

Notes on the genus *Ilyocryptus* Sars, 1862 (Cladocera: Anomopoda: Ilyocryptidae). 2. A re-evaluation of *Ilyocryptus silvaeducensis* Romijn, 1919 in Europe and America

Заметки о роде *Ilyocryptus* Sars, 1862 (Cladocera: Anomopoda: ПьюсCRYPTИДАЕ). 2. Ревизия *Ilyocryptus silvaeducensis* Romijn, 1919 в Европе и Америке

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КЛЮЧЕВЫЕ СЛОВА: ветвистоусые ракообразные, Cladocera, Anomopoda, *Ilyocryptus*, фаунистика, систематика, Европа, Северная Америка, Южная Америка.

ABSTRACT. *Ilyocryptus silvaeducensis* Romijn, 1919 (Cladocera: Anomopoda: Ilyocryptidae) differs from all other species of the genus in having an especially short preanal margin of postabdomen armed with few (5–8), ordinarily doubled, preanal teeth. We found that Nearctic and Neotropical populations of this species form two discrete subspecies. *I. silvaeducensis chengalathi* subsp.n., is described from several localities in U.S.A. and Canada. It differs from other subspecies in having a short, stout fifth seta on the anterior portion of valve, a strong spine near the basalmost preanal teeth, and setules on the distal segment of the proximal lateral swimming setae equal in length to the segment diameter. The undescribed Neotropical subspecies of *I. silvaeducensis* was found in an arid area on the Atlantic coast of Brazil. It differs from other subspecies in possessing several lateral setae at the anal margin, a short distal burrowing spine on the basal segment and thick branches of antenna II. Unfortunately, the sole known specimen was dissected and destroyed, so it is not possible to provide a holotype and establish a new subspecies.

РЕЗЮМЕ. *Ilyocryptus silvaeducensis* Romijn, 1919 (Cladocera: Anomopoda: ПьюсCRYPTИДАЕ) отличается от всех остальных видов рода, имея очень короткий преанальный край постабдомена, вооруженный немногочисленными (5–7) исключительно, или почти исключительно, двойными преанальными зубцами. Мы нашли, что его популяции из Северной Америки и Южной Америки формируют два дискретных подвида. *I. silvaeducensis chengalathi*

subsp.n., найденный в нескольких водоемах из Канады и США отличается от других подвигов, имея короткую и сильную пятую щетинку на переднем крае створки, сильный шип около базального преанального зубца и сетулы на дистальном членике проксимальной плавательной щетинке антенны II длиной равной диаметру этого членика. Неописанный подвид *I. silvaeducensis* из пустынного района на атлантическом побережье Бразилии отличается от других подвигов по: присутствию нескольких латеральных щетинок на анальном крае, короткому дистальному шипу на базальном сегменте антенны II и относительно толстыми ветвями антенны II. К сожалению, в прошлом единственная найденная самка из Бразилии была расчленена и не сохранена, поэтому в настоящее время нельзя установить новый подвид, не имея голотипа.

Introduction

Romijn [1919] suggested that populations of "*Ilyocryptus sordidus*" with a short preanal margin supplied with a few, ordinarily doubled, preanal teeth comprise a separate species. Although the first description of *Ilyocryptus silvaeducensis* Romijn, 1919 (Cladocera: Anomopoda: Ilyocryptidae) from the Netherlands [Romijn, 1919] was relatively detailed, the species was forgotten until Smirnov's [1976] monograph. Then Štifter [1984] redescribed *I. silvaeducensis* and noting its differences from other European ilyocryptids [Štifter, 1991].

Similar forms are present on other continents. Our recent examination of North and South American populations of *I. silvaeducensis* confirmed that they form two discrete subspecies, described below.

Methods

See the previous communication [Kotov & Štifter, 2005].

Unfortunately, for each taxon we had a very limited number of adult females in liquid samples, which could be used for the "conventional" measurements of the ilyocryptids [Kotov, 1999; Kotov et al., 2002]. Juvenile females are not usable for comparison with other species because some of the measured characters manifest a significant size variability [Kotov & Dumont, 2000]. Specimens on slides are normally compressed and not acceptable for correct estimation of proportions between body parts. So, the measurements were not performed.

ABBREVIATIONS FOR COLLECTIONS. AAK — Personal collection of A.A. Kotov, Moscow, Russia; ITZA — Instituut voor taxonomische Zoologie, Universiteit van Amsterdam, the Netherlands; MGU — Zoological Museum of Moscow State University ("Moskovskiy Gosudarstvennyy Universitet"), Moscow, Russia.

Results

Ilyocryptus silvaeducensis Romijn, 1919 sensu Štifter, 1984

TYPE MATERIAL. Apparently lost [Štifter, 1984].

EMENDED DIAGNOSIS OF PARTHENOGENETIC FEMALE. Body triangular-ovoid, dorsal margin almost straight, postero-dorsal angle expressed (Fig. 1); in anterior view, body thick, with a rudimentary dorsal keel. Moulting incomplete, reticulation on head shield and valves well-expressed. Head triangular-ovoid, ocellus small (Fig. 2). Head shield without a postero-lateral projection in region of process of mandibular articulation, the latter triangular, relatively narrow (Fig. 3, arrows), dorsal head pore as a transverse split. Valves with four to five anteriormost setae protruding sparsely; posteriorly to them, a bunch of 5–7 long, closely located setae (Figs 4, 5). Each seta at posterior margin along one side basally with series of spine-like setules, and distally with fine setules (Figs 6, 7). Postabdomen with height maximal in basal part of postanal portion, anus with few spinules on internal wall, opens closely to base than to distal extremity. Preanal margin short, with 5–8 (mostly 6, 7) regularly located, straight, mostly doubled teeth (Figs 8–10). Denticles near preanal teeth often expressed in juveniles (Fig. 8), but strongly reduced or completely absent in adults (Figs 9, 10). Usually, some denticles on postabdomen base. Paired spines short, located on postanal and anal margin. Lateral setae long, the proximalmost lateral seta is located on distalmost portion of preanal margin. One or two strong denticles on the distal ventral margin of the postabdominal claw (Figs 11, 12). Two spines on base of postabdominal claw subequal in size. A group of long setules on the ventral side of the claw. Postabdominal seta longer than postabdomen, its basal segment with rare, long hairs. Antenna I relatively long and thin, its proximal segment with a distinct finger-like projection and low

