent segments and the orange newly-formed 8 head segments and central and posterior segments in most individuals. The different colouration is influenced by different amounts of grains in the chloragogenic cells on the alimentary tract and on lateral blood vessels. The stripes of green pigment found on the anterior of Lumbriculus variegatus are not present in Lampodrilus mrazeki. The frontal lobe is rounded. [110]

Chaetae are unserrated, at the anterior end the ventral chaetae are longer than the dorsal chaetae, and the length of the chaetae decreases toward the posterior.

Segments II to XII (XIII) each have one pair of dorsoventral blood vessels. From Segment VI or VII, two pairs of lateral blood vessels with numerous dead ends branch away from the dorsal blood vessel in each segment. Both pairs of vessels are covered by chloragogenic cells and a small branch communicates with the perivisceral sinus (HRABĚ, 1927, Table 1, Figs. 2-3).

In asexual individuals there are two pairs of gonads in Segments VIII to IX, and sometimes there is a third pair in Segment X. One or two pairs of male ducts have openings behind the ventral chaetae in Segment VI to IX (usually in Segment VIII). Male outlets consist of a funnel attached to the posterior dissepiment of the atrial segment, and a sperm duct, which passes into the following segment, returns, enters the middle muscle layer in the lower section of the atrium, and empties into its cavity near the apical end of the atrial ampulla. Atrial ampullae are long and tubular

with penises at the ends. One to three pairs of spermathecae are in some segment between Segments VIII and XIII, however, most frequently one pair in Segment X has openings behind the ventral chaetae. Spermathecae have an oval ampulla and a distinctly defined outlet.

Bohemia: Čelákovice (HRABĚ, 1928), Central Labe Region (LIŠKOVÁ, 1976).

Moravia: Vranovice, Pouzdřany, Lednice, Hodonín (HRABĚ, 1937).

Slovakia: Leváry (HRABĚ, 1961 leg.).

Lampodrilus mrazeki occurs in seasonal pools, it lives on the bottom among fallen leaves from November to May. In June the worms individually encyst themselves, although there is still sufficient water in the pools (probably due to the lower oxygen content at the bottom?). In the cysts they divide into as many as 36 (!) fragments and regenerate a part of the missing segments. In November, when the pools fill with water following the rains, the worms leave the cysts and grow.

In November, 1936, I collected sexually maturing specimens in pools under Kolby near Pouzdřany, and in the same month in 1960 between Pouzdřany and Ivání. Prior to that, I obtained sexually maturing individuals from laboratory cultures.

Lumbriculus GRUBE, 1844

1844 Lumbriculus GRUBE, Arch. Naturg., 10 I: 207.

Frontal lobe is rounded. While living, anterior segments have intersegmental stripes of green pigment. Chaetae are serrated with an

upper serration which is smaller than the lower one. Segments behind the clitellum each have one pair of lateral blood vessels with numerous dead end extensions. The number and distribution of individual components of the sexual organs varies greatly. Male ducts always precede the spermathecae. Each male duct is connected with a sperm duct to either one funnel attached to the posterior dissepiment of the atrial segment, or with 2 sperm ducts to an anterior and posterior funnel (the anterior funnel is on the anterior side of the anterior dissepiment in the atrial segment, and the posterior funnel is on the posterior dissepiment). The posterior sperm ducts do not pass into the following segment but they always remain in the atrial segment. Atria end in pseudopenises and not penises. Spermathecae have openings along both sides of the lateral line and not in the line of ventral chaetae. [111]

100. Lumbriculus variegatus GRUBE, 1844

Table 19, Figs. 13-17

- 1844 Lumbriculus variegatus GRUBE, Arch. Naturg., 10 I:207, Table 7, Fig. 2 a-d.
 1906 Lumbriculus variegatus, MRÁZEK, Zool. Jb., Anat., 23:381-462, Figs. A-V.
 1913 Lumbriculus variegatus, MRÁZEK, S. B. k. böhm. Ges. Wiss., (II Cl.)
 1913, No. XIV:1-54, Figs. 1-13.

