

# Synopsis of the system of the family Tobrilidae (Nematoda: Enoplida)

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**Summary.** Several new species and genera of tobrilids has been described during the previous 20 years, with the taxonomic structure of the family requiring to be changed to include these newly described taxa. Here, a general scheme for tobrilid taxonomy is proposed with acknowledgement that a detailed revision of all of these genera is required. Two principal sets of features are proposed as a basis for tobrilid classification: structure of the stoma, and the presence and position of buccal pockets and teeth that distinguish subfamilies and tribes in the family. The structure of the supplements and the supplementary apparatus are considered to have lesser taxonomic value, being useful only distinguishing genera and subgenera. Species of the genera *Tobrilus* and *Eutobrilus* require redescription and possibly some synonymisation, a subject for future study.

**Key words:** free-living nematodes, identification key, taxonomy, Tobrilidae.

The previous revision of the family Tobrilidae was published 20 years ago (Tsalolikhin, 1981), and several subsequently alterations to the classification of tobrilid have been proposed (Tsalolikhin, 1983, 1991, 1992a, 1995; Gagarin, 1991a, 1993). None of these alterations represent a profound change to the understanding of the taxonomy of this group. A number of new species have been described during the last 20 years (Ocaña & Zullini, 1988; Zullini, 1988; Shoshin, 1988, 1991, 1998; Tsalolikhin, 1992a, 1992b; Vinciguerra & Zullini, 1991; Ocaña *et al.*, 1996; Eyualem & Coomans, 1997) and the taxonomic changes required are proposed here. A new diagnosis for the family Tobrilidae, diagnoses for the tobrilid genera and subgenera, and a key for the identification of the genera are provided.

## The family Tobrilidae

**Diagnosis** (after Tsalolikhin, 1983). Enoplida. Length of body from 1 to 7 mm, most frequently 1.5-2.5 mm. Cuticle smooth, very finely annulated or with longitudinal ridges. Somatic bristles short, not numerous. Head not offset; with 6 lips around mouth opening. Six long and 4 short cephalic setae present. Stoma developed, usually as a buccal cavity and 2 pockets, sometimes pockets absent;

each pocket with one tooth (onchium). Buccal cavity cup, funnel, or barrel-shaped. Oesophageal tissue surrounds stoma (stoma submerged), except for representatives of the genus *Kurikania*. Ducts of oesophageal glands open in the stoma cavity. Amphids pocket-like, opening at the level of the border of the buccal cavity and the anterior pocket, very rarely more anterior or posterior. Oesophagus without bulbs, 3 pericardial glands present. Female genital system paired, gonads opposed, reflected. Male genital system with paired testes, sperm ducts, two spicules and gubernaculum and usually 6 precloacal midventral papilloid supplements. Caudal glands and terminal duct present (Fig. 1).

Species of the family occur in fresh, rarely brackish, waters, occasionally present in moist soils, and members of the genera are distributed from the polar regions to the tropics and present at altitude or on high mountains.

**Type genus:** *Tobrilus* Andrassy, 1959.

## The genus *Tobrilus* Andrassy, 1959

**Diagnosis.** Stoma with 2 overlapping adjacent pockets (Fig. 1A); each pocket with one tooth; teeth situated about at the same level. Buccal cavity cup- or funnel-shaped. Spicules one fiftieth of

length of male. Supplements submerged: small flattened ampulla, cap poorly developed with one small bristle-like central thorn (Fig. 1E). Five to 9 supplements, occasionally 15, but usually 6; distances between supplements almost equal.

**Type species:** *T. gracilis* (Bastian, 1865).

### The genus *Eutobrilus* Tsalolikhin, 1981

**Diagnosis.** Stoma with 2 overlapping adjacent pockets; each pocket with one tooth; teeth situated about at the same level. Buccal cavity cup- or funnel-shaped. Spicules 50 times shorter than body of male. Supplements echinate (Fig. 1F). Six to 9 supplements, with almost equal distance between them, 1st and last supplements smaller than others. Distance between the second and third (from cloaca) supplements almost equal or markedly exceeding the distance between the other supplements, so-called "0 supplement" (Fig. 1H).