mounds, distal segment without ridges or denticles, distal end without any mounds. Coxal part of antenna II with two sensory setae of greatly different size. Distal sensory seta long, slender, distal burrowing spine (Fig. 13) with size varying between subspecies. Segments of branches (Figs 14, 15) with thickness varying between subspecies. Apical swimming setae short, their distal segments without hooks on tips, asymmetrically armed with minute setules (Figs 16, 19, 22). Proximal and distal lateral swimming setae of unequal size, both setulated asymmetrically, the setules with size varying between subspecies, but always larger than ones on apical setae (Figs 17, 18, 20, 21, 23, 24). Spine on second segment of exopod only somewhat shorter than third segment (Figs 14, 15). A large seta on outer distal lobe of limb I with basal segment armed unilaterally with rare setules, and distal segment armed bilaterally with dense setules, and a small, thin seta. A large, bisegmented seta armed with minute setules near ejector hooks; gnathobase I as a setulated hill-ock. Beating seta near gnathobase III. Limb VI with inner margin bearing continuous row of setules, separated by small incisions into six series. Size up to 920 µm.

EPHIPPIAL FEMALE, MALE. Unknown.

DIFFERENTIAL DIAGNOSIS. *I. silvaeducensis* differs from all other species in having a short preanal margin of postabdomen armed with preanal teeth, which are all or almost all doubled (except of 1–2 rudimentary teeth near anus). There are only two other species with partly doubled preanal teeth, *I. cuneatus* and *I. gouldeni*. *I. silvaeducensis* differs from both these species in having relatively shorter preanal margin with smaller number of teeth, and longer spine on second exopod segment.

TYPE LOCALITY. Not specified clearly, the species was described based on specimens from several water bodies from the Netherlands.

DISTRIBUTION. See descriptions of three subspecies. Similar forms were found in Australia [Sars, 1896] and in Africa [Kotov, 2000], but resolution of their status requires further investigations.

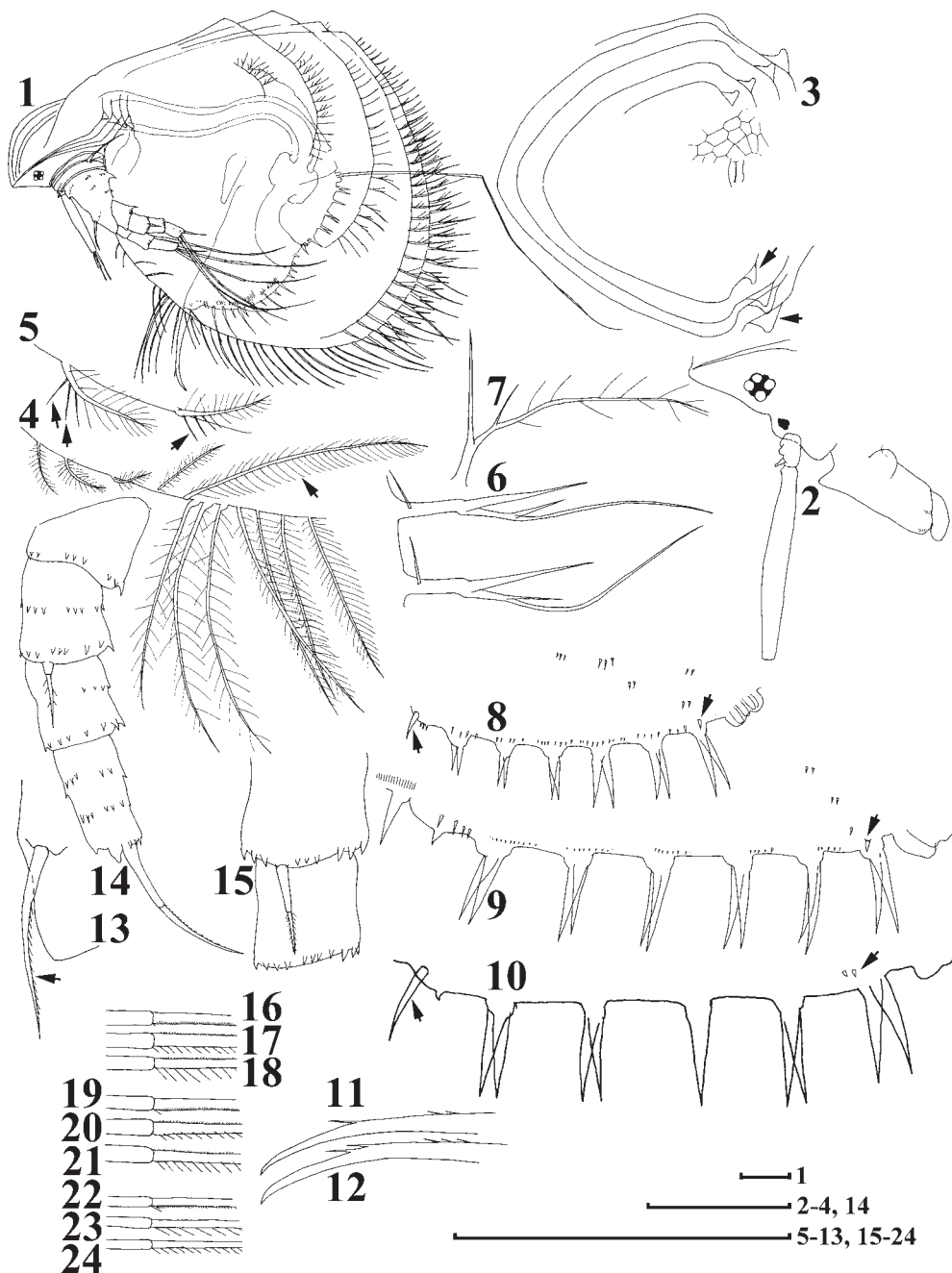
KEY FOR THE SUBSPECIES OF *ILYOCRYPTUS SILVAEDUCENSIS* ROMIJN, 1919

- 1 (4) A single or no lateral seta at anal margin; distal burrowing spine relatively long; segments of branches of antenna II relatively thin.
- 2 (3) Fifth seta on anterior portion of valve long and thin, near basalmost preanal teeth a small denticle or no denticles, length of setules on distal segment of proximal lateral swimming setae markedly greater the segment diameter 1. *I. silvaeducensis silvaeducensis* Romijn, 1919
- 3 (2) Fifth seta on anterior portion of valve short and stout; near basalmost preanal teeth a strong spine; length of setules on distal segment of proximal lateral swimming setae equal to the segment diameter 2. *I. silvaeducensis chengalathi* subsp.n.
- 4 (1) Several lateral setae at anal margin; distal burrowing spine relatively short; segments of branches of antenna II relatively thick Undescribed subspecies from Brazil

