

New and little known palaeartic Pachyotominae (Collembola: Isotomidae)

Новые и малоизвестные палеарктические Pachyotominae (Collembola: Isotomidae)

М.В. Потатов¹, Л.Е. Лобкова², Я.Е. Шрубович³
М.Б. Потапов¹, Л.Е. Лобкова², Ю.Е. Шрубович³

¹ Moscow Pedagogical State University, Kibalchicha St. 6, build. 5, Moscow 129164, Russia. E-mail: mpnk@orc.ru

² Kronotsky Reserve, Ryabikova St. 48, Elizovo, Kamchatka Area 684010, Russia, E-mail: zapoved@mail.kamchatka.ru

³ State Museum of Natural History, National Academy of Science of Ukraine, Teatral'na St. 18, UA-L'viv 79008, Ukraine. E-mail: museum@lviv.net

¹ Московский педагогический государственный университет, ул. Кибальчича д. 6 корп. 5, Москва 129278, Россия.

² Кроноцкий заповедник, ул. Рябикова, 48, Елизово, Камчатская обл. 684010, Россия.

³ Природоведческий музей НАН Украины, ул. Театральная, 18, Львов 79008, Украина.

KEY WORDS: Collembola, Isotomidae, Pachyotominae, sexual dimorphism, new species.

КЛЮЧЕВЫЕ СЛОВА: Collembola, Isotomidae, Pachyotominae, половой диморфизм, новые виды.

ABSTRACT. *Pachyotoma thermaquatica* sp.n. and *Jestella armata* sp.n. with remarkable morphology are described from Far East of Russia. The former species is characterised by very long claws and reduced sensillar chaetotaxy. The latter differs from *J.siva* Najt by shorter macrochaetae and chaetotaxy of posterior side of furca. Taxonomical remarks to *Paranurophorus simplex* Denis, 1929 and subfamily Pachyotominae are given. *Bonetrura dabiensis* Tamura & Zhao is moved to genus *Pachyotoma* Bagnall.

РЕЗЮМЕ. *Pachyotoma thermaquatica* sp.n. и *Jestella armata* sp.n., имеющие необычные морфологические признаки, описаны с Дальнего Востока России. Первый вид характеризуется очень длинными коготками и редуцированной сенсорной хетотаксией. Второй отличается от *J.siva* Najt более короткими макрохетами и хетотаксией задней стороны фурки. Даются таксономические заметки к *Paranurophorus simplex* Denis, 1929 и подсемейству Pachyotominae. *Bonetrura dabiensis* Tamura & Zhao перемещен в род *Pachyotoma* Bagnall.

In the course of our study of family Isotomidae in Russia and adjacent countries we have found about a dozen of undescribed species belonging to subfamily Pachyotominae Potapov, 2001. At present the subfamily is rather homogeneous and includes closely related genera *Paranurophorus* Denis, *Coloburella* Latzel, *Pachyotoma* Bagnall, *Jestella* Najt, and possibly, *Bonetrura* Christiansen & Bellinger (the position of the last genus needs to be confirmed). Generally, the distribution area of the subfamily is restricted by Holarctic region with a few records in tropical part of Asia.

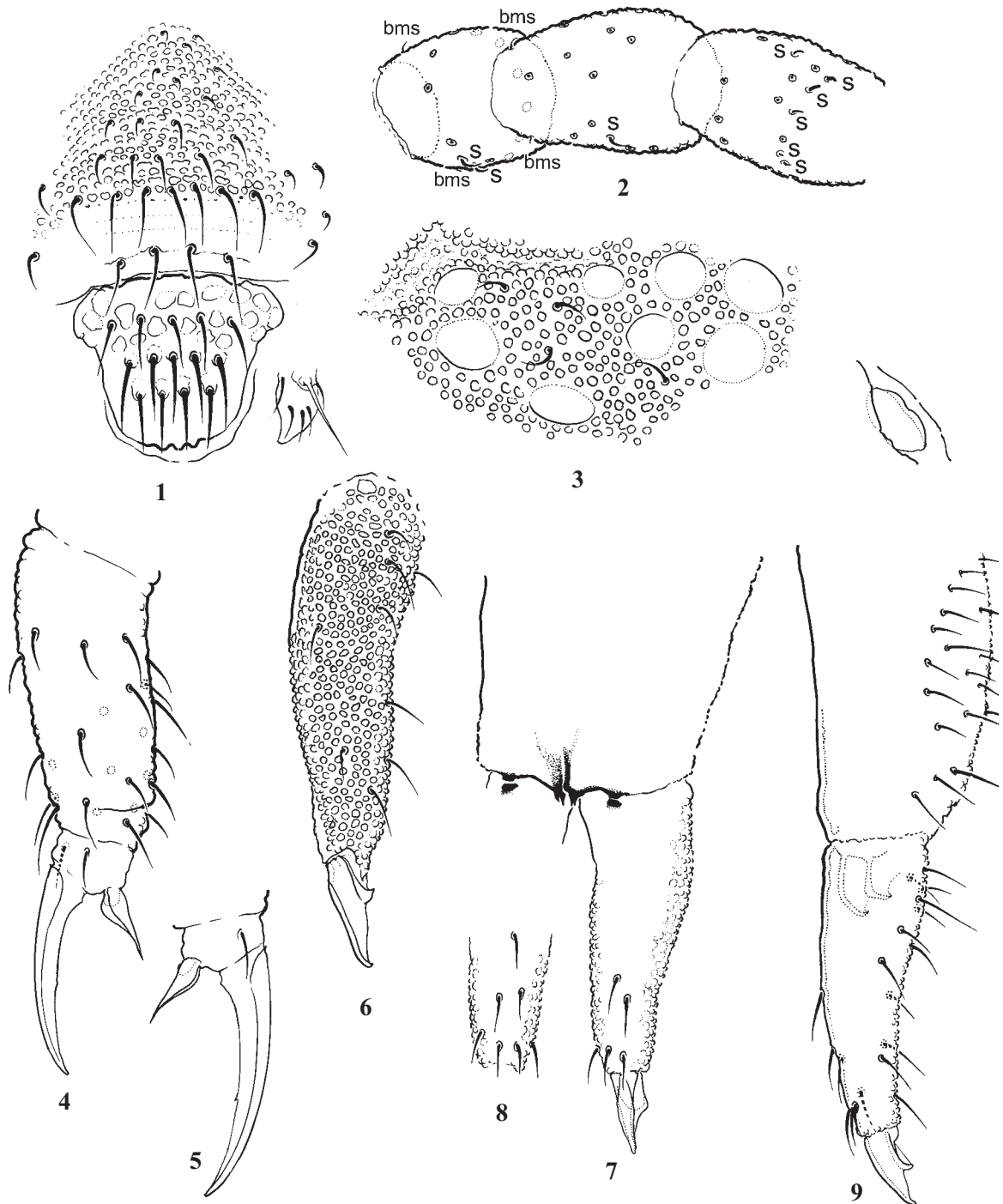
ABBREVIATIONS. AO — antennal organ of third antennal segment, PAO — postantennal organ, Abd.I–VI — abdominal segments I – VI, Ant.1,2,3,4 — antennal segments, Th.II–III — thoracic segments II and III, Ti.I–III — tibiotarsus, VT — ventral tube, al — anteriolateral furcal subcoxa, am — anteriomedial furcal subcoxa, bms — basal microsensillum on antennal segments, ms — microsensillum, p — posterior furcal subcoxa, p-row — posterior row of tergal chaetae, s — sensillum.

