

The millipedes of the Far East of Russia (Diplopoda)

Двупарноногие многоножки Дальнего Востока России (Diplopoda)

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КЛЮЧЕВЫЕ СЛОВА: Diplopoda, фауна, ключи, Дальний Восток, Россия.

ABSTRACT: The millipede fauna of the Far East of Russia is reviewed and summarized in a monograph-like way. A brief review of diplopod morphology is provided coupled with the main methods of collection, preservation and study of material. Illustrated descriptions and diagnoses of, as well as keys to, all millipede taxa recorded in the Russian Far East (63 species) are given. In addition, all available data on the taxonomy, distribution, biology and ecology of the region's Diplopoda are summed up.

РЕЗЮМЕ: Представлен итоговый монографический обзор двупарноногих многоножек фауны Дальнего Востока России. Дан краткий обзор морфологии, приведены основные методы сбора, хранения и изучения материала. Представлены иллюстрированные описания, определительные таблицы и диагнозы всех таксонов диплопод, отмеченных на Дальнем Востоке России (63 вида). Кроме того, обобщены имеющиеся сведения по таксономии, распространению, биологии и экологии региональных Diplopoda.

Introduction

The millipedes, or Diplopoda, inhabit various natural zones except for certain tundra- and desert-clad regions. Being mesophiles, diplopods prefer humid habitats. These myriapods can be encountered in parks, hothouses, vegetable gardens, among plant debris near human settlements, under stones on shores of seas and freshwater bodies, on meadows, plowed fields, in caves, nests and burrows of insects and other animals, etc., wherever they find suitable shelter and organic food supply. However, most of the millipedes are forest-dwellers, inhabitants of the forest litter, soil and rotten wood.

Most of the diplopods are saprophages, a virtually fully terrestrial animal group functioning as primary destructors of plant debris and playing

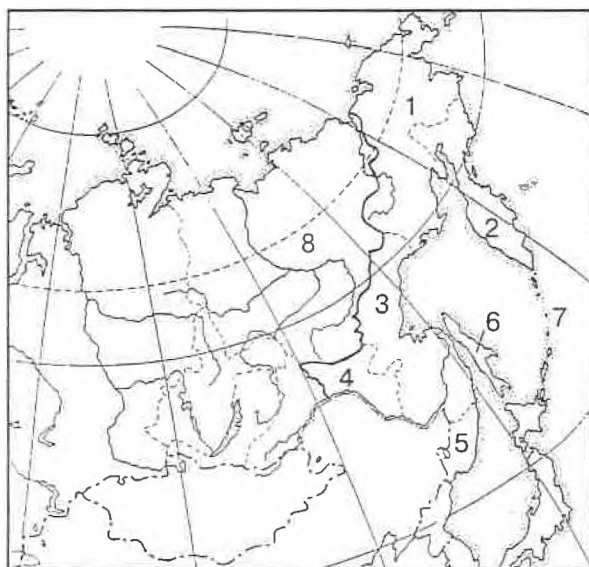
considerable roles in the processes of pedogenesis and in maintaining the natural fertility of the soil.

Millipedes are fine indicators of certain physical, chemical and biological properties of the soil and they can be applied to zoological soil diagnostics [Ghilarov, 1965]. Some species are very active destructors heavily contributing to the processes of soil formation, thus being potential target introductions, while some other species are "pests" in the usual, anthropocentric sense which are capable of damaging various open-ground and hothouse cultivars.

However, a purposeful utility of Diplopoda is still strongly hampered by the poorly known faunas as well as biological and ecological traits of millipedes in most of the globe's regions. As regards Russia, only a single monograph has ever been published concerning the plain areas of the European part of the former Soviet Union [Lokšina, 1969]. This treatise is currently strongly outdated [e.g. Chornyǐ & Golovatch, 1993]. In addition, regardless of a few ubiquitous forms, none of the diplopod taxa below the familial level is shared by the faunas of European Russia and the Far East. Quite expectedly, the latter shows a much stronger resemblance to and affinities with that of Korea [Takakuwa, 1954; Lim, 1988], Japan [Miyosi, 1959] and China [Wang & Mauriès, 1996].

A brief historical account

The Diplopoda represents an independent class of the Phylum Arthropoda [e.g. Hoffmann, 1980], the earlier treatment of the millipedes as a subclass of the Class Myriapoda [e.g. Kuznetsov, 1951; Abrikosov et al., 1955; Dogiel, 1975, 1981; Natali, 1975; Veselov & Kuznetsova, 1979; etc.] being strongly out of date. At present, diplopods include over 10,000 described species, form the largest among the four classes of the composite group Myriapoda and perhaps the third largest among the



Map 1. Administrative and geographical subdivision of the Far East of Russia. 1 — Magadan Area, 2 — Kamchatka, 3 — Khabarovsk Province, 4 — Amur Area, 5 — Maritime Province, 6 — Sakhalin, 7 — Kuriles, 8 — Yakutia.