Architectonical reproduction hinders the determination of the body size and the number of segments. Individuals of intermediate size are 50-80 mm long and consist of 200 to 300 segments. However, in nature I also found an individual who was 20 mm long, and who had only 3 parent segments

and who regenerated 8 head segments and 60 central and posterior segments. MRÁZEK (1913) observed individuals who were 200 mm long when living and who consisted of 500 segments.

This species is characterized by green stripes of pigment cells on the anterior segments; the stripes are within the body cavity on longitudinal muscles and may be seen through the body wall. These stripes are not found in any other annelid found in Czechoslovakia. The green pigment forms subsequently on newly-regenerated segments, and therefore individuals who are regenerating the anterior segments have the stripes only from Segment IX, and the growing or newly-formed segments are initially without them. On fixated individuals the green pigment quickly disappears. The different amounts of grains in the chloragogenic cells on the alimentary tract and on the lateral blood vessels also enable the distinction between new and parent segments in the posterior half of the body.

A line of white dots, which were observed and described by RATZEL (1868), may be seen on the ventral side along the medial line in living individuals. These are special cells which cannot be seen on cross sections because their contents dissolve in formalin and alcohol.

All chaetae are serrated with an upper serration much smaller and narrower than the lower one.

The dorsal blood vessel divides in Segment I into two branches which merge in Segment IV to form the ventral blood vessel. The perivisceral sinus on the side of the alimentary tract from Segment VIII is connected to the ventral blood vessel by 2 small vessels in each segment. One pair of dorsoventral blood vessels, which according to HAFFNER (1927) branch to form a complex network, branches away from the dorsal blood vessel in

each segment between Segments II and VIII. From Segments IX to XVIII (from Segment VII to Segment XVIII according to my observations), one pair of dorsoventral blood vessels branches away from the dorsal blood vessel near the posterior dissepiment and merges with the ventral blood vessel in the same segment. The dorsoventral blood vessels do not branch further, they have no dead ends, and they are not covered by chloragogenic cells in contrast to lateral blood vessels. Each segment from Segment X to the last segment always has only one pair of lateral blood vessels with numerous dead ends; in contrast to the dorsoventral blood vessels, the lateral blood vessels in Lumbriculus variegatus branch away from the dorsal blood vessel near the anterior dissepiment and are not connected with the perivisceral sinus or the ventral blood vessel.

The nephridia are irregularly distributed as in the species Stylo-drilus heringianus. Lumbriculus variegatus reproduces mainly by architomy, and the regeneration of the anterior and segments with the sexual organs results in a "disharmony" (MRÁZEK, 1906) in the arrangement of the sexual apparatus. [112] The experimental work of JANDA (1912-1927), TIRAL (1912), and HRABĚ (1929) fully agree with the results obtained by MRÁZEK (1906 and 1913), which he obtained by studying sexually mature individuals caught in nature. The variability in the number and distribution in the individual components of the reproductive organs is unusual in Lumbriculus variegatus. MRÁZEK was unable to find even 2 individuals among 182 which had the same sexual apparatus. In his material, the atria were in Segment VII in 11% of the individuals, in Segment VIII in 65.5%, and in Segment IX in 1.5%. A single pair of male funnels on the posterior dissepiment in the atrial segment was predominant (77.25%) over individuals with two pairs of male funnels (20.6%). The spermathecae were in 2-9 segments, most frequently in 4

segments (36.4%) or in 5 segments (37.5%) directly behind the atrial segment in 64% of the individuals and in 33.3% of the individuals the spermathecae were in the second segment behind the atrial segment.