1. *Ilyocryptus silvaeducensis silvaeducensis* Romijn, 1919

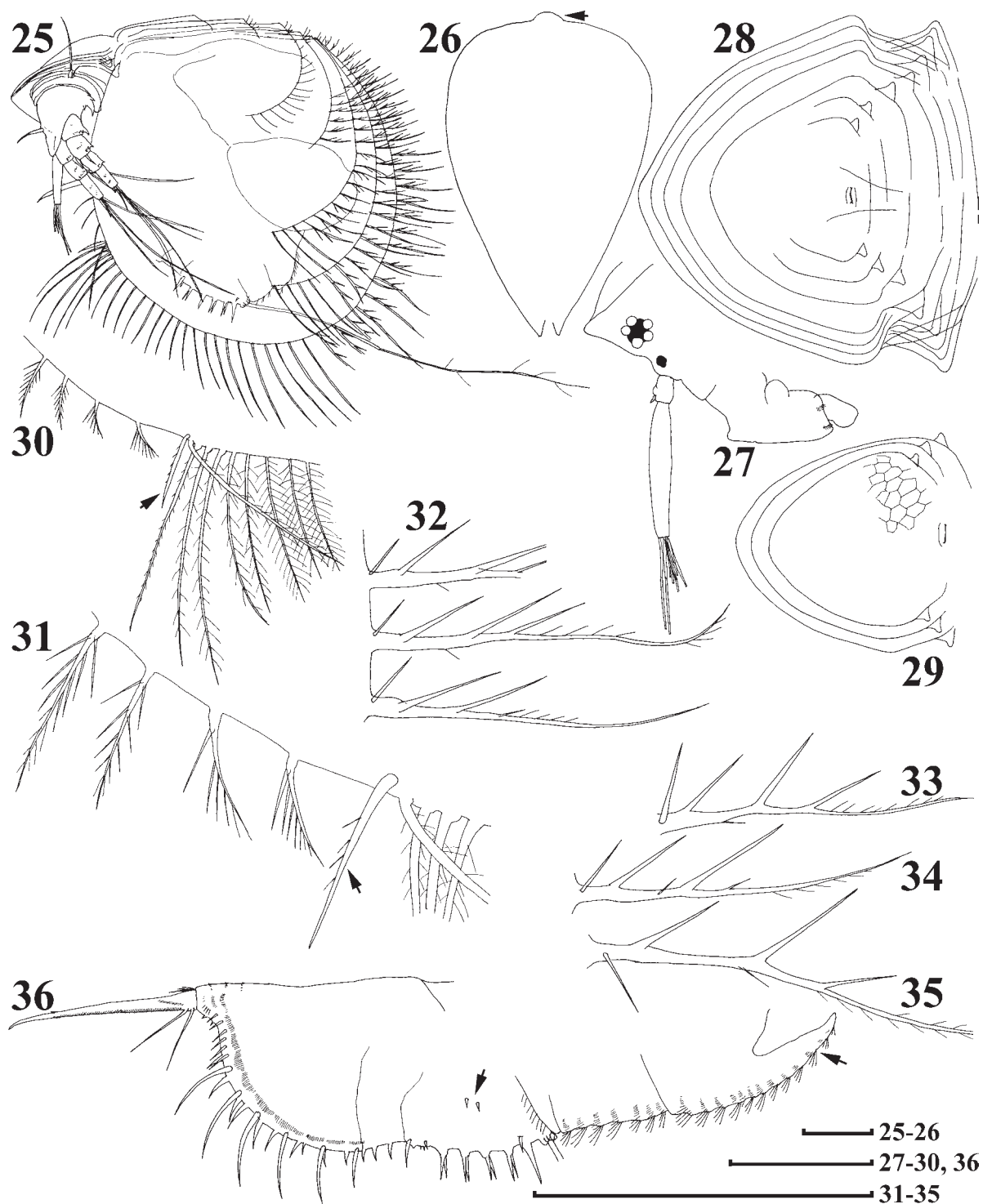
Figs 1–24.

Ilyocryptus silvaeducensis Romijn, 1919: 535, Pl. 2: Figs 25–32 (*Ilyocryptus*); Hollwedel, 1970, Fig. 25 (*sordidus*); Smirnov,



Figs 1-24. *Ilyocryptus silvaeducensis silvaeducensis*, parthenogenetic ♀♀ from Achterste Ghoorven, Oistervijkse Vennen, Netherlands, collected in 06.xi.1952 by De Vries (1-3, 7, 10); from Hahlener Moor, between Oldenburg and Osnabrück, Lower Saxony, Germany, collected in 31.x.1969 by W. Hollwedel (8, 14, 22-24), and from Lough Atorick, west of Lough Derg, County Clare, Ireland, collected in 12.x.1985 by D. G. Frey (4-6, 9, 11-13, 15-21): 1 - large adult, lateral view; 2 - head; 3 - head shield; 4, 5 - setae at antero-ventral margin of valve; 6, 7 - setae at posterior margin of valve; 8 - preanal margin of juvenile, instar II; 9, 10 - preanal margin of adults; 11, 12 - distal portion of postabdominal claw; 13 - distal burrowing spine on basal segment; 14 - exopod of antenna II; 15 - second and third segments of exopod; 16-18 - apical, distal and proximal lateral swimming setae of an individual; 19-21 - the same in another individual; 22-24 - the same in a third individual. Scale 100 µm.

Рис. 1-24. *Ilyocryptus silvaeducensis silvaeducensis*, партеногенетические ♀♀ из Achterste Ghoorven, Oistervijkse Vennen, Голландия, собранные 06.11.1952 Де Вирсом (1-3, 7, 10); из Hahlener Moor, между Ольденбургом и Оснабрюком, Нижняя Саксония, Германия, собранные 31.10.1969 В. Холлвеллом (8, 14, 22-24), и из Lough Atorick, Графство Клэйр, Ирландия, собранные 12.10.1985 Д. Фраем (4-6, 9, 11-13, 15-21): 1 - крупная самка, вид сбоку; 2 - голова; 3 - головной щит; 4, 5 - щетинки на переднебрюшном крае створок; 6, 7 - щетинки на заднем крае створок; 8 - преанальный край у молодой самки второго возраста; 9, 10 - преанальный край взрослой самки; 11, 12 - дистальная часть постабдоминального коготка; 13 - дистальный шип на базальном членике антенны II; 14 - экзоподит антенны II; 15 - второй и третий членик экзоподита; 16-18 - апикальная, дистальная и проксимальная латеральная плавательная щетинка одной самки; 19-21 - тоже у другой самки; 22-24 - тоже у третьей самки. Масштаб 100 µm.