Map 1. Административное и географическое подразделение Дальнего Востока России. 1 — Магаданская область, 2 — Камчатка, 3 — Хабаровский край, 4 — Амурская область, 5 — Приморский край, 6 — Сахалин, 7 — Курильские о-ва, 8 — Якутия.

terrestrial Arthropoda following the Insecta and the Arachnida.

The first record of a millipede in the Far East of Russia, a vast region encompassing the Magadan (1), Kamchatka (2), Sakhalin (6 & 7), Amurskaya (=Blagoveshchensk) (4) areas as well as the Khabarovsk (3) and Maritime (=Primorie) (5) provinces (see Map 1), and Yakut-Sakha Republic (=Yakutia) (8), belongs to Gerstfeldt [1859]. However, most of his descriptions are too poor according to the modern standards of millipede systematics, hence they require a total verification based on additional samples [Mikhajlova, 1993]. So the three species described by Attems [1898, 1899] from Vladivostok remained the only reliable records in and a complete list of millipedes of the Russian Far East by the end of the last century.

Then another huge temporal gap followed until the 1970's when the first information on the abundance of several higher diplopod taxa appeared as a result of soil zoological investigations in the Maritime Province [Ghilarov & Perel, 1971, 1973; Kurcheva, 1977, 1979a, b; Mineyeva, 1978], in the southern part of Sakhalin Island [Molodova, 1973, 1974, 1976] and in the Kheksyr Mts. and Zeya Nature Reserve, Khabarovsk Province [Ryabinin, 1977, 1978]. However, these data were too general, not detailed enough, with some taxonomic errors involved.

A new stage in the history of diplopodological research in the Far East of Russia has begun since the late 1970's, with lots of new millipede taxa de-

scribed or redescribed [Golovatch, 1976a, b, 1977, 1978a, b, 1979a-d, 1980a, 1995; Golovatch & Mikhajlova, 1978, 1979; Lokšina & Golovatch, 1977; Mikhajlova, 1979a, 1981a, b, 1982a, b, 1983a, 1984a, 1988a, 1990, 1993, 1995, 1996a, 1997a, b, 1998; Mikhajlova & Golovatch, 1981; Enghoff, 1985, 1991; Shear, 1990, 1992; Shelley, 1993, 1998; Golovatch et al., 1995; Mikhajlova & Basarukin, 1995]. The faunas of some subregions of the Russian Far East have been assessed, often with data on the biology and ecology not only of dominant but also even of some rare species [Ryabinin, 1975; Golovatch, 1978c, 1979e; Mikhajlova, 1978, 1979b, 1981c, d, 1983b, 1984b, 1987, 1988b, 1991, 1996b, 1997a; Kurcheva & Mikhajlova, 1980; Kozhukhova & Ryabinin, 1981; Mikhajlova & Petukhova, 1983; Ursova, 1983; Mikhajlova & Bakurov, 1989; Gromyko, 1990; Mikhajlova & Basarukin, 1995]. The first information of the roles the millipedes play as destructors in the forests of Cisamuria has appeared [Ganin, 1987, 1988, 1989a, b, 1994, 1997], as well as on the impact of industrial pollution on diplopods [Filatova & Makarevich, 1984; Ryabinin et al., 1988; Ganin, 1992, 1993, 1995].

The first general list of the Diplopoda of the Far East of Russia as well as of all other major regions of the former Soviet Union contained only 23 species [Lokšina & Golovatch, 1979]. Since then the millipede fauna of the continental and insular parts of the Russian Far East have been shown to comprise over 60 species [Mikhajlova, 1993; Mikhajlova & Basarukin, 1995], with several more species added from the Kuriles [Mikhajlova, 1996a, 1998] as well as from the Maritime and Khabarovsk provinces [Mikhajlova, 1995, 1997a, b, 1998].