Pachyotoma thermaquatica Potapov & Lobkova sp.n.

Figs 1–13.

MATERIAL. Holotype: subadult ♀ — Russia, Kamchatka, Kronotsky reserve, Geysers Valley, stony slope above Vodopadny Stream moistened with warm running water (t = 18–28°C), on algae layer, 26.08.03. Leg. L.Lobkova. Paratypes: 15 specimens on slides and 10 specimens in alcohol from the same place. Kept in Moscow State Pedagogical University (holotype and 20 paratypes) and Zoological Institute in St.-Petersburg (5 paratypes).

Size about 1.5 mm (in largest subadult female of type serie). Head large and rather prognathous (Fig. 12). Colour intensively bluish black, including appendages. Integument with well visible secondary granulation all over the body, including appendages, no reticulation. 8+8 ocelli, G and H smaller (Fig. 3). PAO broad elliptical, with weak constriction; 1.1–1.5 as long as ocellus diameter and 0.25–0.33 as long as inner edge of claw 3. Maxillary outer lobe with bifurcate palp and 4 sublobal hairs (Fig. 1). Labral formula as 4/5,5,4. Clypeus with about 25 chaetae, 7 of which stronger and arranged in a transversal row (Fig. 1). Labium with 5 usual papillae (A–E), papilla E with full set of guard chaetae, guards e7 and sometimes e6 moved backwards. Labium with 3 proximal and 4 basomedian chaetae. Ventral side of a head with 2+2 postlabial chaetae. Antennae with few chaetae. Ant.1 with 2 bms, dorsal and ventral, and 2 ventral s; Ant.2 with 2 bms and 1 latero-distal s; Ant.3 with 6 distal s

