

Morphology and differential diagnostics of parasitic larvae of some Strongylidae (Nematoda) of horses

By G. M. DVOJNOS and V. A. HARČENKO

From Department of Parasitology,
Institute of Zoology of the Ukrainian Academy of Sciences, Kiev, USSR

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This work maintains the topic of an earlier publication by the present authors (DVOJNOS & HARČENKO 1987). The investigation of morphology and differential diagnostics of parasitic larvae (L4) of strongylids parasitizing in horses is of current interest since it provides the possibility to clarify the role played by certain species of these parasites in the etiology of strongylid colitis. Moreover, we hoped that the data on comparative morphology of L4 and an additional study of definitive stages (L5 and sexually mature forms) of poorly studied Asiatic forms, in particular, would make it possible to update the classification of cyathostomine larvae in horses being considered by us in agreement with B. CHITWOOD & M. CHITWOOD (1974) within the subfamily Cyathostominae of the family Strongylidae. This work commenced with a revision of the nomenclature of this group (HARČENKO 1986). In view of the fact that the revision of the group was not completed prior to the preparation of the manuscript, we earlier had used the classification of ERŠOV (1943) with the alteration made by BARUŠ (1962). When the revision was over (HARČENKO 1987), it came to our knowledge that the same revision was also carried out by HARTWICH (1986). He established the species earlier known as *Cyathostomum catinatum* LOOSS, 1900, as the type species for the genus *Cyathostomum* MOLIN, 1831, and changed its name to *Cyathostomum tetracanthum* MEHLIS, 1831) sensu HARTWICH, 1986. All this required to introduce certain alterations in the classification suggested by us.

Our system and that of HARTWICH are similar as regards the volume of the genera *Cylindropharynx*, *Caballonema*, *Cylicocycclus*, *Petrovinema*, *Poteriostomum* and *Gyalocephalus*, but we do not distinguish separate tribes among cyathostomine larvae parasitizing in horses, in particular, the tribe Gyalocephalea.

We accept the genera *Cyathostomum* MOLIN, 1861 sensu HARTWICH, 1986 and *Coronocycclus* HARTWICH, 1986, save for *C. aegyptiacum* (RAILLIET, 1923) which we classify with *Coronocycclus* in the volume determined by this author. Through the species *Cylicodontophorus bicoronatus* considerably differs from *C. mettami*, *C. euproctus*, *C. schuermanni* and *C. mongolicus*, we allow for the traditions and do not separate it from other genera, leaving the genus *Cylicodontophorus* in the volume determined by LICHTENFELS (1975) having supplemented it with *C. mongolicus*. We divide the genus *Cylicostephanus* sensu HARTWICH, 1986 into three genera: *Cylicostephanus* (*C. calicatus*, *C. minutus*, *C. hybridus*, *C. longibursatus*, *C. goldi*), *Cylicotetrapedon* (*C. bidentatus* and *C. asymmetricus*) and *Skrjabinodentus* (*S. caragandicus* = *Cylicostephanus longicoelus* and *S. tshijoi* DVOJNOS & HARČENKO, 1986). The species *Hsiungia pekingensis* and *Tridentoinfundibulum gobi* are distinguished as separate genera.

The names of cyathostomine species according to the altered classification are used in the description given below. A number of the larvae described here are presented in the work of HARČENKO (1987) as the larvae of unidentified species (*Cylicostephanus minutus*, *Cylicocycclus radiatus*, *Cylicodontophorus mettami* and *Poteriostomum imparidentatum*).

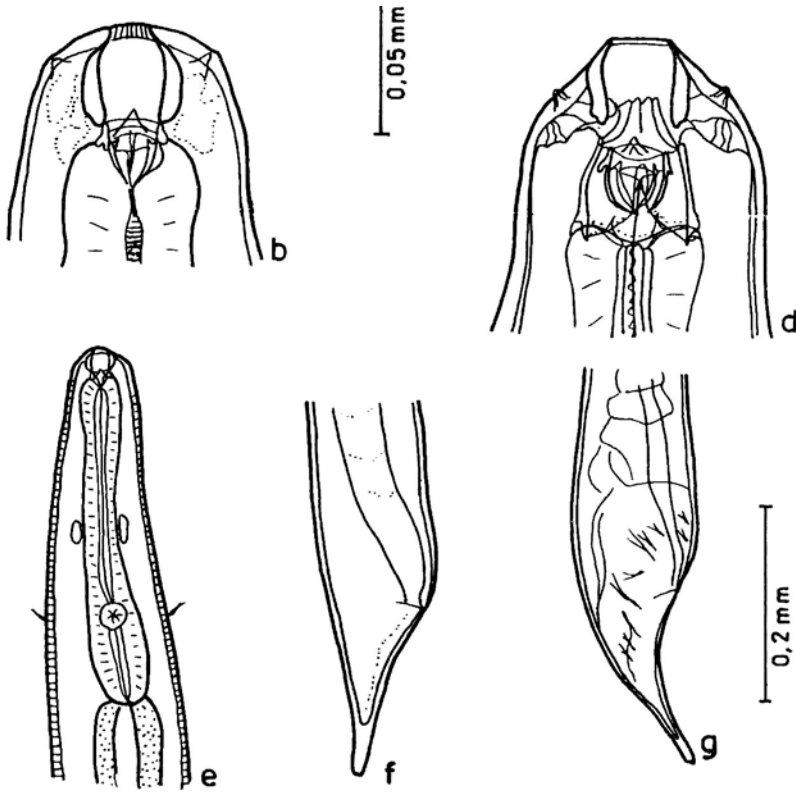


Fig. 1. Parasitic larvae of *Cyclostephanus minutus*: a – buccal capsule of L4, laterally; b – the same, dorso-ventrally; c – head end of L4–5, laterally; d – the same, dorso-ventrally; e – anterior end; f – female tail end; g – the same of male.

***Cyclostephanus minutus* (YORKE & MACFIE, 1918) CRAM, 1924**

Material examined: 14 larvae from horses from the Ukraine, Kazakhstan and the Tomsk Region of the R.S.F.S.R. as well as from an Asiatic wild ass and a zebra from the Askaniya Nova Preserve in the Kherson Region, UkrSSR.

Description (Fig. 1). Small larvae. Buccal collar not separated from the rest of the body. Leaf-crown visible as a frequent striation of the buccal collar inner edge. Buccal capsule small, cylindrical, somewhat widened in the upper part, its width being smaller than the depth. The walls of buccal capsule are of medium thickness gradually narrowing towards the upper edge. Ring of esophageal funnel rather high, narrow. Esophageal funnel well developed, with pointed teeth.