Figs 25–36. *Ilyocryptus silvaeducensis chengalathi* subsp.n., parthenogenetic ♀♀ from a pond near HWY 1, Newfoundland, Canada: 25, 26 — adult in lateral and anterior view; 27 — head; 28, 29 — head shield; 30, 31 — setae at antero-ventral margin of valve; 32–35 — setae at posterior margin; 36 — postabdomen and abdomen. Scale 100 µm.

Рис. 25–36. *Ilyocryptus silvaeducensis chengalathi* subsp.n., партеногенетические ♀♀ из пруда около трассы 1, Ньюфаундленд, Канада: 25, 26 — взрослая самка, вид сбоку и спереди; 27 — голова; 28, 29 — головной щит; 30, 31 — щетинки на переднебрюшном крае щетинок; 32–35 — щетинки на заднем крае; 36 — постабдомен и абдомен. Масштаб 100 µm.

1976: 49–50, Fig. 16 [after Romijn, 1919]; Štifter, 1984: 133–135, Figs 1–10; Štifter, 1988: Table 1; Štifter, 1991: Figs 2b, 3b; Flössner, 2000: 90–91, Fig. 34 [after Štifter, 1984]; Kotov, 2001: 189–190, Figs 4–8 [after Romijn, 1919].

not *Ilyocryptus silvaeducensis* Romijn in Alonso, 1996: 227–228, Fig. 100.

TYPE MATERIAL. See above.

OTHER MATERIAL STUDIED. NETHERLANDS: 1 parth. ♀ from Achterste Ghoorven Stat. 3, Oistervijkse Vennen, Holland, collected in 06.xi.1952 by De Vries, slide ITZA Phyll. 105 008. GERMANY: 1 parth. ♀ from Hahlener Moor, small man-made lake with sphagnum near Quakenbrück, between Oldenburg and Osnabrück, Lower Saxony, collected in 31.x.1969 by W. Hollwedel, tube AAK 1999-009. IRELAND: 1 parth. ♀ from Lough Atorick, west of Lough Derg, County Clare, collected in 12.x.1985 by D. G. Frey, slide AAK-SL-015.

See list of previously studied samples in Štifter [1984].

DIAGNOSIS OF THE NOMINOTYPICAL SUBSPECIES. On valves, setae 1–4 with somewhat thickened setules (Fig. 5, arrows); fifth seta on anterior portion of valve long and thin (Fig. 4, arrow); near basalmost preanal teeth a small denticle or no denticles (Figs 8–10, arrow); a single lateral seta, or no setae at anal margin (Figs 8, 10, arrow); distal burrowing spine of antenna II (Fig. 13, arrow) relatively long, projected behind distal edge of basal segment; segments of branches of antenna II relatively thin (Fig. 14); length of setules on distal segment of proximal lateral swimming setae in adults markedly greater the segment diameter (Figs 18, 21).

Size. Parthenogenetic females up to 910 µm, 700–900 µm according to Flössner [2000].

TYPE LOCALITY. See above.

DISTRIBUTION. This subspecies has a narrow distribution being found only in the northern half of Europe. It was found in the Netherlands (where it is relatively common, see Štifter [1984]), northernmost Germany, and Ireland. Alonso's [1996] "*I. silvaeducensis*" from Spain in reality is *I. cuneatus*, one of the most common species in Europe.

2. *Ilyocryptus silvaeducensis chengalathi* subsp.n. Figs 25–52.

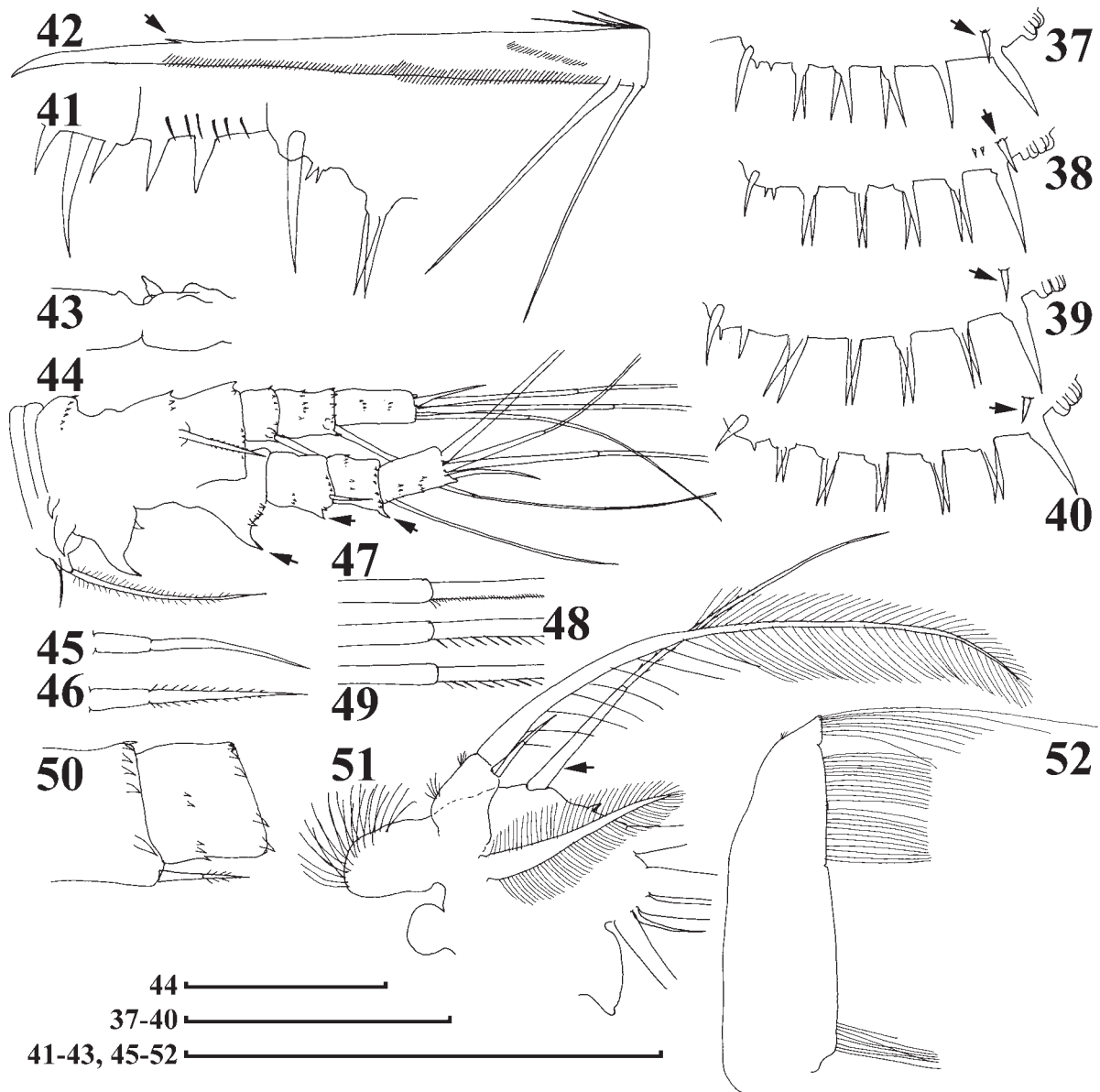
MATERIAL. Holotype parthenogenetic ♀, 630 µm, tube MGU Ml 41. Label of the holotype: "*Ilyocryptus silvaeducensis chengalathi* subsp. nov., 1 parth. ♀ from a pond near HWY 1, 15 km E from HWY 100 junction, Newfoundland, Canada, coll. 15.ix.1979 by R. Chengalath, HOLOTYPE". Paratypes: 2 exuvia, 2 parthenogenetic ♀♀, tube MGU Ml 42; 1 dissected parthenogenetic ♀, slide MGU Ml 43; 2 parthenogenetic ♀♀, tube AAK 2004-085.