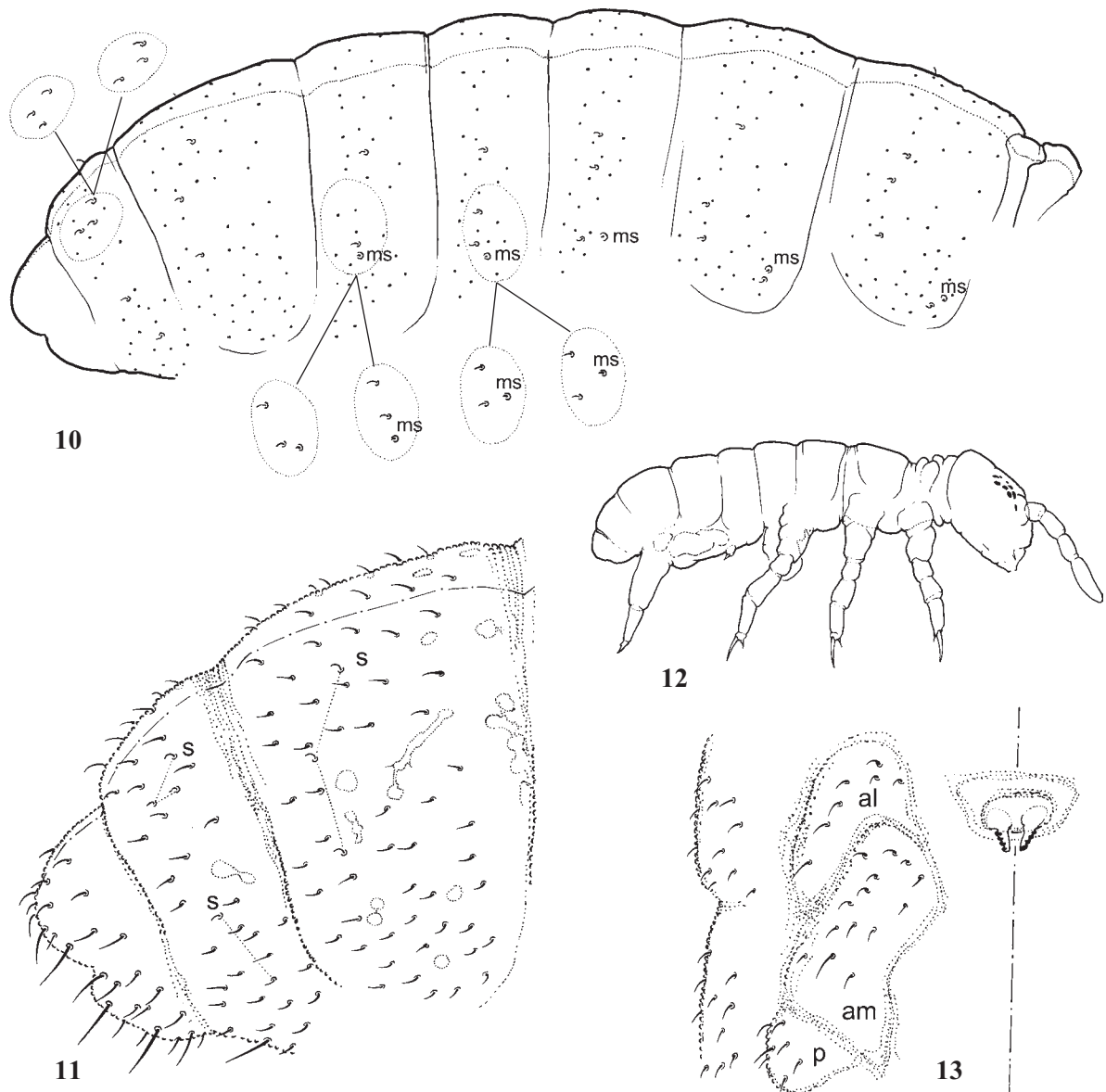


Figs 1–9. *Pachyotoma thermaquatica* sp.n.: 1 — head (part), frontal view; 2 — Ant.1–3 (only sensilla and basal microsensilla are shown); 3 — PAO and ocelli; 4 — tibiotarsus and claw of hind leg; 5 — apical part of fore leg; 6 — posterior side of dens; 7 — anterior side of furca; 8 — anterior side of dens (other specimen); 9 — furca, lateral view.

Рис. 1–9. *Pachyotoma thermaquatica* sp.n.: 1 — голова (часть), вид спереди; 2 — Ant.1–3 (показаны только сенсиллы и базальные микросенсиллы); 3 — ПАО и глазки; 4 — тибіотарсус и коготок задней ноги; 5 — вершина передней ноги; 6 — задняя сторона денс; 7 — передняя сторона фурки; 8 — передняя сторона денс (другой экземпляр); 9 — фурка, вид сбоку.

(including 2 lateral) and without bms; “guards” sensilla of AO small, as long as “inner” ones (Fig. 2). No additional sensilla on first three antennal segments. Sensilla on Ant.4 hardly differentiated, subapical organite small.

With few short chaetae on body. Normally dorsal axial chaetom of Th.II–Abd.IV as 4–5,4/3,3,3,4–5, but asymmetry often occurs (Fig. 10). Thorax without ventral axial chaetae. Macrochaetae absent, only a few larger chaetae have been



Figs 10–13. *Pachyotoma thermaquatica* sp.n.: 10 — general distribution of sensillar elements on body (variation of position of *s* and *ms* on Abd.II, III and V are shown); 11 — chaetotaxy of Abd.IV–VI (sensilla connected with dotted line); 12 — habitus; 13 — ventral chaetotaxy of Abd.III and IV.

Рис. 10–13. *Pachyotoma thermaquatica* sp.n.: 10 — общее расположение сенсорных элементов на теле (показаны вариации позиций *s* и *ms* на Abd.II, III и V); 11 — хетотаксия Abd.IV–VI (сенсиллы соединены точечной линией); 12 — внешний вид; 13 — ventральная хетотаксия Abd.III и IV.

seen on a last abdominal segment (Fig. 11). The largest chaetae on Abd.V 0.10–0.15 as long as this tergite length. Sensilla on tergites curved, cylindrical, and short, a little shorter than common microchaetae. Sensillar formula as 4,4(3)/3(2),3(2),3(2),3(2),5 (*s*), 1,1/1,1,1 (*ms*) (Fig. 10). On Th.III–Abd.IV one of sensilla sometimes lost on one side. Sensilla on Abd.I–III in mid-tergal position (medial sensillum on Abd.III is as apart of *p*-row as about 0.4–0.5 of tergal width). Medial sensilla on thorax well in front of *p*-row of chaetae, in some specimens they just in front of this row. Five sensilla of Abd.V in two groups, with 3 *s* in medial and 2 in lateral one (Fig. 11). Mutual position of sensilla in medial group varies (Fig. 10), at least one *s* in front position. Position

of lateral sensilla more stable, in transversal line. Position of *ms* on Abd.II and III also vary (Fig. 10).

Upper subcoxa of leg 1,2,3 with 0,2,2–3 chaeta respectively. Unguis thin and very long, with inner tooth of various size (Figs 4–5), ratio inner edge of claw : outer edge of tibiotarsi 3 as 0.6–0.7. Empodial appendage with broad lamellae (2.3–3.2 times shorter than inner edge of claw 3). Tibiotarsi of fore and middle legs usually with few additional chaetae (21–23 on each), tibiotarsi of hind leg with some additional chaetae in proximal parts, wholly with 25–28 chaetae. B-row on Ti.I–II with 7 chaetae. Spurs in subadult males (chaetae *x* and *B*₃) on Ti.III undifferentiated. Tibiotarsal tenent chaetae poorly developed, pointed (2.5–3.6 times

shorter than inner edge of claw 3). VT with 4+4 latero-distal chaetae. Posterior side with 2 larger and usually 1–2 smaller chaetae, with the whole variation 2–4. Tenaculum with 4+4 teeth and no chaeta (Fig. 13). Anterior furcal subcoxae looks divided into two groups, anteriolateral with 6–9 chaetae and anteriomedial with 13–16 chaetae, posterior furcal subcoxa with 6–7 chaetae (Fig. 13). Furca of moderate size (Figs 7–9). Anterior side of manubrium smooth, without chaetae, its posterior side granulated, with about 30–40 chaetae on the main part and many (about 10+10) chaetae on its laterobasal lobes. Medial part of manubrial thickening bispinose. Dens with 5–7 anterior chaetae, arranged as 1,2(1),4(3). Posterior side of dens clearly granulated (Fig. 6), with 9–12 chaetae (among them 6–7(5–8) chaetae in basal group, 1 outer, 2 inner and 1 subapical). Mucro strong, armed with strong subapical tooth and several lamellae. Subapical tooth nearly at the middle of mucro, connected with the base by two lamella. Ratio manubrium : dens : mucro = 3.7–4.9 : 2.2–3.2 : 1. On each of anal lobes only one tiny chaeta has been seen.

Males present, no sexual dimorphism observed.