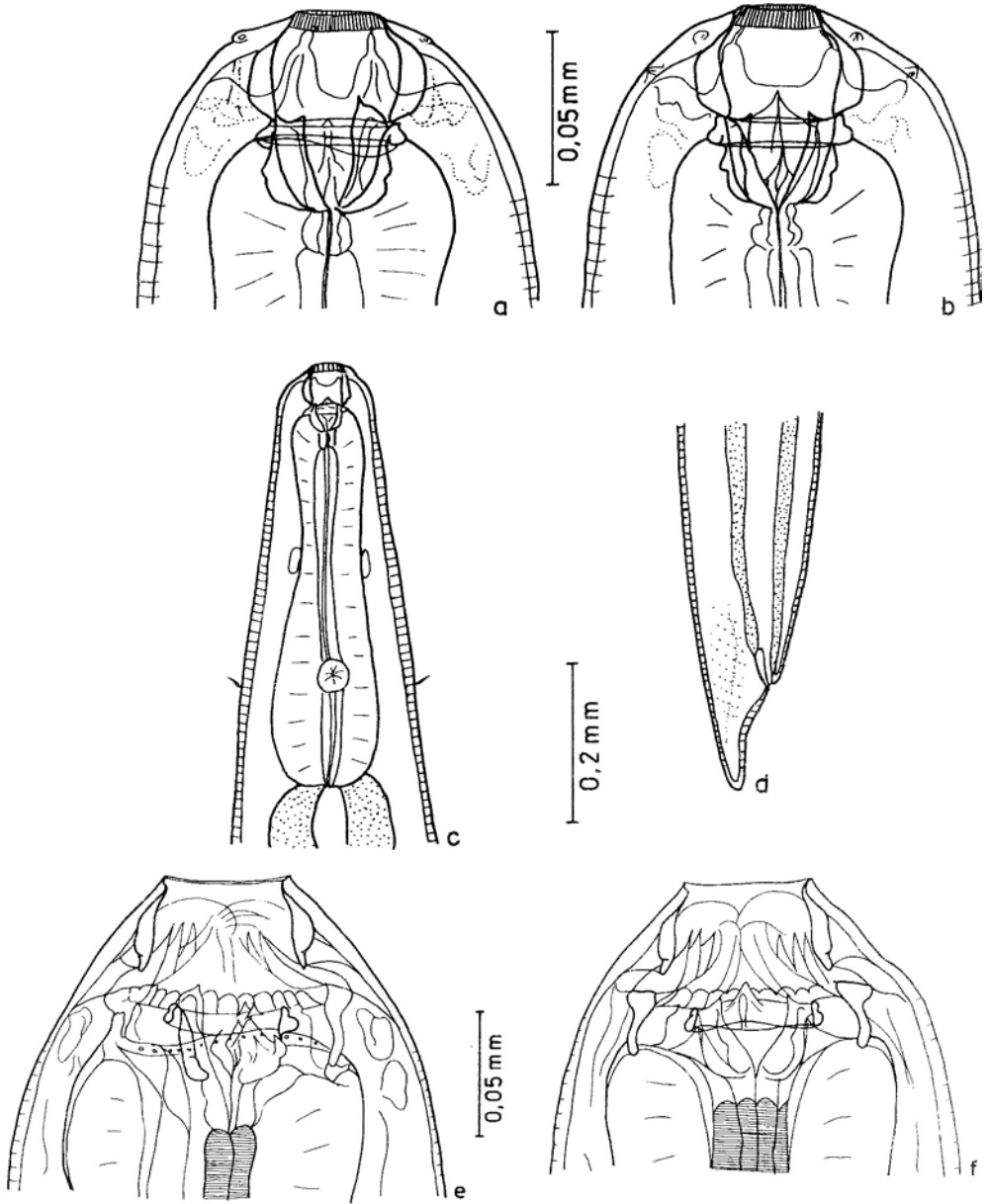


Fig. 2. Parasitic larvae of *Cycloetrapedon bidentatus*: a – buccal capsule of L4, laterally; b – the same, dorso-ventrally; c – anterior end; d – female tail end of L4; e – head end of L4–5, laterally; the same, dorso-ventrally.

Dorsal tooth penetrating into the buccal capsule cavity. Sublateral teeth less developed. Esophagus long and narrow, somewhat widened in its posterior part. Cervical papillae and excretory pore located in the posterior third of esophagus.

Male. Body 4.6–5.6 mm long; length of esophagus 0.308–0.313 mm; width of buccal capsule 0.016–0.020 mm; depth of buccal capsule 0.022–0.023 mm; height of esophageal funnel ring 0.007–0.008 mm; distance of anus from tail end 0.099–0.177 mm.

Female. Body 5.2–5.9 mm long; length of esophagus 0.302–0.364 mm; width of buccal capsule 0.015–0.022 mm; depth of buccal capsule 0.018–0.022 mm; height of esophageal funnel 0.006–0.008; distance of cervical papillae from head end 0.252 mm, of excretory pore 0.346–0.263 mm, of nerve ring 0.157–0.190 mm; distance of anus from tail end 0.123–0.132 mm.

Differential diagnosis. This larva is similar to *Cylicostephanus calicatus* and *C. longibursatus*, but as regards the buccal capsule size, it occupies an intermediate position between these two species. The dimensions of this larva are close to those of *C. longibursatus*, but it differs from the latter by the shape of walls and cavity of the buccal capsule. The larvae cannot be identified with any of the phenons described earlier.

Cylicotetrapedon bidentatus IHLE, 1925

Material examined: 6 larvae from horses from the Ukraine and Kazakhstan as well as from an Asiatic wild ass from the Askaniya Nova Preserve, Kherson Region, UkrSSR.

Description (Fig. 2). Larvae of medium size. Buccal collar not separated from the rest of the body. Leaf-crown visible as a frequent striation of the buccal collar inner edge. Buccal capsule large, cylindrical, its width being somewhat bigger than the depth. Walls of the buccal capsule thick, sharply narrowing towards the edges. The ring of esophageal funnel is of medium size, but far smaller than the buccal capsule is deep. Esophageal funnel well developed, with teeth. Dorsal tooth penetrating into the buccal capsule cavity; it is orbicular and has a spine on the tip. Sublateral teeth smaller, pointed, with wide base. Esophagus long, somewhat widened in its posterior part. Cervical papillae and excretory pore located on the boundary of the posterior fourth of esophagus.

Male. Body about 5.7 mm long; length of esophagus 0.380–0.426 mm; width of buccal capsule 0.040–0.054 mm, depth 0.028–0.030 mm; height of esophageal funnel ring about 0.014 mm; distance of cervical papillae from head end some 0.347 mm, of excretory pore 0.308–0.325 mm, of nerve ring 0.202–0.218 mm; of anus from tail end 0.117–0.129 mm.

Female. Body 5.5–6.6 mm long; length of esophagus 0.409–0.459 mm; width of buccal capsule 0.039–0.050 mm, its depth 0.030–0.034 mm; height of esophageal funnel ring 0.010–0.015 mm; distance of cervical papillae from head end about 0.370 mm, of excretory pore 0.353–0.381 mm, of nerve ring 0.202–0.235 mm; of anus from tail end 0.120–0.132 mm.

Differential diagnosis. The larva is rather similar to *C. goldi*, but shows a bigger size of buccal capsule and esophagus. It cannot be identified with any of the phenons described earlier.

Petrovinema poculatum (LOOSS 1900) ERŠOV, 1943

Material examined: 2 larvae from horses from the Ukraine.

Description (Fig. 3). Larvae of medium size. Buccal collar separated from the rest of the body. Leaf-crown consisting of numerous petals. Buccal capsule big, oval its width is smaller than or equal to the length. Walls of the buccal capsule of medium thickness, gradually narrowing toward the edges. Ring of esophageal funnel wide, reaching $\frac{1}{3}$ of the buccal capsule depth. Esophageal funnel well developed, with characteristic sclerotic formations imparting a cylindrical shape to its external edge. Teeth are absent.