### The subgenus *Eutobrilus* Tsalolikhin, 1981

**Diagnosis.** Six supplements; distance between second and third markedly exceeding the distances between the other supplements (Fig. 1H).

**Type species:** *Eutobrilus* (*Eutobrilus*) *grandipillatus* (Brakenhoff, 1914).

### The subgenus *Peritobrilus* Gagarin, 1993 grad. n.

(syn: *Peritobrilus* Gagarin, 1993 syn. n.)

**Diagnosis.** Six to 9 supplements. Distances between supplements almost equal (Fig. 1I).

**Type species:** *Eutobrilus* (*Peritobrilus*) *graciliformis* (Altherr & Delamare-Deboutville, 1972) comb. n.

Currently, it is not possible to determine the species composition of the genera *Tobrilus* and *Eutobrilus* as a comprehensive review and redescription of the species is required for many of the species attributed to these genera. Also, the differentiation of these two genera requires revision. Several species descriptions (Altherr, 1958; 1963a; 1963b; 1976, Altherr & Delamare-Deboutville, 1972, Gagarin, 1989; 1991a; 1991b; 1996; 1999; Gagarin & Gusakov, 1998) do not provide adequate information to enable the taxonomic position of the putative species to be confirmed.

### The genus *Asperotobrilus* Shoshin, 1991

**Diagnosis.** Stoma with 2 adjacent pockets; each pocket with one tooth; teeth situated almost at

same level. Buccal cavity cup-shaped. Spicules 30-40 times shorter than body of male. Typical tobriloid supplements absent but replaced by bristles; distances between bristles almost equal. Somatic setae prominent.

Indigenous to Lake Baikal.

**Type species:** *A. asper* Shoshin, 1991.

**Other species:** *A. aculeatus* Shoshin, 1998; *A. investis* Shoshin, 1998.

### The genus *Paratrilobus* Micoletzky, 1922 (syn: *Baicalobrilus* Tsalolikhin, 1976)

**Diagnosis.** Stoma large, without pockets, barrel-shaped, sometimes narrowed at the base, with two large teeth on the base. Spicules 50 times shorter than body of male. Supplements echinate. Six supplements, distance between supplements almost equal; 1st and last supplements smaller than others.

**Type species:** *P. grandipapilloides* Micoletzky, 1922.

**Other species:** *P. expugnator* (Tsalolikhin, 1976); *P. brevis* (Tsalolikhin, 1976); *P. ponticus* Tsalolikhin, 1981; *P. rapis* Gagarin, 1991.

### The genus *Quasibrilus* Tsalolikhin, 1976

**Diagnosis.** Stoma cap-shaped, small; pockets and teeth not present (possibly very small teeth present, but not observed). Amphids situated posterior to the level of stoma. Spicules 60 times shorter than body length of male. Five supplements, echinate, the first supplement smaller than others; distance between 2nd and 3rd supplements longer than distances between the others.

Endemics of Baikal Lake.

**Type species:** *Q. nannostomus* Tsalolikhin, 1976. (*Q. strenuus* (Gagarin, 1991) *apud* Gagarin 1993 *non Quasibrilus* Tsalolikhin, 1976).