TAXONOMIC REMARKS. Easily distinguishable species due to long claws and strong tooth at the middle of mucro. After the chaetotaxy of furca and presence of clear tooth on mucro *Pachyotoma dabiensis* (Tamura & Zhao, 2000) **comb.n.** from SW China seems to be the most similar to the new species. *P. dabiensis* was originally described as a member of genus *Bonetrura* Christiansen & Bellinger, 1980 which was established basing mostly on missing chaetae on anterior side of dens. We move *dabiensis* to genus *Pachyotoma* since this species does has these chaetae. Unlike the new species, *P. dabiensis* has normal claws, different shape of mucro, much longer inner sensilla in AO of Ant.3, and other features. Presence of only 2 postlabial chaetae in new species is also remarkable. Among the member of the genus, the same condition was found by us only in *P. crassicauda* (Tullberg), *P. recta* (Stach), and two undescribed species from asiatic part of Russia.

DISTRIBUTION AND ECOLOGY. Known only from type locality. Biotope and morphology (claws, short body chaetae, relatively prognathous head) indicate the neustonic mode of life.

NAME DERIVATION. The species is named due to living on surface of relatively warm water heated by thermal anomalous ground.

Jestella armata Potapov **sp.n.**

Figs 14–35.

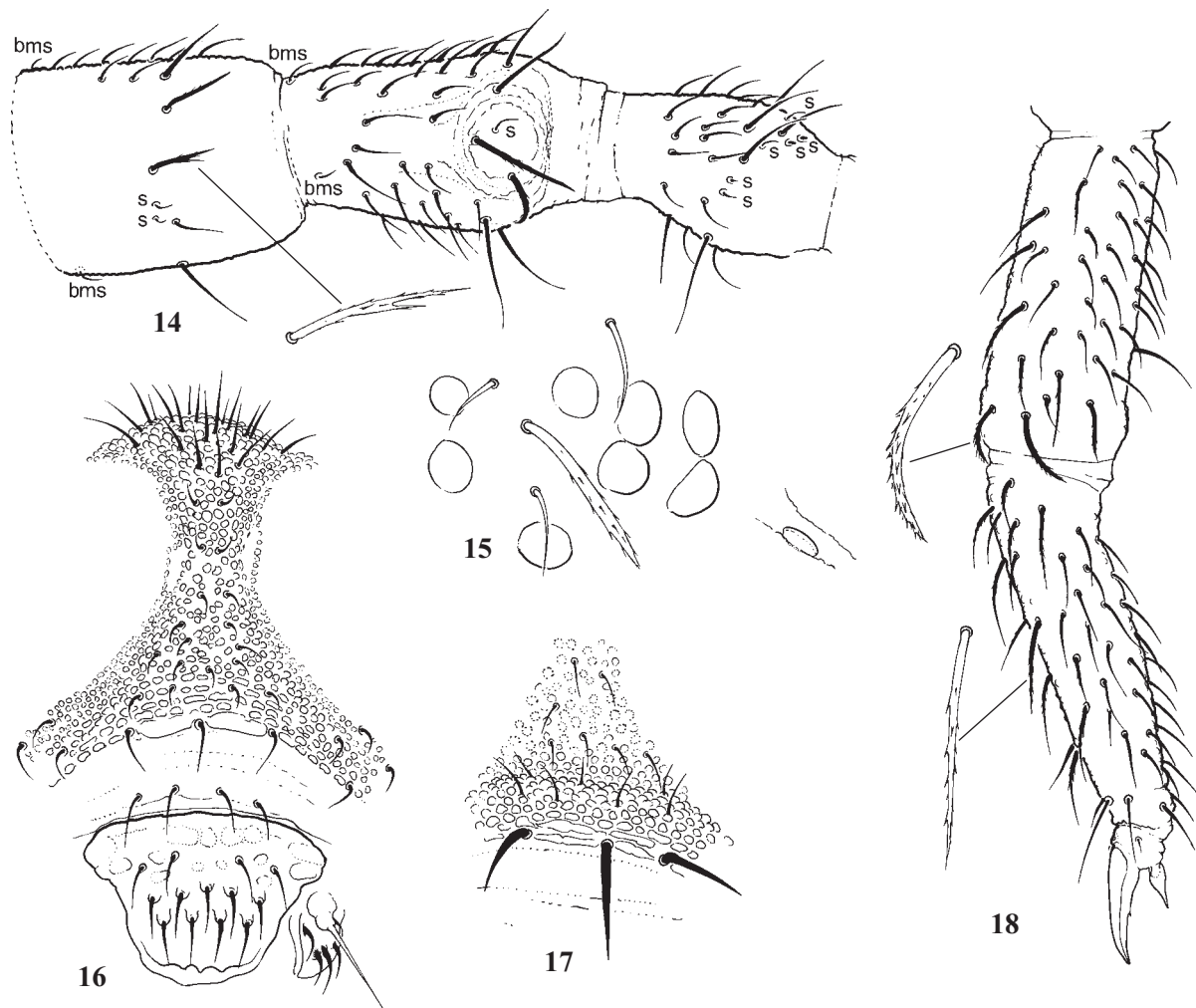
MATERIAL. Holotype: ♂ — Russia, Sakhalin Isl., East Sakhalin Mts., near the fusion of Tym' River and Troynoi Stream, coniferous forest, in pitfall trap (in mass), 15.07.03. Leg. I. Mel'nik. Paratypes: 20 specimens on slides and 10 specimens in alcohol from the same place. Kept in Moscow State Pedagogical University (holotype and 25 paratypes) and Zoological Institute in St.-Petersburg (5 paratypes).