Female. Body 5.8–6.7 mm long; length of esophagus 0.582–0.605 mm; width of buccal capsule 0.040–0.042 mm, its depth 0.038–0.039 mm; height of esophageal funnel ring 0.013–0.014 mm; distance from head end to cervical papillae 0.364–0.386 mm, to excretory pore 0.364 mm; of anus from tail end 0.228–0.237 mm. The tail end is long, gradually getting thinner.

Differential diagnosis. This larva is similar to the larva of *Cylicocyclus elongatus*, but much smaller. The shape of the esophageal funnel is quite peculiar. The esophagus is long and thin. The larva cannot be identified with any of the phenons described earlier. Moulting larvae have not been found. The belonging of the larva to *P. poculatum* has been established basing upon the shape and size of the buccal capsule as well as upon the shape of the esophagus and the tail end.

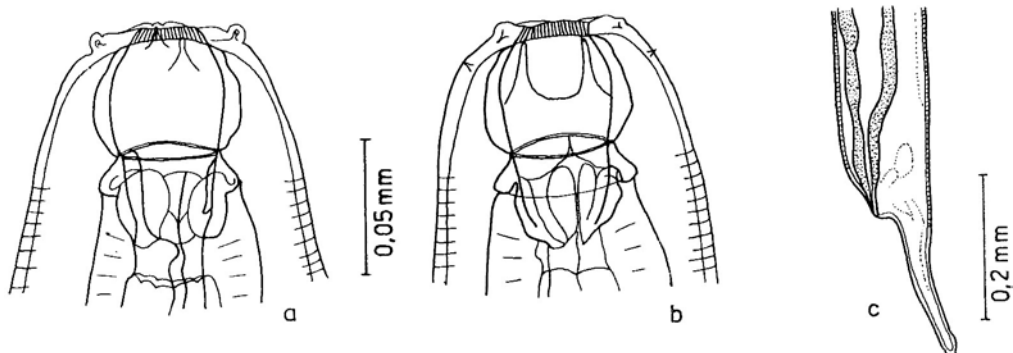


Fig. 3. Parasitic larva L4 of *Petrovinema poculatum*: a — buccal capsule, laterally; b — the same, dorso-ventrally; c — female tail end.

Cylicoocylus radiatus (LOOSS, 1900) CHAVES, 1930

Material examined: 7 larvae from horses from Kazakhstan, from Asiatic wild ass from the Askaniya Nova Preserve, Kherson Region, UkrSSR, and from an ass from Azerbaijan.

Description (Fig. 4). Larvae of big size. Buccal collar not separated from the rest of the body. Buccal capsule of medium size, cylindrical, its width equals the depth. Walls of buccal capsule thick, sharply narrowing towards the edges. Ring of esophageal funnel barely noticeable. Esophageal funnel with pointed dorsal tooth penetrating into the cavity of buccal capsule. The tooth end is pointed upwards, to buccal aperture. Sublateral teeth are absent. Esophagus long and narrow, widened in its posterior part. Cervical papillae and excretory pore located somewhat in front of the place where the esophagus joins to the intestine.

Male. Body some 8.0 mm long; length of esophagus 0.515 mm; width of buccal capsule 0.038 mm, its depth 0.039 mm; height of esophageal funnel ring 0.008 mm; distance of cervical papillae from head end 0.515 mm, of excretory pore 0.520 mm, of nerve ring 0.314 mm; distance of anus from tail end 0.210 mm.

Female. Body some 8.6 mm long; length of esophagus 0.594 mm; width of buccal capsule 0.039 mm, its depth 0.038 mm; height of esophageal funnel ring 0.008 mm; distance of cervical papillae from head end 0.459 mm, of excretory pore 0.470 mm, of nerve ring 0.347 mm; distance of anus from tail end 0.177 mm.

Differential diagnosis. The larva is similar to *Coronocylus coronatus*, but it is bigger and its dorsal tooth has a different shape. This larva cannot be identified with any of the phenons described earlier.

Cylicoocylus triramosus (YORKE & MACFIE, 1920) CHAVES, 1930

We found in Asiatic wild ass N 5 from the Askaniya Nova Preserve a single specimen L4–5 of *C. triramosus* with preserved esophageal funnel ring being very similar to that in L4 of *Cylicoocylus nassatus*. Probably, L4 of *C. triramosus* were present in our material among L4 of *C. nassatus*, but we could not clearly differentiate the phenons belonging to the two species.

Cylicodontophorus euproctus (BOULENGER, 1917) CRAM, 1924

Material examined: 15 larvae from horses from Kazakhstan.

Description (Fig. 5). Larvae of medium size. Buccal collar not separated from the rest of the body. Two leaf-crowns were observed. ELC consists of numerous small petals. The petals of ILC are much bigger. Buccal capsule big, its width exceeds the depth more than

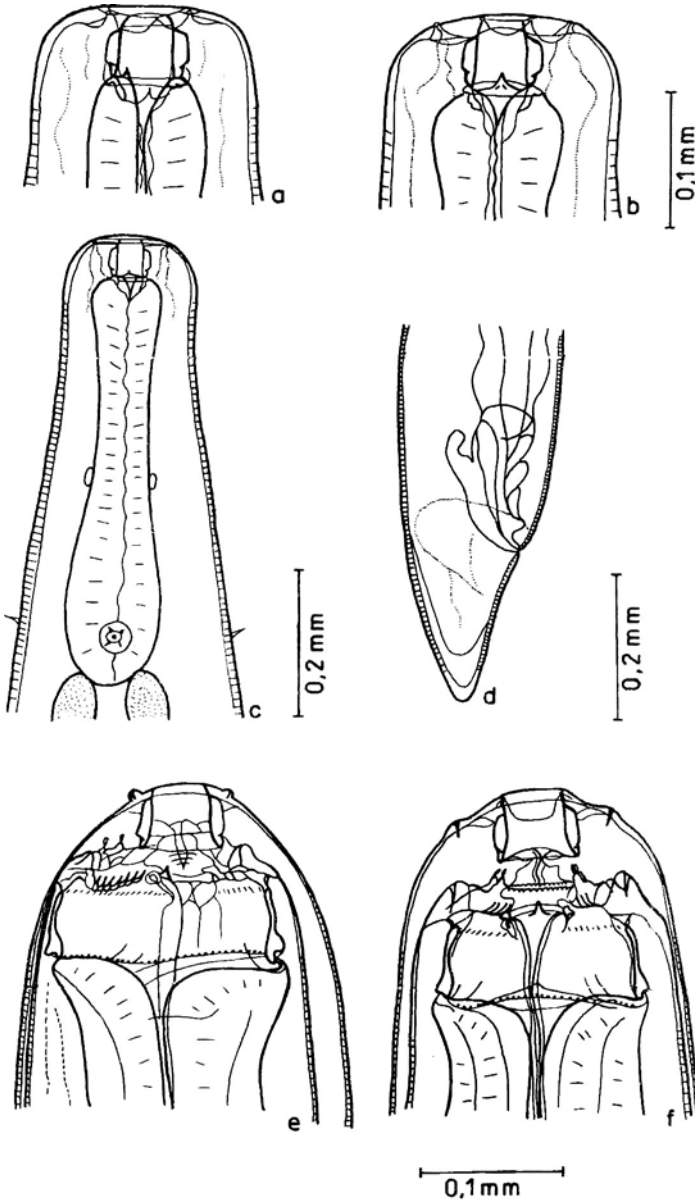


Fig. 4. Parasitic larvae of *Cylicocyclus radiatus*: a – buccal capsule of L4, laterally; b – the same, dorso-ventrally; c – anterior end; d – male tail end; e – head end of L4 –5, laterally; f – the same, dorso-ventrally.