### The genus *Lamuania* Tsalolikhin, 1976

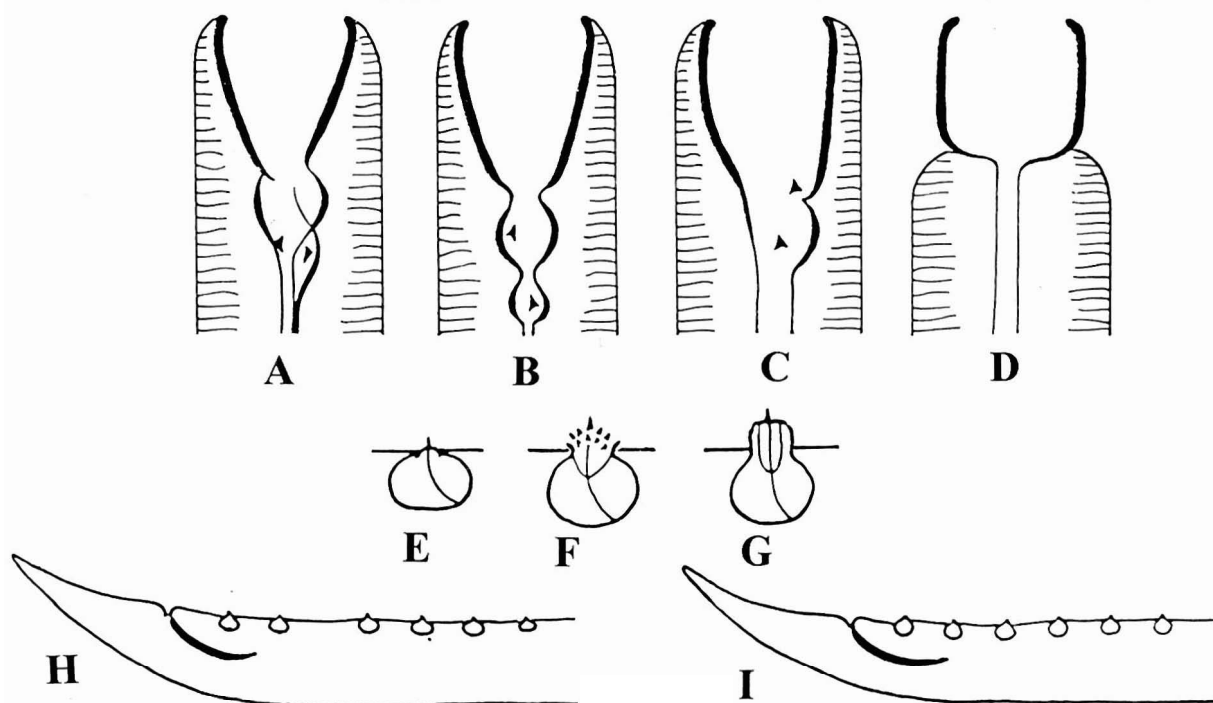
**Diagnosis.** Stoma cap-shaped; pockets and teeth not present (possibly very small teeth are present, but not observed). Amphids situated posterior to the level of stoma. Males unknown.

Indigenous to Lake Baikal.

**Type species:** *L. orientalis* Tsalolikhin, 1976.

### The genus *Kurikania* Tsalolikhin, 1976

**Diagnosis.** Stoma wide, large, cap-shaped, not surrounded by oesophageal tissue (Fig. 1D); po-



**Fig. 1.** Morphological characters used for the taxonomy of the family Tobrilidae. Stoma structure (A-D). A: Stoma with 2 overlapping pockets adjacent each other; B: Stoma with 2 pockets, situated one after the other; C: Stoma with single pocket, D: Stoma without pockets. Supplement types (E-G). E: Submerged supplement; F: Echininate supplement; G: Supplement with stretched neck. Distribution of supplements in the row (H, I). H: Distance between second and third markedly exceeds the distances between the other supplements; I: Distances between supplements equal.

ockets and teeth not present. Spicules 50 times shorter than body length of male. Five supplements echinate, equal, distance between them almost equal.

Indigenous to Lake Baikal.

**Type species:** *K. sibirica* Tsalolikhin, 1976.

**Other species:** *K. tsalolikhini* Shoshin, 1991.

### The genus *Mesotobrilus* Tsalolikhin, 1981

**Diagnosis.** Stoma cup-shaped with one pocket containing two teeth and widely separated from buccal cavity. Spicules with dilatation on the proximal end and 50 times shorter than body of male. Supplements echinate with ampulla with widened base; cap strongly protruding. Six to 8 equal supplements, distance between them almost equal.

Indigenous to Lake Baikal.

**Type species:** *M. ultimus* (Tsalolikhin, 1977).

**Other species:** *M. delicatus* Shoshin, 1988.

### The genus *Neotobrilus* Tsalolikhin, 1981 (*non Neotobrilus sensu* Rathore & Nama, 1989)

**Diagnosis.** Stoma with 2 pockets, situated one

after the other along the longitudinal body axis; each pocket with one tooth (Fig. 1B). Buccal cavity cup-shaped distinctly separated from anterior pocket; posterior pocket separated from anterior pocket by a narrow duct. Vagina bulb-like, with multilayer musculature. Spicules 25 times (18 to 36) shorter than body of male. Supplements echinate with strongly developed cup. Six supplements with closely distanced supplements near the cloaca (1-3), small and rudimentary, and others, 4-6, large distinctly separated from first group.