The sperm ducts are very narrow, their diameter is only 13-16 μm , they enter the lower part of the atrial ampulla between the muscle layer, pass between the muscle fibres, and empty into the cavity near the apical end of the ampulla. The atrial ampullae have diverse shapes, sometimes they are elongated and pear-shaped (in the early stages of development of the sexual apparatus), and at other times they are wide, saclike, or tubular. The atria do not end in penises, as is stated in literature; it is not a duplication of the epithelium resulting from the bulging of the body wall, but they are pseudopenises. Behind the very flat epithelium which lines the atrial ampullae, there is a special conical section of the male outlet, turned so that the base is at the ental end, which is lined initially with very long epithelial cells elongating to form a long protoplasmic cluster which winds into a central duct in this section. The epithelial cells of the conical section gradually become lower, and in the ectal end of the male outlet the epithelium becomes cubic. In the epithelium of the conical section the nuclei are elongated, and in the cubic epithelium the nuclei are spherical. During copulation, in my opinion, only the section with spherical nuclei is extended, whereas the conical section merely opens up like a bell-shaped sucker with a cluster of protoplasmic sections of epithelial cells in the middle.

England, France, Switzerland, Italy, Federal Republic of Germany, Denmark, Finland, Sweden, Poland, Roumania, Bulgaria, USSR, USA, Japan.

Czechoslovakia: numerous localities.

Lumbriculus lives mainly in stagnant water, particularly in forest pools with fallen leaves at the bottom, or in the mountains in pools with peat. This species reproduces, as stated, asexually by architomy, and sexually mature individuals are rare although they do sometimes occur.

In a letter which he sent to me on July 14, 1927, Prof. Dr. W. MICHAELSEN expressed the opinion that the genera Lampodrilus and Telescolex should be added to the genus Lumbriculus, "was jedoch einer eingehenden Überlegung bedürfte" (HRABĚ, 1931:48). MICHAELSEN never mentioned that Lampodrilus genetically belongs to the species Lumbriculus variegatus, as WILKE (1967:24) erroneously believed. I classified the species mrazeki under the genus Lampodrilus because of the shape of the atria, and not because of the number of gonads and atria as the same author also erroneously believed. The genus Lumbriculus differs from the genus Lampodrilus because it has pseudopenises, the spermathecae have openings along both sides of the lateral line, and the chaetae are serrated, whereas members of the genus Lampodrilus have true penises in penial sheaths, the spermathecae have openings in the line of ventral chaetae, and the chaetae are unserrated, and therefore I cannot agree with MICHAELSEN's carefully worded opinion that the genera Lampodrilus, Telescolex, and Lumbriculus should be combined into one genus.

Rhynchelmis HOFFMEISTER, 1843

[113]

1843 Rhynchelmis HOFFMEISTER, Arch. Natgesch., 9 I: 192.

The body is cylindrical in the anterior section, in the central

section it is shaped like a parallelogram, and in the posterior section it is flattened. The frontal lobe of all Czechoslovak species is elongated into a long and mobile flagellum.

The chaetae are unserrated, but rarely in some species or forms, the chaetae are serrated.

The longitudinal musculature separates near the edges from the circumferential musculature and slightly turns in the line of the ventral chaetae and along the lateral line (VEJDOVSKÝ, 1884: Table 16, Fig. 2; HRABĚ, 1961: Figs. 2 and 3).

One or two pairs of testes are in Segment X or in Segments IX and X, and one pair of ovaries is in Segment XI. One or two pairs of spermathecae, which are connected to the esophagus by a duct, are in Segment VIII or in Segments VIII and IX. Segment IX in most species contains an unpaired stunted atrium without sperm ducts. One pair of male sexual outlets has openings in Segment X behind the ventral chaetae. Two pairs of male funnels are on Dissepiments 9/10 and 10/11 (in the Baikal species Rhynchelmis brachycephala the anterior funnels are missing). The sperm ducts are almost as wide as the atria, and they empty into very long tubular atrial ampullae near their apical end. One pair of female funnels is on Dissepiment 11/12 and the funnels have openings in Intersegmental Notch 11/12.

101. Rhynchelmis limosella HOFFMEISTER, 1843

Table 19, Fig. 18

1843 Rhynchelmis limosella HOFFMEISTER, Arch. Natgesch., 9:192, Table 9, Fig. 8.

- 1884 Rhynchelmis limosella, VEJDOVSKÝ, Syst. Morph. Olig.:57, Table 12, Fig. 33, Table 13, Figs. 1-2, Table 15, Fig. 27, Table 16, Figs. 1-6.
- 1900 Rhynchelmis limosella, MRÁZEK, S. B. k. böhm. Ges. Wiss., (mat. nat. Cl.), 1900, No. 25: 1-5, Table 35, 1-2.
- 1909 Rhynchelmis limosella, SIJAZOV, Uč. zap. Kazan. univ., 76:1-94, Tables 1-4.