twofold, but the ring of esophageal funnel conceals this difference. The walls of buccal capsule have a complex structure getting thinner in a sphenoid fashion towards the front edge. The walls also have a projection from the lateral side. The ring of esophageal funnel is well developed, its wall possesses a clavate appendage. Three small pointed teeth are located on the funnel bottom. The dorsal tooth has a peculiar shape

Male. Body 3.8– 5.6 mm long; length of esophagus 0.308–0.364 mm; width of buccal capsule 0.039–0.062 mm, its depth 0.021–0.026 mm; height of esophageal funnel ring 0.016–0.018 mm;

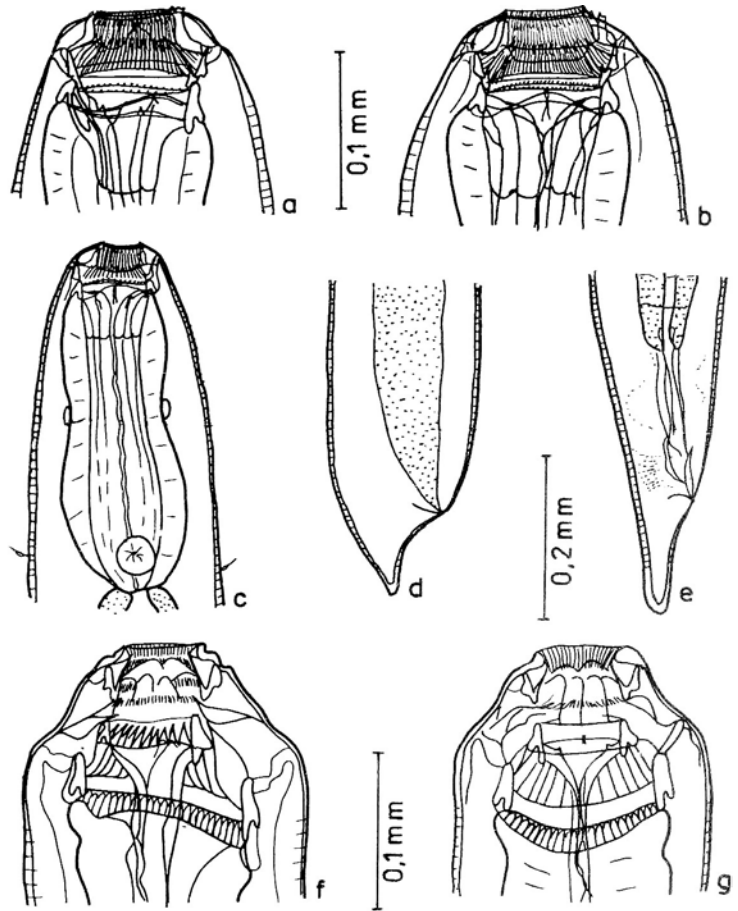


Fig. 5. Parasitic larva L4 of *Cylicodontophorus euproctus* (a-e) and L4-5 of *C. mongolica* (f, g): a - buccal capsule, laterally; b - the same, dorso-ventrally; c - anterior end; d - male tail end; e - the same of female; f - head end, laterally; g - the same, dorso-ventrally.

distance of cervical papillae from head end 0.302-0.392 mm; of excretory pore 0.314-0.392 mm, of nerve ring 0.168-0.230 mm; distance of anus from tail end 0.063-0.132 mm.

Female. Body 4.5-6.1 mm long; length of esophagus 0.342-0.403 mm; width of buccal capsule 0.040-0.057 mm, its depth 0.021-0.026 mm; height of esophageal funnel ring 0.012-0.015 mm; distance of cervical papillae from head end 0.291-0.420 mm, of excretory pore 0.308-0.448 mm, of nerve ring 0.202-0.235 mm; distance of anus from tail end 0.147-0.210 mm.

Differential diagnosis. This larva distinctly differs from the L4 of other species of strongylids. Its belonging to *Cylicodontophorus euproctus* was determined on the basis of a moulting form whose deformation made its picture a physical impossibility. When studying the E. E. ŠUMAKOVIČ collection of strongylids from horses from Mongolia (1933), we found the moulting larva of *Cylicodontophorus mongolicus*. Its structure is identical with the L4 of *C. euproctus*. The small amount of available material does not permit to make more definite conclusions pertaining to the structure of *C. mongolicus*. The opinion about the belonging of the larvae from Kazakhstan to *C. euproctus* is confirmed by the fact that their hosts were characterized by the absence of definitive stage *C. mongolica*.

Cylicodontophorus mettami (LEIPER, 1913) FOSTER, 1936

Material examined: 30 larvae from horses from the Ukraine and Kazakhstan as well as from an ass from Azerbaijan.

Description (Fig. 6). Larvae of medium size. Buccal collar not separated from the rest of the

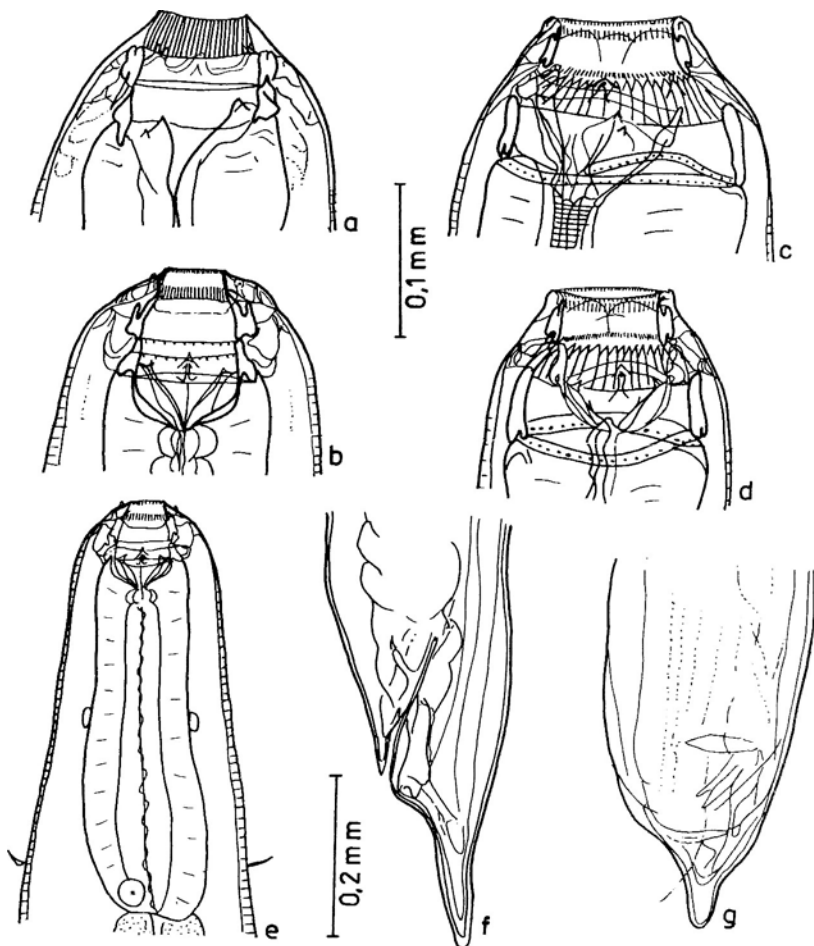


Fig. 6. Parasitic larvae of *Cylicodontophorus mettami*: a — buccal capsule of L4, laterally; b — the same, dorso-ventrally; c — head end of L4-5, laterally; d — the same, dorso-ventrally; e — anterior end; f — female tail end; g — the same of male.