**Type species:** *N. longus* (Leidy, 1852).

**Other species:** *N. diversipapillatus* (Daday, 1905) (syn.: *Tobrilus longior* Altherr, 1963; *T. savaryi* Altherr, 1963); *N. telekiensis* (Allgen, 1952) (syn.: *Trilobus hoehnelensis* Allgen, 1952); *N. macrospiculum* (Altherr, 1963); *N. longiformis* (Loof, 1973); *N. vicinus* (Loof, 1973); *N. breviductus* (Loof & Riemann, 1976) (syn.: *Tobrilus longus (pro parte) sensu* Meyl, 1957a); *N. nicaraguensis* (Loof & Riemann, 1976) (syn.: *Tobrilus longus (pro parte) sensu* Meyl, 1957a); *T. nicasimilis* Loof & Riemann, 1976; *N. hopei* (Loof & Riemann, 1976); *N. ampiei* (Joubert & Heyns, 1979); *N. filipjevi* (Ebsari, 1982); *N. rossicus* Tsalolikhin, 1983 stat. n. (syn.: *N. longus rossicus* Tsalolikhin,

1983 syn. n.).

*Species inquirendae*: *N. brzeskii* (Altherr, 1963); *N. tantloyi* (Sukul, 1971); *N. floridensis* (Joubert & Heyns, 1979).

### The genus *Brevitobrilus* Tsalolikhin, 1981

**Diagnosis.** Stoma with 2 pockets, situated one behind the other along the longitudinal body axis; each pocket with one tooth. Buccal cavity cup-shaped distinctly separated from anterior pocket; posterior pocket separated from anterior pocket by a narrow duct. Spicules about 40 times shorter than body length of the male. Supplements echinate, without micro-thorns, with stretched neck (Fig. 1G) and short central thorn and sclerotized pieces on the cup. Six supplements with 1st supplement smaller than others; in some species the distance between supplements is almost equal, whereas in others the distance between supplements 3 and 4 is longer.

**Type species:** *B. stefanskii* (Micoletzky, 1925) (synonyms: *Trilobus stefanskii* Micoletzky, 1925; *T. s. paludicola* Micoletzky, 1925; *T. paludicola* Filipjev, 1928; *T. stefanskii stenurus* Filipjev, 1929; *T. grandipapillatus sensu* Ditlevsen, 1921; *T. malayanus* Schneider, 1937 = *Brevitobrilus sensu* Tsalolikhin, 1983; *T. gracilis consimilis* Schneider, 1939; *Tobrilus vibratus* Sukul, 1967 = *Brevitobrilus sensu* Tsalolikhin, 1983; *Tobrilus allophysis sensu* Vinciguerra, 1972; *Brevitobrilus montanus* Ocana, Hernandez & Martin, 1996).

**Other species:** *B. graciloides* (Daday, 1908) (Syn.: *Tobrilus africanus* Zullini, 1988); *B. findeneggi* (Schiemer, 1971) (syn.: *Tobrilus sardus* Vinciguerra & Zullini, 1991); *B. granatensis* (Ocana & Zullini, 1988) (synonyms: *Tobrilus graciloides sensu* Vinciguerra, 1972; *Tobrilus stefanskii sensu* Joubert & Heyns, 1979; *Tobrilus siculus* Vinciguerra & Zullini, 1991); *B. keniensis* Tsalolikhin, 1992 (synonyms: *Trilobus graciloides sensu* Allgen, 1952; *Tobrilus graciloides sensu* Andrassy, 1964); *B. fesehai* Eyualem & Coomans, 1997; *B. tsalolikhini* Eyualem & Coomans, 1997.

*Species inquirendae*: *B. consimiloides* (Altherr, 1965); *B. confusus* (Khera, 1975); *B. sexsetiferous* (Khera, 1975).