The body of living individuals is pink, 80-140 mm long, 2-3 mm wide, and consists of as many as 200 segments. The frontal lobe is flagellate. Chloragogenic cells cover the alimentary tract from Segment VII.

In immature individuals the nephridia begin in Segment VII and in mature individuals they begin in Segment XII on Dissepiment 12/13; there is then one pair of nephridia in each subsequent segment. The funnel changes into a short duct and then widens into saclike postseptale which are conspicuous in living individuals by the brown colouration visible through the body wall. Through the center of the postseptale there is a duct which is surrounded by one row of large cells with protoplasm filled with numerous cavities. The duct leaves the postseptale in its distal section and folds four times; therefore cross sections show groups of four tubes. The duct is very long, it ascends toward the dorsal side of the body, and then passes toward the posterior and empties in front of the ventral chaetae in the segment with postseptale.

In the frontal lobe the dorsal blood vessel divides into two branches [114] which merge in Segment VII to form the ventral blood vessel. In the anterior 13 segments, one pair of dorsoventral blood vessels divides from the dorsal blood vessel in each segment, and the dorsoventral vessels then wind within the body cavity. In Segment XIV and in subsequent segments,

one pair of lateral blood vessels with numerous dead end extensions branches away from the dorsal blood vessel in the posterior third of each segment. The lateral blood vessels are covered by chloragogenic cells, and the blood vessels are connected with a special branch to the perivisceral cavity and to the ventral blood vessel in individuals found in Czechoslovak waters.

The clitellum extends from Segment VIII to Segment XVI. One pair of spermathecae has openings behind the ventral chaetae in Segment VIII. Segment IX contains an unpaired opening of a stunted atrium under the right or left edge of the ventral nerve cord, or, rarely, in the line of ventral chaetae. One pair of male sexual openings is behind the ventral chaetae in Segment X. Two pairs of testes are in Segments IX and X on Dissepiments 8/9 and 9/10, and one pair of ovaries is in Segment XI on Dissepiment 10/11. Spermathecae have a pear-shaped ampulla and a short outlet. The ampulla is connected to the esophagus by a narrow duct, which is easily visible on cross sections. Segment IX contains an unpaired stunted atrium without funnels and sperm ducts. Two pairs of male funnels are on Dissepiments 9/10 and 10/11. Sperm ducts empty into very long tubular atria near their apical end. The atria are only slightly wider than the sperm ducts and they pass through 9 segments. The atrial ampullae and the stunted atrium are covered by prostatic cells which are identical in appearance. One pair of female funnels is on Dissepiment 11/12. Three pairs of sperm sacs are on Dissepiments 8/9, 9/10, and 10/11; the posterior pair of sperm sacs and the egg sacs sometimes extend as far as Segment LIV (VEJDOVSKÝ, 1884:57).

Rhynchelmis limosella begins to mature sexually in October, spins cocoons in March, and in May the individuals have a reduced sexual apparatus.

Switzerland, Federal Republic of Germany, Finland, Poland, USSR.

Bohemia: Kostelec nad Labem, Vltava in Prague (VEJDOVSKÝ, 1884),
Čelákovice, Labe near Liběchov and Roudnice, Ohře near Levousy (HRABĚ, 1939).

Moravia: pools under Kolby near Pouzdřany, forest pools near
Pouzdranský Pond, near Podivín and Mušov (HRABĚ, 1927-1978 leg.).