body. Two leaf-crowns were observed. ELC consists of numerous small petals. The petals of ILC are a bit bigger and smaller in number. Buccal capsule big, cylindrical, its width exceeds the depth more than twofold, but the high ring of esophageal funnel somewhat conceals this difference. Walls of buccal capsule very thick, having an almost equal thickness over the entire length. Esophageal funnel ring well developed, its height equals the depth of buccal capsule, the lower edge is bifurcated. Esophageal funnel with three pointed teeth. The dorsal tooth is the most developed one, but not a single tooth reaches the lower boundary of the buccal capsule.

Male. Body 4.6–5.6 mm long; esophagus length 0.392–0.414 mm; width of buccal capsule 0.068–0.081 mm, its depth 0.022–0.026 mm; height of esophageal funnel ring 0.026–0.040 mm; distance of anus from tail end 0.123–0.141 mm.

Female. Body 5.1–7.4 mm long; esophagus length 0.313–0.515 mm; width of buccal capsule 0.057–0.090 mm; its depth 0.021–0.027 mm; height of esophageal funnel ring 0.027–0.042 mm; distance of anus from tail end 0.135–0.210 mm.

Differential diagnosis. This larva is similar to *Cylicocycylus ultrajectinus* and *Poteriostomum imparidentatum*. It differs from the former by the presence of teeth in the buccal capsule and from the latter by the shape of the buccal funnel. The larva cannot be identified with any of the phenons described earlier.

***Poteriostomum imparidentatum* QUIEL, 1919**

Material examined: 18 larvae from horses from the Ukraine and Kazakhstan, from a Przewalski's horse and an Asiatic wild ass from the Askaniya Nova Preserve, Kherson Region, UkrSSR, as well as from an Asiatic wild ass from the Badkhyzsky Preserve, Turkmenian SSR.

Description (Fig. 7). Larvae of medium size. Buccal collar not separated from the rest of the body. Leaf-crown consisting of numerous long petals. Buccal capsule big, its width exceeds the depth more than twofold, but the ring of esophageal funnel somewhat conceals this difference. Walls of buccal capsule slightly curved outwards so that the maximum width of the buccal capsule lies near the middle. The walls are thick, narrowing towards the edges; they have appendages in the upper and lower parts which face each other. Ring of esophageal funnel well developed, its width is almost equal to the depth of the buccal capsule. The ring is bifurcated in the lower part. Esophageal funnel well developed, with teeth. The pointed dorsal tooth almost reaches the lower boundary of the buccal capsule. Sublateral teeth sharp and barely noticeable. Esophagus wide.

Male. Body 5.5–6.4 mm long; esophagus length 0.504–0.532 mm; width of buccal capsule 0.087–0.112 mm, its depth 0.032–0.035 mm; height of esophageal funnel ring 0.040–0.047 mm; distance of anus from tail end 0.174–0.210 mm.

Female. Body 4.0–8.5 mm long; length of esophagus 0.504–0.532 mm; width of buccal capsule 0.080–0.140 mm, its depth 0.030–0.040 mm; height of esophageal funnel ring 0.031–0.046 mm; distance of anus from head end 0.280–0.448 mm.

Differential diagnosis. The female's tail is long, having a peculiar shape, with gradually narrowing end. This larva is similar to *Cylicoecylus ultrajectinus* and *Cylicodontophorus mettami* as well as to the larvae of the "c" type of IHLE & OORDI (1923) and the "k" type of MÜLLER (1950).

***Gyalocephalus capitatus* LOOSS, 1900**

Material examined: 2 larvae from a horse from Kazakhstan and an Asiatic wild ass from the Askaniya Nova Preserve, Kherson Region, UkrSSR.

Description (Fig. 8). Larvae of medium size. Buccal collar not separated from the rest of the body. Leaf-crown consisting of numerous petals. Buccal capsule of medium size, ampullaceous, its width is almost equal to the depth. Walls of the buccal capsule of medium thickness, they get narrowed after the ledge located on the external side close to the upper edge. Ring of esophageal funnel of medium size. The esophageal funnel is well developed and has big teeth in each sector. The teeth reach $\frac{1}{3}$ of the buccal capsule depth and their edges are pointed vertically upwards. There is a blunt projection on the apex of the dorsal tooth. The apex of each sublateral tooth has three pairs of projections or indentations arranged in pairs one close to another. In addition, at the base of the teeth there are some appendages on the lining of esophageal funnel resembling those observed in sexually mature forms. Esophagus long and narrow. Cervical papillae and excretory pore located on the same level, approximately on the boundary of the posterior third of esophagus.

Female. Body 3.6–5.2 mm long; length of esophagus 0.543–0.582 mm; width of buccal capsule 0.074–0.075 mm, its depth 0.050 mm; height of esophageal funnel ring 0.009 mm; distance of cervical papillae and cloacal aperture from head end 0.403 mm, of nerve ring 0.291 mm; distance of anus from tail end 0.168–0.255 mm. The tail is long and narrow.

Differential diagnosis. This larva differs considerably from the others by its ampullaceous buccal capsule and the presence of three teeth having a peculiar shape. The identification of the moulting form of the L4 of *Triodontophorus serratus* permitted us to reject the assumption that the given phenon belongs to this species (BARUŠ, 1962). Among strongylids, the females of just a few species have a long tail. The narrow and long esophagus as well as the presence of characteristic projections in the esophageal funnel testify to the fact that this larva belongs to *Gyalocephalus capitatus*.

***Craterostomum acuticaudatum* (KOTLAN, 1919) IHLE, 1920**

Material examined: 9 larvae from horses from Kazakhstan as well as from Asiatic wild asses from the Askaniya Nova Preserve, Kherson Region, UkrSSR, and from the Badkhyzsky Preserve, Turkmenian SSR.