### The genus *Semitobrilus* Tsalolikhin, 1981

**Diagnosis.** Stoma with 2 pockets, situated one after the other along the longitudinal body axis; each pocket with one tooth. Buccal cavity cup-shaped distinctly separated from anterior pocket; posterior pocket separated from anterior pocket by

a narrow duct. Vagina strongly muscularized, but not bulb-like, sometimes angled to ventral surface of the body. Spicules 25-30 times shorter than body of male. Six to 8 supplements submerged under cuticle, almost completely reduced with very small ampulla, variable distances between them.

**Type species:** *S. pellucidus* (Bastian 1865) (synonyms: *Trilobus pellucidus* Bastian, 1865; *T. leptosoma* De Man, 1881; *T. tenuicaudatus* Daday, 1897; *T. longicaudatus* W. Schneider, 1923 *sensu* Stefanski, 1938; *Tobrilus bayonensis* Altherr, 1963; *T. gagarini* Ebsary, 1982 = *Semitobrilus sensu* Gagarin, 1993).

**Other species:** *S. closlongicaudatus* (Gagarin, 1971) (synonyms: *Trilobus longicaudatus* Linstow, 1876 *sensu* Hofmänner, 1913; *T. pellucidus* Bastian, 1865 *sensu* Hofmänner & Menzel, 1915; *Tobrilus pellucidus longicaudatus* Juget, 1969; *T. pellucidus lemani* Gerlach & Riemann, 1974; *T. longicauda* (Linstow, 1876) *sensu* Zullini, 1982; *S. parapellucidus* (Ebsary, 1982); *S. ebsari* Tsalolikhin, 2000 (syn.: *Tobrilus longicaudatus* (W. Schneider, 1923) *sensu* Ebsary, 1982).

### The genus *Epitobrilus* Tsalolikhin, 1981

**Diagnosis.** Stoma with one posterior pocket; buccal cavity and anterior pocket jointed (Fig. 1C). Dorsal tooth situated at the base or mid-part of joint buccal cavity, second tooth situated in the posterior pocket. Spicules 30-40 times shorter than body of male, supplements echinate with small sclerotized pieces on the cup or "semisubmerged", an intermediate type between submerged and echinate supplements. Supplements same size, distances between them almost equal.

**Type species:** *E. meyli* Tsalolikhin, 1981 (syn.: *Trilobus graciloides* Daday, 1908 *sensu* Meyl, 1957).

**Other species:** *E. medius* (G. Schneider, 1916) Tsalolikhin, 1991 (= *Eutobrilus sensu* Tsalolikhin, 1983); *E. allophysis* (Steiner, 1919) Gagarin, 1991 (= *Raritobrilus sensu* Tsalolikhin, 1983); *E. setosus* (Altherr, 1963). *E. flagellatus* (Andrassy, 1963); *E. sablensis* (Ebsary, 1982).

*Species inquirenda*: *E. parvipapillatus* (Kreis, 1923).

### The genus *Raritobrilus* Tsalolikhin, 1981

(syn. *Macrotobrilus* Tsalolikhin, 1981 syn. n.)

**Diagnosis.** Stoma with 2 pockets, situated one after the other along the longitudinal body axis; each pocket with one tooth. Buccal cavity cup or funnel-shaped, weakly separated from anterior

pocket. Spicules 30-50 times shorter than body length of male. Supplements echinate; central thorn sometimes with process. Six to 13 supplements, 1st and/or last being smaller than others; distances equal between supplements, but occasionally greater between 2 and 3 (from cloaca).

**Type species:** *R. steineri* (Micoletzky, 1925) (syn.: *Trilobus steineri* Micoletzky, 1925 = *Eutobrilus sensu* Tsalolikhin, 1992).

**Other species:** *R. scallensis* (W. Schneider, 1925); *R. husmanni* (Altherr, 1958) (= *Eutobrilus sensu* Tsalolikhin, 1983); *R. elephas* (Andrassy, 1964) (= *Macrotobrilus sensu* Tsalolikhin, 1981); *R. heptapapillatus* (Joubert & Heyns, 1979) (= *Eutobrilus sensu* Tsalolikhin, 1983).