OTHER MATERIAL STUDIED. CANADA: 2 parth. ♀♀ from a pond on HWY 81, 14 km south of Whitbourne, Newfoundland, coll. in 09.ix.1984 by D.G. Frey, tube AAK 2004-061; 3 parth. ♀♀ and exuvium from Small pond near La Manche marsh, Newfoundland, coll. in 27.viii.1984 by D.G. Frey, tube AAK 2004-063; 2 parth. ♀♀ and 3 exuvia from a pond opposite Three Corner Pond near HWY 1, 9 km east of HWY 100 junction, Newfoundland coll. in 15.ix.1979 by R. Chengalath (station 216, 47°26'N, 53°30'W), slides AAK-SL-007-009; 3 parth. ♀♀ from Little Trout Pond, 1 km north of road to Charlottetown, HWY 1, Newfoundland, coll. in 17.ix.1979 by R. Chengalath (station 225, 48°27.4'N, 54°00.7'W), slides AAK-SL-010-011, and tube AAK 2004-064; 7 parth. ♀♀ from Beaverskin Lake, Kejimikujik National Park, Nova Scotia, coll. in 13.x.1984 by D. G. Frey, tube AAK 2004-062 and slide AAK-SL-012; 2 parth. ♀♀ from a roadside pond on HWY 104, south of Springhill, Nova Scotia, coll. in 13.ix.1979 by R. Chengalath (station 208, 45°41'N, 63°40'W); 1 parth. ♀ from

Opeongo Lake, Algonquin National Park, Ontario, Canada, coll. C. Tudorancea; 1 parth. ♀ from Fairy Lake, Beausoleil Island, Georgian Bay Island National Park, Muskoka district, Ontario, coll. in 28.viii.1979 by R. Chengalath (station 191, 44°53.7'N, 79°50.9'W), tube AAK 2004-065. U.S.A.: 1 parth. ♀ from a pond at Kennebec River, Maine, coll. in 10.x.1951 by R. Kiser, slide AAK-SL-014.

SUBSPECIES DIAGNOSIS. Fifth seta on anterior portion of valve short and stout; near basalmost preanal teeth a strong spine; a single lateral seta, or no setae at anal margin; distal burrowing spine on basal segment of antenna II relatively long; segments of branches of antenna II relatively thin; length of setules on distal segment of proximal lateral swimming setae approximately equal to the segment diameter.

DESCRIPTION. PARTHENOGENETIC FEMALE. Body triangular-ovoid, dorsal margin almost straight, postero-dorsal angle expressed (Fig. 25). In anterior view, body thick, with a rudimentary dorsal keel (Fig. 26, arrow). Head triangular-ovoid, with a low projection for bases of antennae I, ocellus small (Fig. 27). Head shield with well-expressed reticulation, relatively wide, without a postero-lateral projection in region of process of mandibular articulation, the latter sub-triangular, relatively narrow (Figs 28, 29). Valves with four anteriormost setae protruding sparsely, posteriorly to them, a bunch of 6–7 closely located setae, the first seta in the bunch short and stout (Figs 30, 31, arrow), while following setae long and thin. Setae at ventral margin of valve short, setae at postero-ventral portion of valve remarkably long (Fig. 25); each of 28–32 setae at posterior margin in its basal 1/2–2/3 with 2–3 spine-like setules along one side, and distally with fine setules, a stout spinule immediately on seta base (Figs 32, 35). Abdominal projection long (Fig. 36, arrow); postabdomen with height maximal in postanal portion; preanal margin short and straight, armed with 5–7 teeth, among them 1–2 distalmost members very small, while most of preanal teeth regularly located, straight, predominantly doubled, a strong spine near basalmost preanal teeth (Figs 37–40, arrow), other denticles near preanal margin completely absent; usually, few denticles on basal lateral walls of postabdomen (Fig. 36, arrow). Anus with few spinules on internal wall (Fig. 41). Paired spines short, located on postanal and anal margin. Lateral setae long, the proximalmost lateral seta located on distalmost portion of preanal margin. Distally on postabdominal claw, one-two strong denticles ventrally (Fig. 42, arrow). Two spines on base of postabdominal claw unequal in size; a group of long setules on claw base ventrally. Postabdominal seta markedly longer than postabdomen, its basal segment with rare, long hairs (Fig. 25). Antenna I relatively long and thin, its proximal segment with a distinct finger-like projection and low mounds (Fig. 43), distal segment without ridges or denticles, distal end without any mounds (Fig. 27). Coxal part of antenna II with two sensory setae of greatly different size (Fig. 44). Basal segment with strong spines in its basal portion; its distal sensory seta long, slender (Fig. 45), distal burrowing spine as long as the former (Fig. 46), projected behind distal edge of basal segment. Segments of branches of antenna II relatively thin, first-third segments of exopod with robust denticles (Fig. 44, arrows). Apical swimming setae relatively short, their distal segments without hooks on tips, asymmetrically armed with minute setules (Fig. 47). Proximal and distal lateral swimming setae of unequal size, both setulated asymmetrically (Figs 48, 49), the setules approximately as long as seta diameter. Spine on second segment of exopod only somewhat shorter than third segment