102. Rhynchelmis vagensis HRABĚ, 1961

1961 Rhynchelmis vagensis HRABĚ, Spisy přír. fak. univ., Brno, 421: 133-136,
143-145, Figs. 3-4.

The body of living individuals is milk-white, generally only 40 mm long; the longest individual fixated with formalin is 60 mm long, 1.4 mm wide, and consists of 165 segments. The frontal lobe extends to form a flagellum. Chaetae are unserrated. Pharynx glands extend as far as Segment VI or VII. Chloragogenic cells cover the alimentary tract from Segment VII.

The dorsal blood vessel is connected to the ventral blood vessel in each segment between Segments XXXII and XLI by one pair of blood vessels, which never have dead end extensions; from Segment XXXIII to XXXV, a different pair of blood vessels with at least 3 dead end extensions branches away from the dorsal blood vessel and leads into the perivisceral sinus.

The arrangement of the sexual organs in Rhynchelmis vagensis is identical to the arrangement of organs in Rhynchelmis limosella.

Slovakia: Drainage basin of the Váh River: Studený Stream near Zverovka, Váh near Liptovský Hrádek, Boca Stream near Michalov pod Malužinou, Svidový Stream, Ipelica Stream near Rastok, in one of Ráčkových Mountain Lakes in the West Tatra Mountains (HRABĚ, 1961).

In samples caught in July, August, and September in various locations in the drainage basin of the Váh River, the sexual organs were only partially developed. Sexually mature individuals were caught in May and October.

103. Rhynchelmis granuensis HRABĚ, 1961

1961 Rhynchelmis granuensis HRABĚ, Spisy přír. fak. univ., Brno, 421: 131-133, 140-143, Figs. 1-2.

The body is up to 50 mm long, at most 1.3 mm wide, and consists of 120 to 160 segments. When living, the body is white and the alimentary tract is yellowish. The frontal lobe has a long and mobile flagellum.

The chaetae of individuals caught in Slovakia are always simple without the rudimentary upper serration, which is present in the dorsal chaetae of f. onegensis Hr. caught in Oněžské Lake. A conspicuously narrow esophagus begins in Segment II and in Segment XVI to XVII rapidly changes into a wide intestine. The cavity of Segments IV to VII (VIII) contains clumps of pharynx glands.

From Segment I to Segment XXX to XXXIII, one pair of unbranched blood vessels separates from the dorsal blood vessel in each segment and leads into the ventral blood vessel. Starting approximately in Segment XXV and continuing until the last segment, a different pair of lateral blood

vessels separates from the dorsal blood vessel in each segment and leads into the upper half of the perivisceral sinus. These blood vessels have as many as 12 pairs of short dead end extensions.

One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Two pairs of male funnels are on Dissepiments 9/10 and 10/11, and the anterior pair of funnels is smaller than the posterior pair. Sperm ducts of equal width (60 μ m) empty into long, only 65 μ m long tubular atria, which sometimes extend as far as Segment XVI. Atria are covered by clusters of prostatic cells. Rudimentary atrium and the first pair of testes in Segment IX are missing. Two pairs of spermathecae of equal size are in Segments VIII and IX; they consist of an ampulla and a long and narrow outlet. A short duct connects the ampulla with the esophagus. Paired sperm sacs sometimes extend as far as into Segment XXX.

USSR: Oněžské Lake (f. onegensis Hr.)

Slovakia: Drainage basin of the Hron River: Štiavnička Stream downstream from Mýt u Března, Hron upstream from Beňuš, Vajskový Stream upstream from Horní Lehota; drainage basin of the Tisa River; karst spring southwest from Muráň near the road to Tisovec (HRABĚ, 1961).

Individuals caught in early March were generally sexually mature, whereas individuals caught in June and August had the sexual apparatus, except for some insignificant remainders, reduced. Only worms caught in September and October by Dr. RAUŠER in the karst stream between Muráň and Tisovec were generally completely sexually mature.

104. Rhynchelmis vej dovskyi HRABĚ et ČERNOSVITOV, 19261926 Rhynchelmis Vej dovskyi HRABĚ et ČERNOSVITOV, Zool. Anz., 65:265-268, Fig. 1.