### Key to genera and subgenera of the family Tobrilidae

1. Stoma with 2 overlapping pockets against each other, or stoma with 1 pocket, or stoma without pockets ..... 2
  - Stoma with 2 pockets situated one after another along longitudinal axis of the body ..... 11
2. Stoma with 2 pockets; teeth situated almost at the same level ..... 3
  - Stoma with 1 pocket, or without pockets ..... 6
3. Supplements echinate ..... 4
  - Supplements submerged or bristle-like ..... 5
4. Distance between second and third markedly exceeds the distances between the other supplements ..... *Eutobrilus* Tsalolikhin, 1981
  - Distances between supplements almost equal ..... *Peritobrilus* Gagarin, 1993
5. Supplements submerged .....
  - ..... *Tobrilus* Andrassy, 1959
  - Supplements bristle-like .....
    - ..... *Asperotobrilus* Shoshin, 1991
6. Stoma with 1 pocket ..... 7
  - Stoma without pockets ..... 8
7. Spicules with dilatation on the proximal end; ampulla of supplement widened on the base .....
  - ..... *Mesotobrilus* Tsalolikhin, 1981
  - Spicules without dilatation on the proximal end; ampulla of supplement roundish .....
    - ..... *Epitobrilus* Tsalolikhin, 1981
8. Stoma barrel-shaped; two big teeth situated on the base of stoma ... *Paratrilobus* Micoletzky, 1922
  - Stoma not barrel-shaped; teeth not present ..... 9
9. Stoma is free: wide, roomy, cup-shaped .....
  - ..... *Kurikania* Tsalolikhin, 1976
  - Stoma surrounded by oesophageal tissue ..... 10
10. Vestibulum very high .....
  - ..... *Quasibrilus* Tsalolikhin, 1976
  - Vestibulum low ..... *Lamuania* Tsalolikhin, 1976

11. Supplementary row differentiated: 1-3 supplements from cloaca very small, 4-6 supplements very large, vagina bulb-like .....
  - ..... *Neotobrilus* Tsalolikhin, 1976
  - Supplementary row not differentiated; vagina not bulb-like ..... 12
12. Supplements with stretched neck .....
  - ..... *Brevitobrilus* Tsalolikhin, 1981
  - Supplements of a different structure ..... 13
14. Supplements echinate .....
  - ..... *Raritobrilus* Tsalolikhin, 1981
  - Supplements almost completely reduced .....
    - ..... *Semitobrilus* Tsalolikhin, 1981

### Taxonomic structure of the family Tobrilidae

(with short diagnoses of subfamilies and tribes)

#### Family Tobrilidae Filipjev, 1918

**Subfamily:** Tobrilinae (stoma with 2 overlapping pockets adjacent to each other, or pockets absent; teeth situated at the same level, or absent).

**Tribe:** Tobrilini (stoma with 2 overlapping pockets adjacent to each other).

**Genera:** *Tobrilus*, *Eutobrilus* and *Asperotobrilus*.

**Tribe:** Paratrilobini trib. n. (stoma without pockets).

**Genera:** *Paratrilobus*, *Quasibrilus*, *Kurikania*, *Mesotobrilus*.

**Subfamily:** Neotobrilinae subfam. n. (stoma with 2 pockets, situated one after the other along the longitudinal body axis; each pocket with single tooth).

**Tribe:** Neotobrilini (buccal cavity distinctly separated from anterior pocket).

**Genera:** *Neotobrilus*, *Brevitobrilus*, *Semitobrilus*.

**Tribe:** Epitobrilini trib. n. (buccal cavity and anterior pocket jointed, or buccal cavity weakly separated from anterior pocket).

**Genera:** *Epitobrilus*, *Raritobrilus*.

The position of the genus *Lamuania* can not be determined.

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**Цалолыхин С.Я.** Конспект системы семейства Tobrilidae (Nematoda: Enoplida).

**Резюме.** За последние 20 лет было описано значительное число новых видов и родов тобрилид, что привело к изменению таксономической структуры семейства. В настоящее время можно предложить лишь общую схему таксономической структуры тобрилид. В качестве морфологической основы таксономического деления тобрилид (подсемейства, трибы) предлагается строение стомы: наличие и расположение карманов и онхов. Строению супплементов и супплементарного аппарата придается подчиненное значение (роды, подроды). Обстоятельная ревизия всех родов, переописании и синонимизации видов *Tobrilus* и *Eutobrilus* требует специальной публикации.