Figs 37–52. *Ilyocryptus silvaeducensis bengalathi* subsp.n., parthenogenetic ♀♀ from a pond near HWY 1, Newfoundland (37, 41–52), a pond opposite Three Conner Pond near HWY 1, Newfoundland (38–38), and Beaverskin Lake, Kejimikujik National Park, Nova Scotia (40), Canada: 37–40 — preanal margin of postabdomen; 41 — anus; 42 — postabdominal claw; 43 — basal segment of antenna I; 44 — antenna II; 45, 46 — distal sensory seta and distal burrowing spine on basal segment of antenna II; 47–49 — apical, distal lateral and proximal lateral swimming seta; 50 — spine on second segment of endopod; 51 — limb I; 52 — limb VI. Scale 100 μ m.

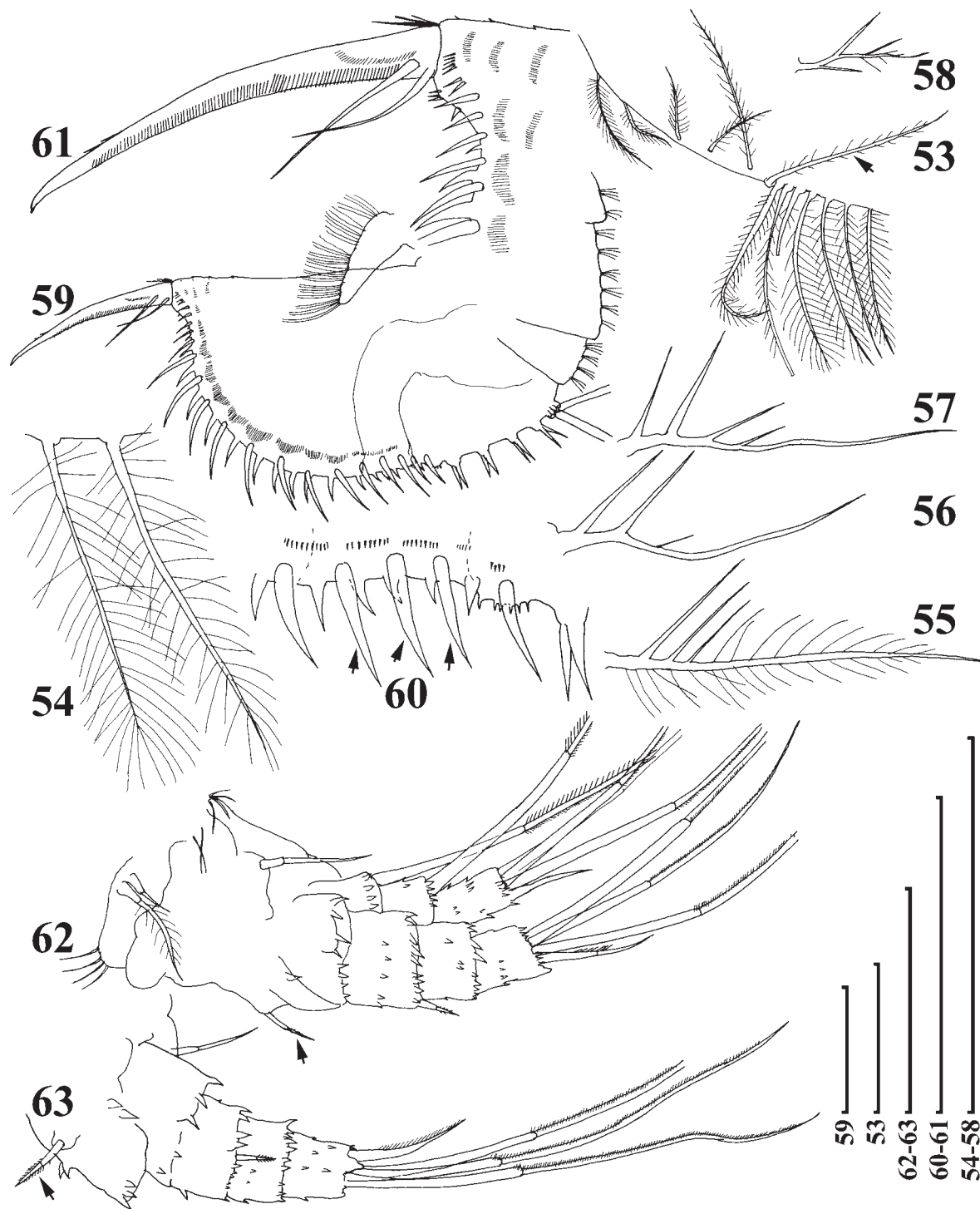
Рис. 37–52. *Ilyocryptus silvaeducensis bengalathi* subsp.n., партеногенетические ♀♀ из пруда около трассы 1, Ньюфаундленд (37, 41–52), пруда напротив Three Conner Pond около трассы 1, Ньюфаундленд (38–38), и Beaverskin Lake, Kejimikujik National Park, Новая Шотландия (40), Канада: 37–40 — преанальный край постабдомена; 41 — анальное отверстие; 42 — постабдоминальный коготок; 43 — базальный членик антенны I; 44 — антенна II; 45, 46 — дистальная чувствительная щетинка и дистальный шип антенны II; 47–49 — апикальная, дистальная латеральная и проксимальная латеральная плавательная щетинка; 50 — шип на втором сегменте эндоподита; 51 — нога I; 52 — нога VI. Масштаб 100 μ m.