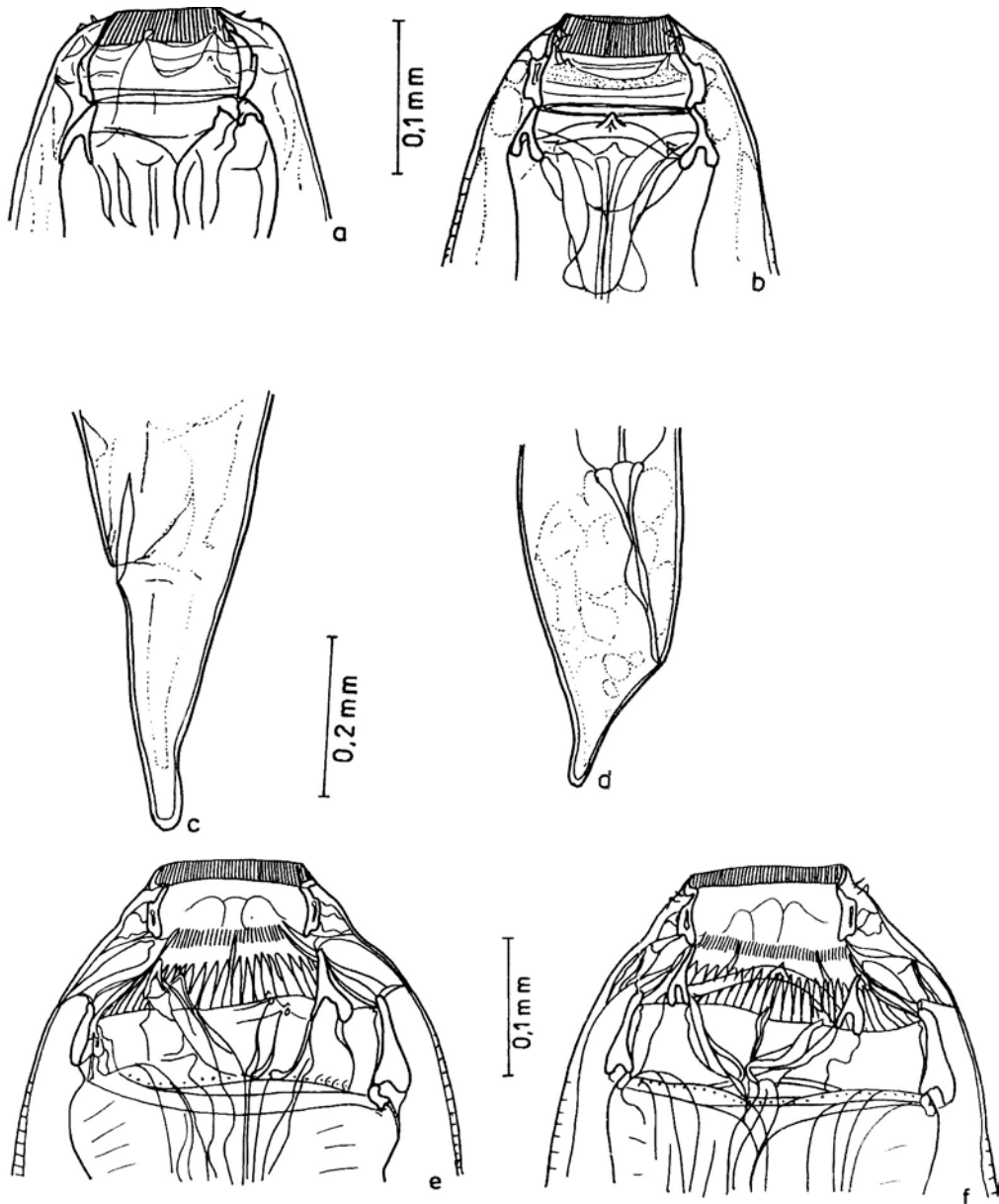


Fig. 7. Parasitic larvae of *Poteriosstomum imparidentatum*: a – buccal capsule of L4, laterally; b – the same, dorso-ventrally; c – female tail end; d – the same of male; e – head end of L4–5, laterally; f – the same, dorso-ventrally.

Description (Fig. 9). Larvae of medium size. Buccal collar not separated from the rest of the body. Leaf-crown was not observed. Buccal capsule of medium size, cylindrically shaped; its width is approximately equal to the depth. Walls of buccal capsule of medium thickness; in the lower part, they bend to the inside of the buccal capsule, gradually narrowing to the upper edge. The esophageal funnel ring is of medium height and relatively narrow. Esophageal funnel well developed and provided with teeth. Dorsal tooth with a spine on the upper margin, reaching $\frac{1}{3}$ of the buccal capsule

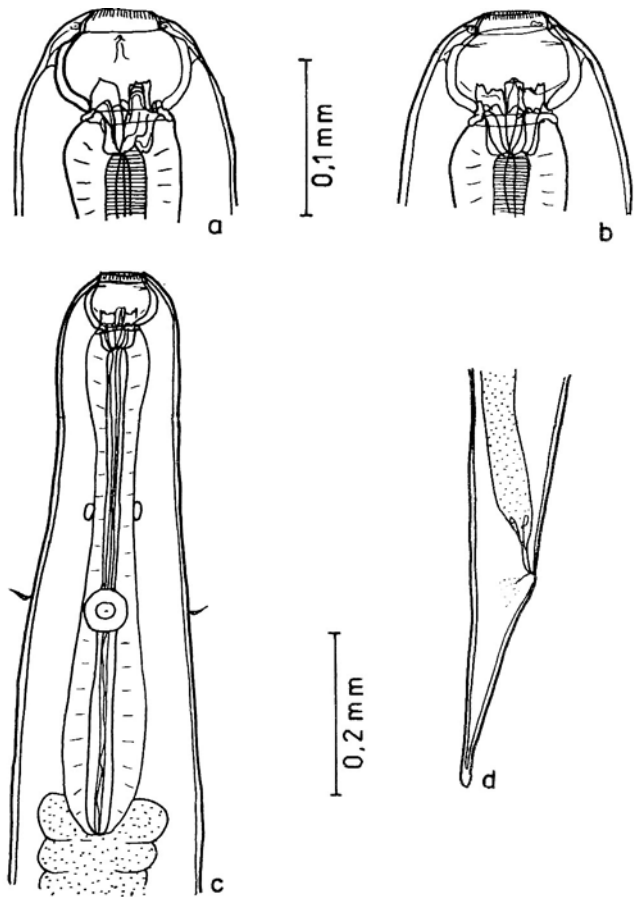


Fig. 8. Parasitic larva L4 of *Gyalocephalus capitatus*: a – buccal capsule, laterally; b – the same, dorso-ventrally; c – body anterior end; d – female tail end.

depth. Pointed sublateral teeth are arranged at the base of esophageal funnel ring; they do not project into the cavity of buccal capsule. Esophagus comparatively short. Cervical papillae and excretory pore located roughly on the same level on the posterior third of esophagus.

Male. Body 3.9–5.0 mm long; length of esophagus 0.325–0.386 mm; width of buccal capsule 0.042–0.050 mm, its depth 0.037–0.039 mm; height of esophageal funnel ring 0.010–0.012 mm; distance of cervical papillae from head end 0.291–0.347 mm, of excretory pore 0.297–0.353 mm, of nerve ring 0.190–0.213 mm; distance of anus from tail end 0.114–0.150 mm.

Female. Body 4.1–5.7 mm long; length of esophagus 0.347–0.403 mm; width of buccal capsule 0.042 mm, its depth 0.037–0.039 mm; height of esophageal funnel ring 0.009–0.012 mm; distance of cervical papillae from head end 0.302–0.314 mm, of excretory pore 0.308–0.353 mm, of nerve ring 0.196–0.218 mm; distance of anus from tail end 0.267–0.279 mm.

Differential diagnosis. This larva is similar to a larva the species of which is not yet identified (phenon VI, in print), but differing from the latter in the shape of the buccal capsule, the size of the esophageal funnel ring and the length of female's tail. This larva cannot be identified with any of the phenons described earlier.