Size from 1.9 to 2.3 mm, generally males a little larger than females. Feet rather long (Figs 29–31). Colour intensively bluish black, including appendages. Integument with rugose secondary granulation all over the body, including appendages. Inner surface of integument with clear reticulation. Reticulated fields cover the most part of dorsal side of head, Th.II–Abd.VI (Figs 27–28). On other parts of body reticulation much weaker and have been seen only under anterior furcal subcoxa, outer side of basal segments of legs, and clypeus. 8+8 ocelli, G and H smaller (Fig. 15). PAO very small, half as long as ocellus diameter and about 0.2 as long as inner edge of claw 3. Maxillary outer lobe with bifurcate

palp and 4 sublobal hairs (Fig. 16). Labral formula as 4/5,5,4. Clypeus with about 16–17 chaetae, 3 of which stronger and arranged in a transversal row (Figs 16–17). Labium with 5 usual papillae (A–E), papilla E with full set of guard chaetae, guards e7 moved backwards. Labium with 3 proximal and 5 basomedian chaetae. Ventral side of a head with 4+4 postlabial chaetae. Antennae with many chaetae (Fig. 14). Ant.1 with 2 bms; dorsal and ventral, and 2 ventral s; Ant.2 with 2 bms and 1 latero-distal s; Ant.3 with 6 distal s (including 2 lateral) and without bms, “guards” sensilla of AO small, two times longer than “inner” ones. Basal microsensilla Ant.2 large and hardly differ from small common chaetae of this segment. No additional sensilla on first three antennal segments. Sensilla on Ant.4 hardly differentiated, subapical organite small.

With many chaetae of various length on body. A portion of common chaetae serrated, especially on three last abdominal segments (Fig. 22). The most chaetae on thoracic segments smooth (Fig. 23). Axial chaetom of Th.II–Abd.IV as 9(8),7(6,8)/5,5(4),4–5,7–8. Thorax without ventral axial chaetae. Macrochaetae present (Fig.19), well differentiated only on posterior edge of head and on Th.II–Abd.III, 4/6,6/3,4,4 in number. On these segments they serrated, erect and blunt (Figs 21, 29, 31), three of which in front of p-row of chaetae on abdomen, one in front position. Abd.I with only 3 posterior macrochaetae, the front macrochaetae present as a thickened chaeta only. Abd.IV usually with several macrochaetae-like chaetae (Figs 20, 26). Their differentiation and number sex and specimen dependent (see sexual dimorphism). The largest chaetae on Abd.V 0.3–0.4 as long as this tergite length (Fig. 26). Sensilla on tergites curved and thin, well differ from common chaetae (Fig.24). Number of sensilla varies, as: 13–15,12–16/11–13,11–13,13–16,16–17,11–13 (s) (Figs 19, 26). On Th.II–Abd.III sensilla mostly located just in front of p-row of chaetae and on lateral parts of tergites, on Abd.IV and V — in front of p-row and near medial part of a tergite. Microsensilla 1,1/1,1,1; rather small (Fig. 25), as a rule, hardly visible on Th.II and Abd.II.

On fore leg, upper subcoxa without chaeta, lower subcoxa with a chaeta. Upper and lower subcoxa of middle and hind legs with many chaetae (7–13 on each). Basal segments of fore and middle legs with serrated macrochaetae, as: 2,2 on upper subcoxa, 1,1 on lower subcoxa and coxa, respectively (Figs 29, 31). Tibiotarsus and femur of all legs with thickened serrated chaetae along outer side, stronger and more curved on femur. In some specimens these chaetae more marked than it is shown on Fig. 18. Females usually bear less serrated chaetae. Unguis of normal size and shape, with inner tooth (Fig. 18). Empodial appendage about half as long as inner edge of claw 3. Tibiotarsi of all legs with numerous additional chaetae. B-row on Ti.I–II with 7 chaetae. Spurs in subadult males (chaetae x and B₃) on Ti.III undifferentiated. Tibiotarsal tenent chaetae thin, pointed or slightly blunt (1.2–1.8 times shorter than inner edge of claw 3), 1,2,2 in number. VT with 7–10+7–10 latero-distal chaetae. Its posterior side with 2 large and 7–15 smaller chaetae. Tenaculum with 4+4 teeth and 1–2, rarely 3, chaeta. Anterior furcal subcoxae looks divided into two groups, anteriolateral with 15–22 chaetae and anteriomedial with 21–24 chaetae, posterior furcal subcoxa with 7–9 chaetae. Furca of moderate size (Figs 33–35). Posterior side of manubrium roughly granulated, with many chaetae (about 50 on each side, including laterobasal lobes, its anterior side weakly granulated, without chaetae. Medial part of manubrial thickening simple, sometimes with irregular edge or bispinose. Dens with 5 (more rarely 4 or 6) anterior chaetae, arranged as 2,3. Posterior side of dens



Figs 14–18. *Jestella armata* sp.n.: 14 — Ant.1–3, outer side; 15 — PAO and ocelli; 16–17 — head (part), frontal view; 18 — distal half of hind leg; 14–15, 17–18 — male; 16 — female.