(Fig. 50). Outer distal lobe of limb I with a small, thin seta, and a large seta with basal segment armed unilaterally with rare setules, and distal segment armed bilaterally feathered with dense setules; a large, naked, bisegmented seta near ejector hooks (Fig. 51, arrow). Limb VI as in Fig. 52, most

probably, part of setules was occasionally removed during dissection.

EPHIPPIAL FEMALE, MALE. Unknown.

SIZE. Holotype 630 μ m, juvenile and adult parthenogenetic females from type locality 480–630 μ m ($n = 6$); adult



Figs 53–63. *Ilyocryptus silvaeducensis* subsp. from a small pool near Lagoa da Colher, SW village of Mandacaru, the eastern border of the Lençóis Maranhenses dune field, Maranhao, NE-Brazil, collected on 17.viii.1996 by K. Van Damme: 53 — setae at antero-ventral portion of valve; 54 — seta at ventral margin; 55 — seta at postero-ventral portion; 56, 57 — setae at ventral portion of posterior margin; 58 — seta at dorsal portion of posterior margin; 59 — postabdomen, lateral view, 60 — anus, inner view; 61 — postabdominal claw; 62, 63 — antenna II. Scale 100 μm.

Рис. 53–63. *Ilyocryptus silvaeducensis* subsp. из маленького пруда около Lagoa da Colher, штат Маранхао, северо-западная Бразилия, собранная 17.viii.1996 К. Ван Даммом: 53 — щетинки на переднебрюшной части створки; 54 — щетинки на брюшном крае; 55 — щетинка на заднебрюшной части створки; 56, 57 — щетинки на брюшной части заднего края; 58 — щетинки на спинной части заднего края; 59 — постабдомен, вид сбоку, 60 — анальное отверстие, вид изнутри; 61 — постабдоминальный коготок; 62, 63 — антенна II. Масштаб 100 μm.

parthenogenetic females from Beaverskin Lake, Nova Scotia 620–780 ($n = 6$). Minimal size is likely greater than 620 because the smallest female belonged to the third instar.

ETYMOLOGY. This subspecies is dedicated to Dr. Rama Chengalath, investigator of Canadian cladoceran fauna (see Chengalath [1982, 1987]) of Indian origin, who collected the most part of specimens examined here. Chengalath [1982] determined these populations as belonging to *I. sordidus*.

TYPE LOCALITY. A pond near HWY 1, 15 km East of HWY 100 junction, Newfoundland, Canada, 47°26.2'N, 53°28.0'W. The type series was collected in 15.ix.1979 by R. Chengalath, this locality was marked as station 218.

DISTRIBUTION. *I. silvaeducensis chengalathi* subsp.n. is apparently a common North American cladoceran, but its distribution seems to be restricted to the North-East corner of the continent. Up to recently, it was found in Ontario, Newfoundland and Nova Scotia (Canada), and Maine (U.S.A.). Most probably, the taxon is present in Quebec and New Brunswick.

We did not find *I. silvaeducensis* in about 200 samples from adjacent areas of New York and New England. It was also absent in numerous samples from British Columbia [Kotov et al., 2002], as well as from less numerous samples from the southern U.S.A. The senior author spent a lot of time studying Mexican Ilyocryptids, checked hundreds of samples from tropics and temperate regions, but never saw *I. cf. silvaeducensis* in Mexico. According to recent data, *I. cf. silvaeducensis* is completely absent in southern half of North America.

3. Undescribed subspecies of *I. silvaeducensis* from Brazil

Figs 53–76.

DIAGNOSIS. Fifth seta on anterior portion of valve long and thin; several lateral setae at anal margin; a spine near basalmost preanal teeth absent; segments of branches of antenna II relatively thick.

DESCRIPTION. Body triangular-ovoid; fifth seta on anterior portion of valve long and thin (Fig. 53, arrow), setae at ventral margin plumose (Fig. 54), setae at postero-ventral region with setules continuously increasing in size basally (Fig. 55), each setae in middle of posterior margin with 3–4 spine-like setules and lacking of any other setules (Figs 56, 57), setae in dorsal portion of posterior margin with both spine-like and unmodified setules (Fig. 58); only four large doubled preanal teeth plus two clusters of small denticles in distal portion of preanal margin; no denticles near the basalmost preanal teeth and basal part of postabdomen (Fig. 59); several lateral setae at anal margin (Fig. 60, arrows); two denticles distally on postabdominal claw (Fig. 61); distal burrowing spine relatively short (Figs 62, 63, arrows); segments of branches of antenna II relatively thick; spine on second segment of exopod about 3/4 of third segment length; length of setules on distal segment of proximal

lateral swimming setae somewhat greater the segment diameter. Limb I with outer distal lobe bearing a small seta and a large seta with basal segment unilaterally armed with rare, robust setules, and distal segment bilaterally feathered with fine setules; a large seta near ejector hooks; gnathobase I as a setulated hillock (Figs 64, 65). Limb II with a stout beating seta armed with stout setules (Figs 66, 67, arrow). Limb III with two distalmost setae on inner margin of unequal size, beating seta near gnathobase III (Figs 68, 69, arrow). Limb IV with four setae at inner-distal margin in size, but similarly armed (Figs 70, 71), and a short sensillum (Fig. 71, arrow). Limb V with incised inner margin (Figs 72–74), distal armature of gnathobase with four setae (Fig. 75), filter plate V with five setae. Inner margin of limb VI with a row of fine setules, separated into six series by small incisions (Fig. 76).

EPHIPPIAL FEMALE, MALE. Unknown.

SIZE. Approximately 700 μm .

LOCALITY. A small, shallow pool (02°36'45" S; 42°43'30" W), near Lagoa da Colher, SW village of Mandacaru, the eastern border of the Lençóis Maranhenses dune field, Maranhao, NE-Brazil, collected on 17.viii.1996 by K. Van Damme.

DISTRIBUTION. It was found only in the single locality in an arid territory on Atlantic Coast of Brazil. No other *silvaeducensis*-like populations were found in South America by us as well as by previous investigators.

COMMENTS. A single adult female was found in the sample, received from K. Van Damme during AAK stay at the State University of Ghent in 1997, dissected, pictured and, unfortunately, not saved. At that time we had no ideas about differentiation of *silvaeducensis*-like forms, and importance of this specimen. Now, having no holotype, it is not possible to attribute a new name for this, apparently new, taxon.