Discussion. Thus, the larvae of 21 species of Cyathostominae have hitherto been identified, excluding the L4 of *Cylicodontophorus bicoronatus* (DEMSIN, 1964) whose description is evidently insufficient, as well as 4 species of

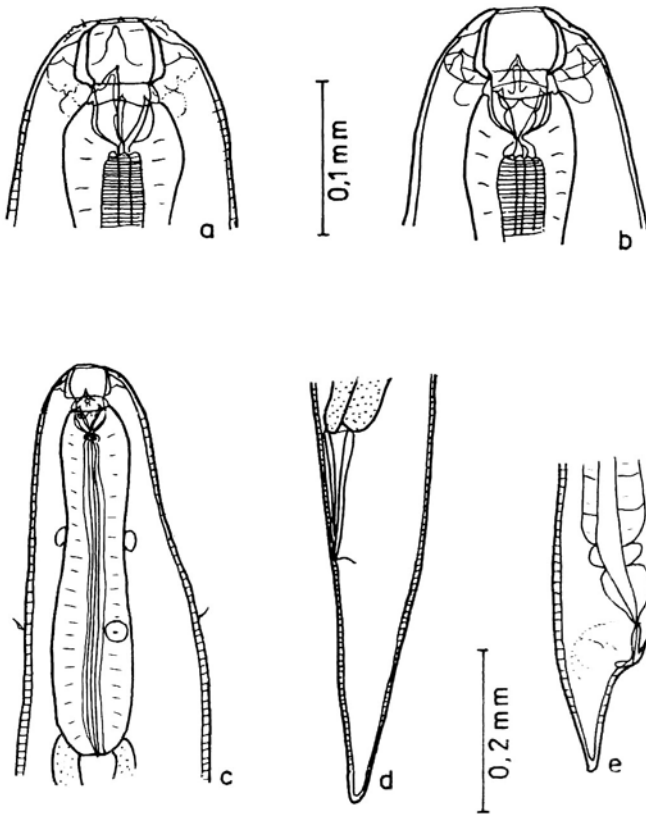


Fig. 9. Parasitic larva L4 of *Craterostomum acuticaudatum*: a – buccal capsule, laterally; b – the same, dorso-ventrally; c – body anterior end; d – female tail end; e – the same of male.

small strongylids (*Craterostomum acuticaudatum* and 3 species of the genus *Triodontophorus*). To them one can add the larvae of *Cylicocyclus triramosus* and *Cylicodontophorus mongolica* which are known to be very similar to *Cylicocyclus nassatus* and *Cylicodontophorus mongolica*, respectively. Unfortunately, the larvae of such common species of cyathostomins as *Coronocyclus labratus*, *Cylicostephanus hybridus*, *Cylicodontophorus bicoronatus* and *Poteriostomum ratzfi* are not among the larvae identified by us. Besides, the larvae of some rare exotic species also remain unidentified. According to our classification, the identified larvae belong to 10 genera: *Cyathostomum* (2 species), *Coronocyclus* (2 species), *Cylicostephanus* (4 species), *Cylicotetrapedon* (1 species), *Petrovinema* (2 species), *Cylicocyclus* (6 species), *Cylicodontophorus* (2 species), *Poteriostomum* (1 species), *Gyaloecephalus* (1 species), *Craterostomum* (1 species), and *Triodontophorus* (3 species). This list does not involve the larvae of *Cylicodontophorus mongolica* and *Cylicocyclus triramosus*.

We did not manage to reveal the features of generic rank in L4 though the morphology of larvae in a number of species testifies to their close affinity and may provide an additional information when taking the traditional approach to system formation based on a comparison of the characters of sexually mature forms. The L4 of *Cyathostomum tetracanthum* and *C. pateratum*, having a thick-walled buccal capsule, are very similar to each other. Considerable similarity exists between the larvae of 3 species in the genus *Cylicostephanus*: *C. calicatus*, *C. minutus* and *C. longibursatus*. Slightly differing from them is the larva of *C. goldi* which is more similar to the L4 of *Cylicotetrapedon bidentatus*. At the same time, the larva of *C. goldi* is also similar to the larvae of *Cylicocyclus nassatus* and *C. triramosus*. In general, the larvae representing the genus *Cylicocyclus* are featured by a great variety. The larva of *C. leptostomus*, having a smaller size and a different shape of the dorsal tooth, is similar to the larvae of *C. nassatus* and *C. triramosus*. Another group of larvae of the species belonging to this genus is represented by the larvae of *C. elongatus* and *C. insigne*. Somewhat different is the L4 of *C. radiatus* and quite peculiar is the larva of *C. ultrajectinus*. This larva is more similar to the L4 of *Poteriostomum imparidentatum* as well as to *Cylicodontophorus mettami*, *C. euproctus* and *C. mongolicus* being different from the latter three only by the presence of a leaf-crown. In general, the

larvae of *Poteriostomum imparidentatum* and *Cylicodontophorus* spp. are very similar. A peculiar structure of the buccal capsule is observed in the larvae of *Cylicodontophorus euproctus* and *C. mongolicus* though the presence of two leaf-crowns, the location of the internal leaf-crown inside the buccal capsule and the high ring of the esophageal funnel are the common features for all known species of the genus *Cylicodontophorus*. Quite peculiar is the larva of *Petrovinema skrjabini* whose structure of the buccal capsule served as an additional proof for the separation of this genus. The L4 of *P. poculatum* has a certain similarity with the L4 of *C. elongatus* and *Cylicostephanus* spp., in particular, with *C. calicatus*. The L4 of *Gyalocephalus capitatus* is quite different from the larvae of other Cyathostominae. While having a well developed buccal capsule, the larvae of strongylids belonging to the genera *Craterostomum* and *Triodontophorus* are closer to the larvae of cyathostomins than to the larvae of strongylids belonging to the genera *Strongylus*, *Alfortia*, and *Delafondia*. This fact may be explained by the peculiarities of the developmental cycle.

Apparently, groups of very similar or even actually identical larvae may be distinguished among L4. This makes it possible to suppose that some hitherto unknown larvae should be similar to those whose species have not yet been identified. One may believe that the larva of *Cylicostephanus hybridus* is similar to the larvae of *C. calicatus* and *C. minutus*, the larva of *Cylicotetrapedon asymmetricus* to the larva of *C. bidentatus*, and the larva of *Poteriostomum ratzii* to the larva of *P. imparidentatum*.

Though the L4 considerably differs from the definitive stage by the structure of the head end, we still believe that there exists a certain correlation between the peculiarities of their structure in separate species which is well seen in L4 of *Gyalocephalus capitatus* and *Triodontophorus* spp. Moreover, certain characters in the larvae remain intact in the definitive stage as well (shape and length of esophagus, location of cervical papillae and excretory pore relative to the place where the esophagus joins to the intestine, shape of female's tail end). All this helped to identify the larvae in a number of species.

It is evident that the stage L4 is more simple than the definitive one. During its investigation, the main attention was paid to the structural peculiarities in the walls of the buccal capsule and the ring of esophageal funnel which may be treated as structures homologous to the protorhabdiae and telorhabdiae of the Rhabditids. Apparently, these peculiarities have adaptive nature.