The body of living individuals is white, 50-60 mm long, and consists of 90 to 120 segments. The frontal lobe is extended into a flagellum. Segments starting in Segment III are divided into a front narrow and a posterior wide ring. Chaetae are unserrated.

[116]

In Segments II to VIII one pair of blood vessels separates from the dorsal blood vessel in each segment and merges with the two branches of the ventral blood vessel in Segments II to VIII, which in Segment VIII merge together to form a single ventral blood vessel. Lateral blood vessels are not present behind the clitellum.

The clitellum extends from Segment VII to Segment XIV. One pair of spermathecae has openings in Segment VIII behind the ventral chaetae, and one pair of male openings is in a similar position in Segment X. One pair of female funnels has openings in Intersegmental Notch 11/12. Rudimentary atrium in Segment IX is missing.

One pair of testes is in Segment X, and one pair of ovaries is in Segment XI. Spermathecae with a large ampulla are connected to the esophagus by a duct. Two pairs of male funnels are in Segments IX and X on Dissepiment 9/10 and 10/11. Sperm ducts empty into a long and narrow tubular atrium near its apical end. Atrial ampullae extend as far as into Segment XIII. Sperm sacs extend as far as into Segment XXXV, and egg sacs sometimes extend as far as into Segment XXXVII.

USSR: Carpathian Ruthenia, mountain streams in the drainage basin of the Tisa River (HRABĚ-ČERNOSVITOV, 1926).

Czechoslovakia: Species not yet found in Czechoslovakia.

Haplotaxidae MICHAELSEN, 1900

1900 Haplotaxidae MICHAELSEN, Tierreich, 10:107.

Individual segments have 4 or 8 chaetae, and sometimes only 2 when the dorsal chaetae are missing. A muscular stomach is present in the genus Haplotaxis but not in the genera Pelodrilus and Adenodrilus. Two pairs of testes are in Segments X and XI, and one or two pairs of ovaries are in Segments XII and XIII or only in Segment XII. Short sperm ducts have openings in Segments XI and XII or both in either of them. Atria are missing. One to four pairs of spermathecae have openings in Intersegmental Notches 5/6 to 8/9 or in one of them.

Haplotaxis HOFFMEISTER, 1843

1843 Haplotaxis HOFFMEISTER, Arch. Naturgesch., 9, (I) 193.

1845 Phreoryctes, HOFFMEISTER, Die bis jetzt bekannten Arten., Braunschweig:40.

Esophagus does not have high epithelium on the dorsal side.
Segments IV to V have a cylindrical muscular stomach.

105. Haplotaxis go dioides (HARTMANN, 1821)

1821 Lumbricus gordioides HARTMANN, Neue Alpina, 1: 45.

The body is very thin and flexible and resembles the Gordioids; however, it is segmented, it is up to 300 mm long, and consists of as many as 200 (480) segments. The prostomium is longer than it is wide, and it is separated from a very short metastomium by a notch which is visible even on the dorsal side. Segments from Segment V to Segment XVIII are divided by an intrasegmental notch into an anterior narrow and posterior wide ring which are in the ratio of 2:3. [117]

The chaetae are not serrated and the ventral chaetae are much longer than the dorsal chaetae. Each segment except Segment I has only 4 or even only 2 chaetae because the dorsal chaetae are generally missing in the central and posterior segments.

Two pairs of testes are in Segments X and XI, and two pairs of ovaries are in Segments XII and XIII. Two pairs of male funnels are on Dissepiments 10/11 and 11/12, and their sperm ducts empty directly (without atria) in Segment XI and XII in front of the ventral chaetae. Female funnels are on Dissepiments 12/13 and 13/14. Spermathecae in Segments VII to IX have openings in the lateral line in Intersegmental Notch 6/7, 7/8, and 8/9.

England, France, Switzerland, Italy, Yugoslavia, Federal Republic of Germany, Poland, Roumania, Bulgaria, USSR, USA.

Czechoslovakia: in various locations.

I was unable to catch sexual individuals. They probably remain deep in the ground; this would be supported by a finding of sexually mature individuals in a trench 0.8-1 m deep (HESSE, 1923) during the First World War.