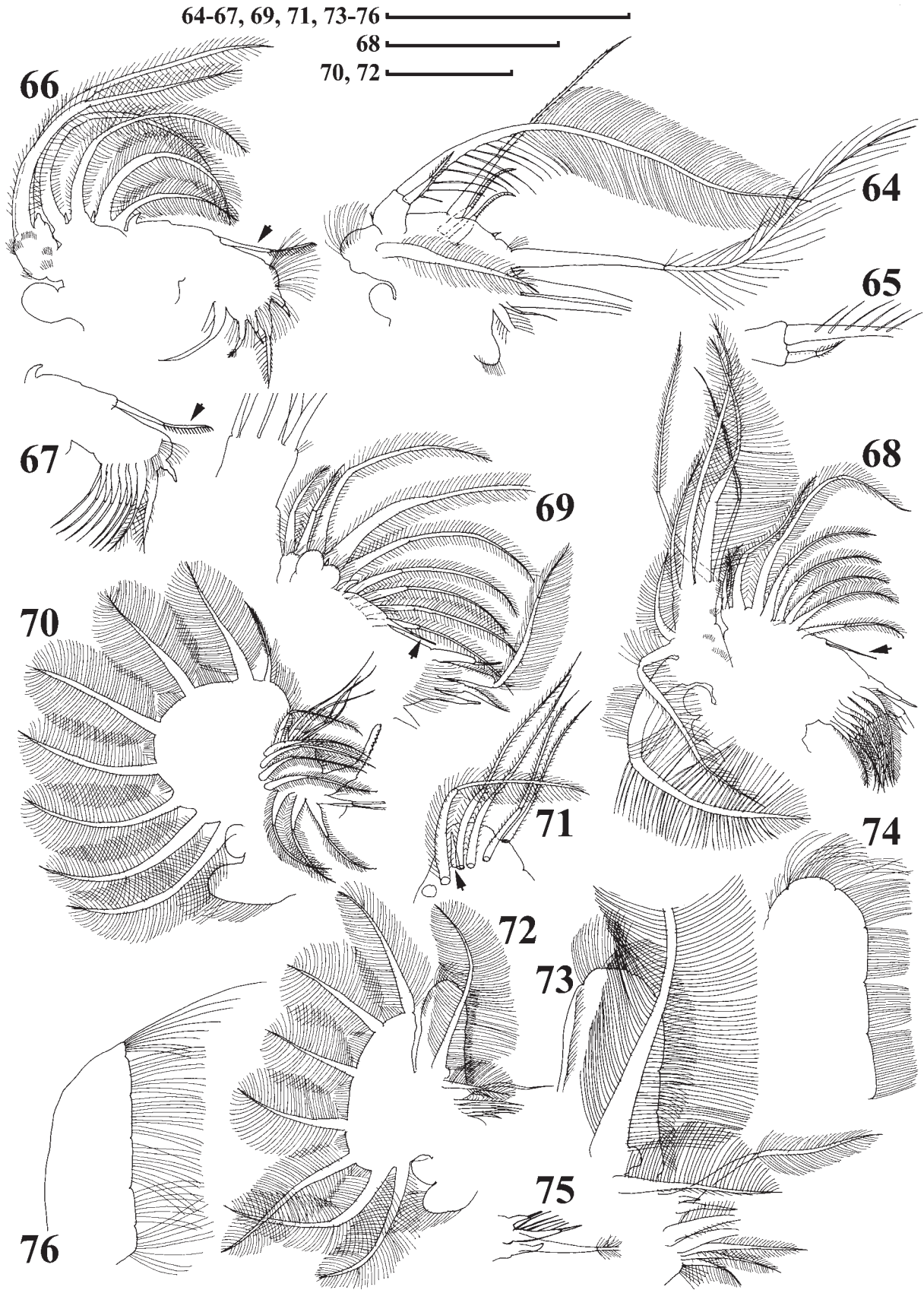
Discussion

The morphological evidence indicates that the European *I. silvaeducensis silvaeducensis* and North American *I. silvaeducensis chengalathi* subsp.n. are closely related, while the un-named Brazilian subspecies is relatively distant. Among the similarities of the two Holarctic subspecies, we note the especially thin antennal branches. This thinness is a synapomorphy of the two taxa among *sordidus*-like forms, which usually have robust, thick segments of antenna II. The structure of segments of antenna II was previously regarded as a diagnostic trait of *I. silvaeducensis* [Štifter, 1984, 1988], but in reality it is characteristic of only Holarctic subspecies.

Our investigation is only a first step in the revision of *I. silvaeducensis*-species group, widely distributed in the world. Ilyocryptid populations with short preanal

Figs 64–76. Thoracic limbs of *Ilyocryptus silvaeducensis* subsp. from a small pool near Lagoa da Colher, NE-Brazil: 64, 65 — limb I and its outer distal lobe; 66, 67 — limb II and its gnathobase; 68, 69 — limb III and its inner portion; 70, 71 — limb IV and its inner-distal portion; 72–75 — limb V, its inner portion, inner-distal margin and distal armature of gnathobase V; 76 — limb VI. Scale 100 μm .

Рис. 64–76. Грудные ноги *Ilyocryptus silvaeducensis* subsp. из маленького пруда около Lagoa da Colher, штат Маранхао, северо-западная Бразилия: 64, 65 — нога I и ее внешняя дистальная доля; 66, 67 — нога II и ее гнатобаза; 68, 69 — нога III и ее внутренняя часть; 70, 71 — нога IV и ее внутренне-дистальная часть; 72–75 — нога V, ее внутренняя часть, внутреннедистальный край и дистальное вооружение гнатобазы V; 76 — нога VI. Масштаб 100 μm .



margin of postabdomen and preanal teeth all or almost all doubled, are present also in Australia and South part of Africa, but their study is an aim of further investigations. Note that a very short preanal margin, preanal teeth which are all or almost all doubled, very long spine on second segment of exopod of antenna II are obvious synapomorphies of this group among *sordidus*-like ilyocryptids sensu Kotov et al. [2002]. *I. silvaeducensis*-group is a closest relative of *I. cuneatus*-group, which is also widely distributed (*I. cuneatus* s. str. in Palaearctic plus similar populations in South Africa, China, Australia and New Zealand). But, in contrast to obviously monophyletic *I. silvaeducensis*-group, *I. cuneatus*-group can be paraphyletic, indeed, it is difficult to propose any synapomorphies of it as compared with *I. silvaeducensis*-group.

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