Investigations of the upper part of the buccal capsule of L4 with the aid of the scanning electron microscope may provide additional informations pertaining to generic connections between the separate species of strongylids.

Zusammenfassung. Morphologie und Differentialdiagnostik parasitischer Larven einiger Pferdestrongyliden (Nematoda). — Die Morphologie der Viertlarven von *Cylicostephanus minutus*, *Cylicotetrapedon bidentatus*, *Petrovinema poculatum*, *Cylicocyclus radiatus*, *C. triramosus*, *Cylicodontophorus euproctus*, *C. mettami*, *C. mongolicus*, *Poteriostomum imparidentatum*, *Gyalocephalus capitatus* und *Craterostomum acuticaudatum* wird erörtert. Die Arten werden in Übereinstimmung mit dem neuen System benannt, das in der Einführung umrissen wird. Die Bestimmung erfolgt bei Larven, die während der 4. Häutung getötet werden, und berücksichtigt für L4 und L5 gemeinsame Merkmale: Darmmorphologie, Lage der Cervicalpapillen, Exkretionsöffnung, Morphologie des Schwanzteils beim Weibchen. Für die L4 werden Gattungsmerkmale nicht unterschieden (ausgenommen *Petrovinema* spp.). Die Larven der kleinen Strongylinae-Arten sind denen der Cyathostominae ähnlich.

Резюме. Морфология и дифференциальная диагностика паразитических личинок некоторых стронгилид лошадей (Nematoda, Strongylidae). Рассматривается морфология четвертой стадии *Cylicostephanus minutus*, *Cylicotetrapedon bidentatus*, *Petrovinema poculatum*, *Cylicocyclus radiatus*, *C. triramosus*, *Cylicodontophorus euproctus*, *C. mettami*, *C. mongolicus*, *Poteriostomum imparidentatum*, *Gyalocephalus capitatus*, *Craterostomum acuticaudatum*. Названия видов даются в соответствии с новой системой, очерк которой изложен во введении. Идентификация проведена по личинкам, фиксированным в момент четвертой линьки и по общим для 4-й и 5-й стадий признакам: форме пищевода, расположению цервикальных сосочков и экскреторного отверстия, форме хвостового конца самки. У четвертой стадии признаков родового ранга не выделено (исключение составляет *Petrovinema* spp.). Личинки мелких стронгилид сходны с личинками циатостомин.

Summary. The morphology of L4 of *Cylicostephanus minutus*, *Cylicotetrapedon bidentatus*, *Petrovinema poculatum*, *Cylicocyclus radiatus*, *C. triramosus*, *Cylicodontophorus euproctus*, *C. mettami*, *C. mongolicus*, *Poteriostomum imparidentatum*, *Gyalocephalus capitatus* and *Craterostomum acuticaudatum* is discussed. The species are named in accordance with the new system, which is outlined in the introduction. The criteria for the identification of larvae killed during their 4th skinning include distinctive marks occurring in the 4th and 5th stages: gut morphology, position of cervical papillae, excretory opening, morphology of the caudal part of the female. For L4, generic characteristics have not been distinguished (except *Petrovinema* spp.). Larvae of small Strongylinae species are similar to those of Cyathostominae.

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Authors' address: Dr. G. M. DVOJNOS, Dr. V. A. HARČENKO, Otdel parazitologii, Institut zoologii AN Ukr.SSR, ul. Lenina, 15, Kiev-30 GSP, 252601, USSR.

Kürzung von Zeitschriftentiteln. Nachdem hier (Bd. 28, S. 237) die Transliteration der kyrillischen Buchstaben nach dem DDR-Fachbereichsstandard TGL 37116 vorgestellt wurde, wollen wir diese Vermittlung neuester Standards heute ergänzen durch einen Bericht über den DDR-Fachbereichsstandard TGL 20969 vom Juni 1984 „Regeln für die Kürzung von Titeln fortlaufender Sammelwerke“ (mit „Titel“ ist hier also der „Titel der Zeitschrift“ verstanden, nicht der Titel einer Arbeit). Diese Regeln für die Bildung von Kurztiteln („Kurztitel“ ist hier also der für Zitierzwecke abgekürzte Titel einer Zeitschrift) von „Zeitungen, Zeitschriften, zeitschriftenartigen Reihen und Schriftenreihen“ in Literaturverzeichnissen sind für die in der DDR erscheinende wissenschaftliche Literatur verbindlich. Nur aus einem Wort bestehende Titel dürfen nicht gekürzt werden (es heißt also „Naturwissenschaften“), ebensowenig (in zusammengesetzten Titeln) die (darin enthaltenen) einsilbigen Wörter, Artikel entfallen (es heißt also „Falke“ und nicht „D. Falke“). Das erste Wort jedes Kurztitels (auch des Kurztitels der Unterreihe, nach dem Komma; ein Beispiel für die Verwendung des Kommas: J. Bot., Sect. A) wird grundsätzlich groß geschrieben (es heißt also „Medicamentum“ und „Horizont“, obwohl sich diese Zeitschriften selbst — in Abweichung vom „Duden“ — mit kleinen Anfangsbuchstaben schreiben). Es kommt vor, daß verschiedene Titel gleich abgekürzt werden. Dann (und wenn gar zwei verschiedene Zeitschriften den gleichen Titel tragen) wird in () ein unterscheidender Hinweis gegeben, z. B. der Erscheinungsort: Medical Journal (New York) = Med. J. (N. Y.); Medizinisches Journal (Berlin West); = Med. J. (Berlin West); Medicamentum (dt. Ausg. DDR; die in diesem Beispiel empfohlene Abkürzung dt. für deutsche steht im Widerspruch zu der Festlegung in der Wortliste, wonach deutsch mit Dtsch. abzukürzen sei); Medicamentum (engl. Ausg.). Zusammengesetzte Wörter werden abgekürzt, z. B. Forschungstechnologie zu Forsch.technol. (wobei in diesem Fall zu beachten ist: ohne Leertaste zwischen den beiden Wortbestandteilen) Für „Deutsche Demokratische Republik“ im Titel ist in den Kurztitel „DDR“ zu übernehmen; Beispiel: Gesetzbl. DDR. Eigennamen bleiben voll erhalten. z. B. „Hoppe-Seyler's Z. physiol. Chem.“. Einige Abkürzungsbeispiele: ärztl., Disease = Dis.; Jahrbuch = Jahrb.; -kunde = kd.; psychisch = psych.; psychologisch = psychol.; -schrift = schr. Die vorstehenden Abkürzungen findet man nicht in der am Schluß der TGL als 5.6. angehängten Wortliste, die ebenfalls verbindlich ist. Wie die Wortliste zu benutzen ist, sei am Beispiel der „Angewandten Parasitologie“ erläutert: Angewandt wird Angew.; Parasitologie fehlt, aber Paläontolog.- ist Paläontol. abzukürzen; analog wird Parasitolog.- zu Parasitol.; also ist „Angew. Parasitol.“ die Standard-Abkürzung für „Angewandte Parasitologie“. Wer im Zweifelsfall Schwierigkeiten hat, kann sich bei der Deutschen Bücherei in Leipzig erkundigen, wie der von ihm benötigte Kurztitel seiner Zeitschrift lautet bzw. zu bilden ist. (WdE.)