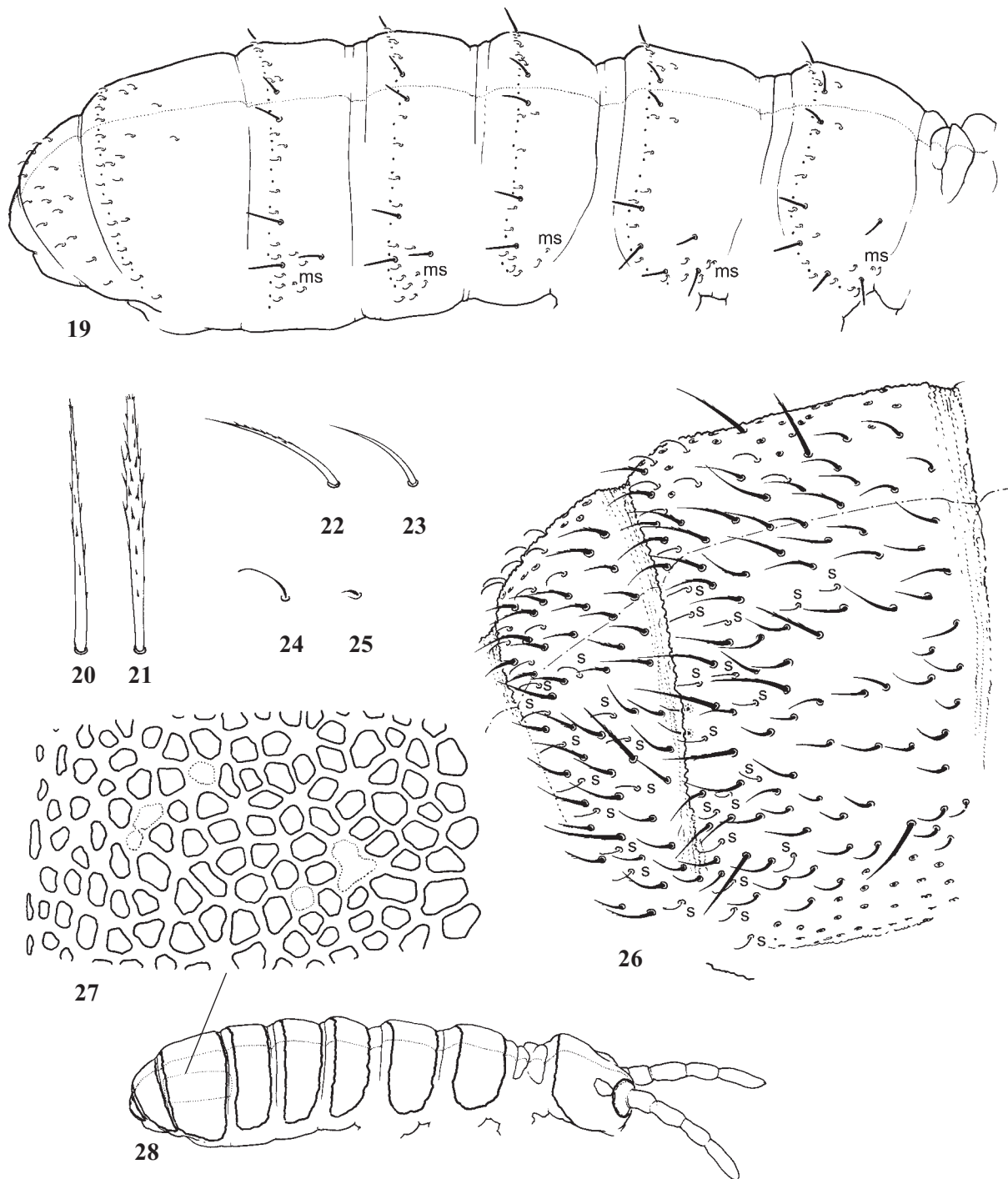
Рис. 14–18. *Jestella armata* sp.n.: 14 — Ant.1–3, наружная сторона; 15 — ПАО и глазки; 16–17 — голова (часть), вид спереди; 18 — дистальная половина задней ноги; 14–15, 17–18 — самец; 16 — самка.

clearly granulated (Fig. 34), with 7–9 chaetae (among them 5(4–6) chaetae in basal group, 1 outer, 1 inner and 1 subapical). Mucro bidentate. Subapical tooth as apart of mucro apex as 1/3–2/5 of mucro length. Ratio manubrium : dens : mucro 4.0–6.0 : 2.5–3.4 : 1.

SEXUAL DIMORPHISM. Adult males acquire longer antennae with thicker basal segments (ratio head : antennae as 0.32–0.36 and 0.24–0.28 in males and females respectively), stronger head armed with spine-like and hook-like macrochaetae, and longer legs. In males, head larger, ratio head : body length as 0.25–0.3 (vs. 0.22–0.23 in females); frontal and clypeal parts swollen, anterior half of head bear 9 thickened macrochaetae (absent in females), as a pair on lateral parts of head capsule, a pair on ocular fields, 3 distal hook-like in distal row of clypeus and a pair strong hooks on lateral side of buccal cone (Figs 17, 29–30). Antennae set closer in males (cf. Figs 30 and 32), Ant.2 swollen on lateral side forming special wart having sensillum and armed with two serrated thickened chaetae one of which straight and other curved. Some chaetae on outer side of Ant.1 also serrated (Figs 14, 30). Posterior half of body almost sex independent. As a rule, macrochaetae in males a little more

marked, Abd.IV can bear almost the same macrochaetae as on other segments (much weaker than on other segments in females).

TAXONOMIC REMARKS. No doubt, the new species is the second member of remarkable genus *Jestella* Najt, 1977 described from Nepal. *Jestella siva* Najt, 1977 and *Jestella armata* sp.n. share well marked sexual dimorphism, well developed macrochaetae on body tergites, inner reticulation of integument, chaetotaxy of furca and other features. Like in new species, antennae and head of males are mostly effected by dimorphism in *J.siva*. Both sexes of these species differ in chaetotaxy of body: *J.siva* has much longer macrochaetae in medial parts of body tergites (vs. relatively short in *J.armata*), they are especially long on Abd.IV and V (vs. absent or short in *J.armata*). Posterior side of dens with more setae in *J.siva*, 13–16 vs. 7–9 in *J.armata*. Males of *J.siva* have no lateral swelling on Ant.II (present in *J.armata*), have more and longer thickened macrochaetae on head and antennae (see Figs 29–30 and, 1A in Najt [1977] for comparison). Among members of closely related genus *Pachyotoma*, *P. dabiensis* is the most similar to the *J.armata*. The former, however, has no macrochaetae and reticulation on body.



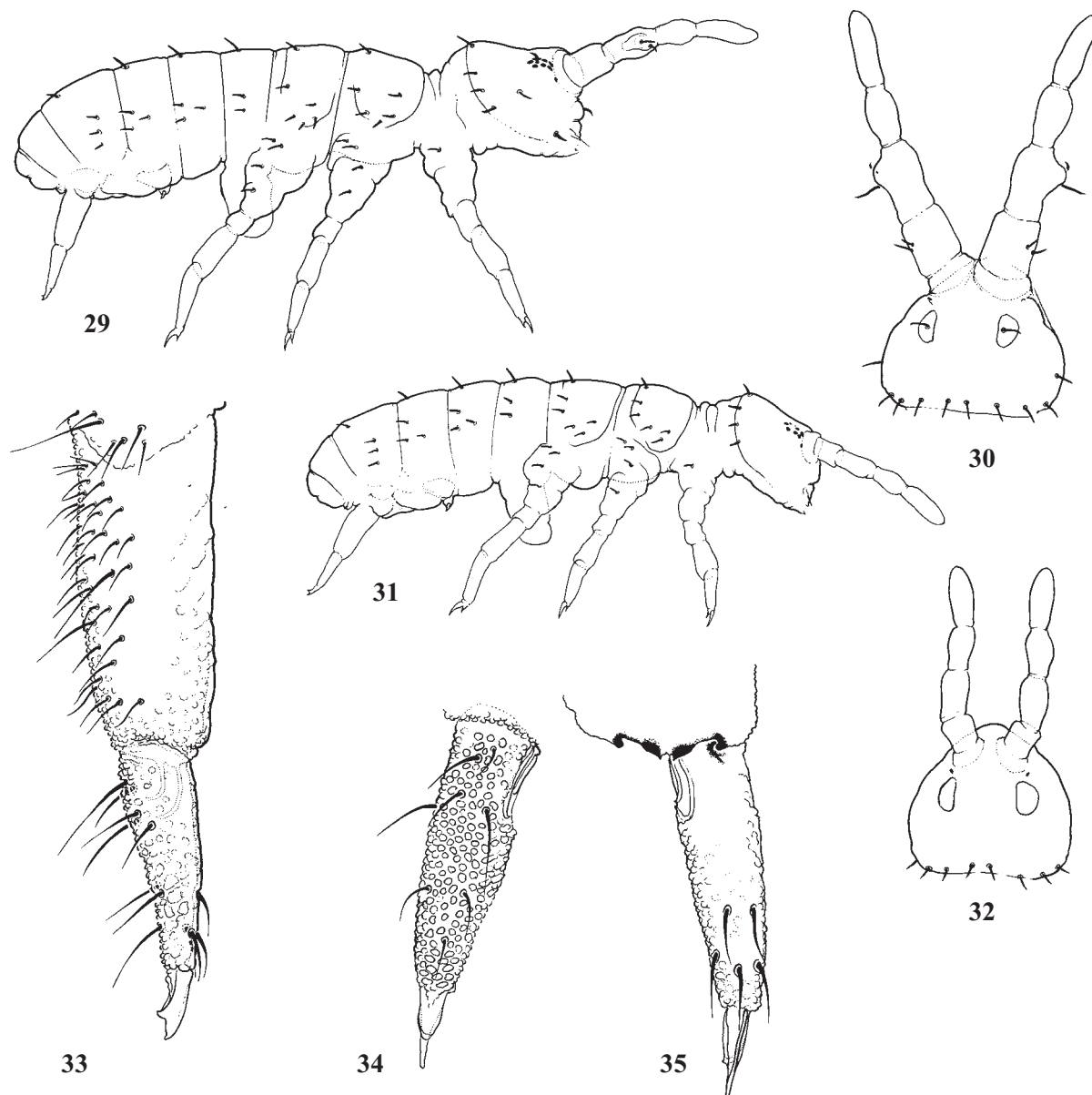
Figs 19–28. *Jestella armata* sp.n., female: 19 — general distribution of sensillar elements and blunt macrochaetae; 20–21 — macrochaetae of Abd.IV (20) and Th.II (21); 22–23 — common chaetae of Abd.V (22) and Th.II (23); 24 — sensillum; 25 — microsensillum of Abd.III; 26 — chaetotaxy of Abd.IV–V; 27 — reticulation of Abd.IV; 28 — general distribution of fields of reticulation on dorsal side of body.

Рис. 19–28. *Jestella armata* sp.n., самка: 19 — общее расположение сенсорных элементов и тупых макрохет; 20–21 — макрохеты Abd.IV (20) и Th.II (21); 22–23 — обычные хеты Abd.V (22) и Th.II (23); 24 — сенсилла; 25 — микросенсилла Abd.III; 26 — хетотаксия Abd.IV–V; 27 — ретикуляция Abd.IV; 28 — общее расположение полей ретикуляции на спинной поверхности тела.

Basing on morphology of two species, the genus *Jestella* can be separated from *Pachyotoma* by having well developed macrochaetae on body and remarkable sexual dimorphism. Inner reticulation of integument found in both *J.siva* and

J.armata is not a diagnostic for *Jestella* because the same was seen by us in an undescribed species of *Pachyotoma* from Yakutia.

DISTRIBUTION. Known only from type locality.



Figs 29–35. *Jestella armata* sp.n.: 29, 31 — habitus (macrochaetae shown); 30, 32 — head, dorsal view; 33 — furca, lateral view; 34 — posterior side of dens; 35 — anterior side of furca; 29–30 — male; 31–32 — female.

Рис. 29–35. *Jestella armata* sp.n.; 29, 31 — внешний вид (макрохеты показаны); 30, 32 — голова, вид сверху; 33 — фурка, вид сбоку; 34 — задняя сторона денс; 35 — передняя сторона фурки; 29–30 — самец, 31–32 — самка.

NAME DERIVATION. Named after modified males armed with thick chaetae and swollen antennae.

Paranuorphorus simplex Denis, 1929

Fig. 38.

MATERIAL. 10 specimens. Ukraine, L'viv, Botanical garden, in soil of greenhouse, 09.02.99. Leg. J. Shrubovych.

Maxillary outer lobe with simple palp and 4 sublobal hairs. Labral formula as 4/5,5,4. Labium with 5 usual papillae (A–E), papilla E with full set of guard chaetae, guards e7 moved backwards. Labium with 3 proximal and 4 basomedian chaetae. Ventral side of a head with 4–5+4–5 postlabial chaetae. Antennae with few chaetae. Ant.1 with 2 large basal microsensilla (bms), dorsal and ventral, and 2 ventral sensilla

(s); Ant.2 with 2 large bms and 1 latero-distal s; Ant.3 with 6 distal s (including 2 lateral) and without bms; “guards” sensilla of AO small, three times longer than “inner” ones. Basal microsensilla of antennae large and hardly differ from small common chaetae of this segment. No additional sensilla on first three antennal segments. Sensilla on Ant.4 hardly differentiated, subapical organite small.

Thorax without ventral axial chaetae. Macrochaetae absent. Sensilla on tergites curved and thin, clearly differ from common chaetae. Number of sensilla normally, as: 4(5),4/3(2),3(2),3,3(4),4(5) (Fig. 38). On Th.II–Abd.III sensilla located in front of p-row of chaetae. Microsensilla 1,1/0,1,1 (ms), large on Th.II and Abd.III and small on Th.III and Abd.II. In studied material, microsensilla have not seen by us on Abd.I.

On fore leg upper subcoxa without chaeta, lower subcoxa with a chaeta. Tibiotarsi with many additional chaetae.

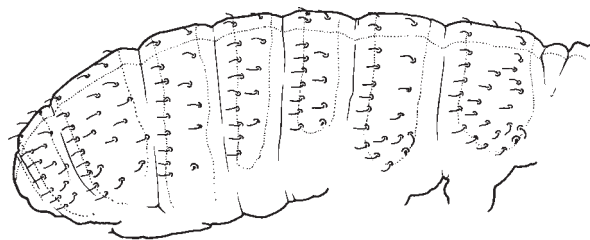
TAXONOMIC REMARKS. *Paranurophorus simplex* was redescribed several times, also under the name *armatus* (for more details see Potapov [2001]). In our redescription we give some morphological characters unknown before.

Taxonomic remarks to subfamily Pachyotominae

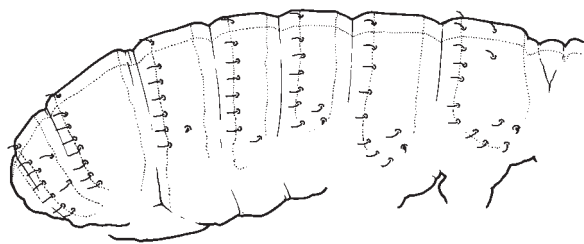
The subfamily Pachyotominae was established mostly basing on having the secondary granulation on integument and abundant sensillar chaetotaxy on body [Potapov, 2001]. The latter character is shared by most species of the subfamily indeed. *Pachyotoma thermaquatica* and *Paranurophorus simplex* however, show sensillar chaetotaxy strongly reduced (see the descriptions of these species). Two mentioned species cause to reconsider the taxonomic importance of number of sensilla. The number of sensilla on body of Pachyotominae seems to be genus and species dependent. Two members of genus *Jestella* have very abundant sensillar chaetotaxy (see Fig. 9 in Deharveng [1979] and Fig. 19 in this paper). A single species of *Paranurophorus* has reduced sensillar chaetotaxy (Fig. 38). *Coloburella zangheri* (Denis), the only species of the genus with known chaetotaxy of body, shows moderately abundant sensillar chaetotaxy (Fig. 10 in Deharveng [1979]). In 15 species of the genus *Pachyotoma* (*caucasica* (Stach), *crassicauda* (Tullberg), *curva* (Gisin), *granulata* (Stach), *pseudorecta* (Haybach), *recta* (Stach), *sajanica* (Stebaeva), *thermaquatica* sp.n., *topsenti* (Denis), and six undescribed species from Russia) sensillar chaetotaxy varies from very abundant (Fig. 36) to moderately abundant (Fig. 37) and, more rarely, reduced (Fig. 10). So, the evolutionary trend to reducing the number of sensilla on body tergites is characteristic to each of three subfamilies of the family of Isotomidae, as: Anurophorinae s.l., Isotominae and Pachyotominae.

Ventral chaetotaxy of Abd.III and IV can play a diagnostic role in the family Isotomidae. After our study all species of Pachyotominae mentioned above has formally three furcal subcoxa, as posterior, anterior (=anteriomedial) and the third one which is possible to call the anteriolateral. All species of *Pachyotoma* and *Jestella* has anteriolateral subcoxa free from setaceous part of Abd.III, like in Fig.13. *Paranurophorus simplex*, *C. zangheri* (Denis) and *Coloburella* sp. (N America) have it partly fused to lateral corner of of Abd.III (like in Figs 1–5 in Denis [1929]). 67 species of Proisotominae and Isotominae we have studied have only posterior and anterior furcal subcoxa, whereas anteriolateral subcoxa is fully fused to lateral part of Abd.III .

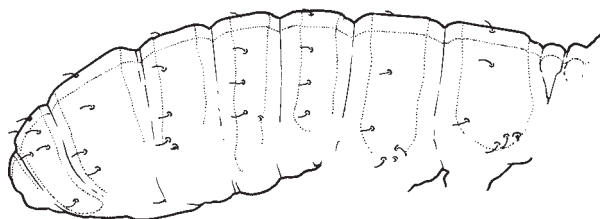
ACKNOWLEDGEMENTS. Anatoly Babenko, Alexander Ermakov, Arne Fjellberg, Ivan Kuchiev, Natalia Kuznetsova, Andrey Matalin, Nikolay Ryabinin, and Sophia Stebaeva contributed the specimens to my disposal. I am especially indebted to Igor Mel'nik, who paid an attention to enormous number of black "flews",



36



37



38

Figs 36–38. General distribution of sensilla and microsensilla on body of *Pachyotoma recta* (36), *P. crassicauda* (37), and *Paranurophorus simplex* (38).

Рис. 36–38. Общее расположение сенсилл и микросенсилл на теле у *Pachyotoma recta* (36), *P. crassicauda* (37) и *Paranurophorus simplex* (38).

Jestella armata in this paper, which had fallen to his pitfall trap.

This work was carried out with the support by the Russian Foundation for Fundamental Research (grant 02–04–49083) and Scientific schools program (project III–2154.2003.4) for Potapov M.

References

- Denis J.R. 1929. Notes sur les Collemboles récoltés dans ses voyages par le Prof. F. Silvestri. I. Collemboles d'Extrême-Orient // Bulletin Lab. Zool. gen. agr. Portici. Vol.22. P.166–180
- Najt J. 1977. Un nouveau genre de collembole Isotomidae du Népal: *Jestella siva* n. g. n. sp. // Nouvelle Revue d'Entomologie. Vol.7. Fasc.4. P.363–375.
- Deharveng L. 1979. Chétotaxie sensillaire et phylogenese chez les Collemboles Arthropoena // Travaux du Laboratoire d'Ecobiologie des Arthropodes Édaphiques. Université P.Sabatier. Vol.1. Fasc.3. P.1–15.
- Potapov M. 2001. Synopses on Palaearctic Collembola. Volume 3. Isotomidae // Abhandlungen und Berichten der Naturkundemuseum Görlitz. Addendum. Bd.73. Hf.2. S.1–603.