Methods of millipede collecting, preparation and identification

Faunistic collections of diplopods are usually effectuated by means of hand sorting from (sieved) litter, rotten wood and all other kinds of plant debris. Millipedes can be taken from under stones, logs, shingle, various driftwood remains, algae, etc. on sea shores and banks of lakes and streams, on mushrooms, etc. One should not overdo in terms of the number of (seemingly) conspecific individuals per sample. In fact this recommendation concerns collecting any arthropod group. For one thing, some species may prove rare, even endangered, so the restriction is fully in line with the increasing concern for nature conservation. Secondly, at any site only one to a few species are dominant, so it appears useless to collect too many specimens of such forms. Thirdly, a collecting vial, jar too full of millipedes is difficult to store: the animals stain each other with their often dark secretions, they get easily broken or even macerated if the alcohol content drops too much due to water

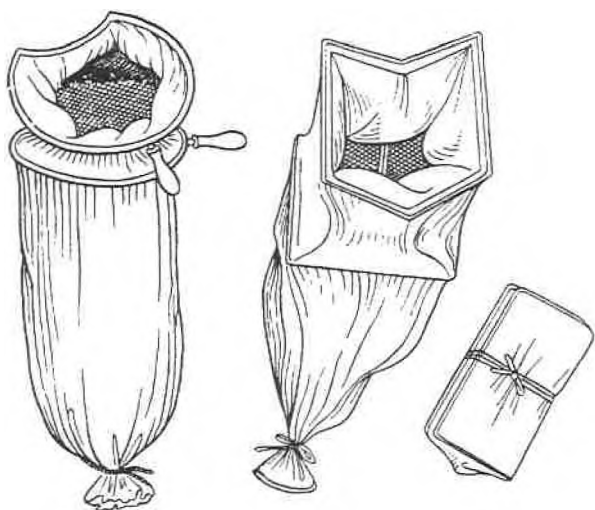


Fig. 1. Sifters for litter or rotten wood to be sieved through (after Tikhomirova [1975]).

Рис. 1. Сита-мешки (сифтеры) для просеивания подстилки или гнилой древесины (по [Тихомирова, 1975]).

absorption from the animal tissues.

Special devices like a sieve or sifter (Fig. 1) are particularly efficient for collecting millipedes and virtually all other groups of soil/litter macrofauna (= mesofauna, according to the Russian soil zoological tradition). The most common sifters used are those which have the first hoop 275 mm in diameter, the second one 330 mm, and the third 120 mm. The second hoop supports a sieve (metallic or nylon strings) ca. 8-10 mm mesh size and a handle fixed at 90° to the handle of the first hoop. The distance between the first and second hoops is about 290 mm, that between the second and third hoops ca. 750 mm.

Place some substrate (dead leaves, rotten wood, removed bark, moss, etc.) on top of the sieve to almost fill the upper compartment and then, keeping both handles tightly, thrash the sifter rather energetically for about 1 min until the lower compartment is no longer filled with the debris fallen through the sieve from above. Then empty the upper compartment from the rougher debris, untie the laces just above the third hoop and spread the finer, sieved, fauna-containing debris on a previously stretched piece of oilskin or plastic, or a larger tray with upturned margins. Many active runners (beetles, spiders, etc.) can be taken at once, using soft pincers of course, but better wait for a half-hour or so without disturbing the debris, to make sure that even cryptic, often mimetic creatures start moving, hence become visible and captured.

This operation is repeated as many times you like. Moreover, not only qualitative, but quantitative samplings/censuses can be carried out using a sifter, e.g. from a square unit of a forest floor. Yet one must keep in mind that, besides the litter, a complete census must also include taking a soil sample for which the sifter is useless.

Material is usually fixed with 70-75% ethanol which, to avoid maceration of the specimens (see above), is better to change for a fresh lot not later than 4 h after the first conservation. The vial/jar is labelled provisionally, according to the notes you make in your field notebook. When in the lab, all material is sorted out in alcohol into groups/species, and this time each subsample is supplied with (a) permanent label(s), better photo or printed, reading the exact locality, the kind of habitat, the date(s) of capture, and the collector(s) name(s). Another label is added upon completion of the identification work: full Latin name of the species, its author and date of publication, the number (and sex) of the specimens, the year and the name(s) of the person(s) who determined the material (e.g. det. Mikhaljova, 1997). For the sake of compactness, the labels must not take more than a few square cm, i.e. comparable in size with the creatures they accompany. Hence abbreviations are often implied, but please make sure these are conventional and not too numerous (e.g. Distr. instead of District, NE. instead of Northeast, 18.05.1997 instead of 18 May 1995, etc.).

Material is usually stored in glass or plastic vials filled with fresh alcohol and corked with special lids or cotton stoppers. Make sure no air bubble remains inside, otherwise some fragile specimens may easily become fragmented or lose ornamentation/appendages, or both. Keep the vials turned upside down in bigger jars and fully sunk in alcohol. Usually such a jar contains conspecific or congeneric material, so label the jar accordingly to make the samples easily available.

Prevent material from drying up, refilling the jar with fresh alcohol if/when necessary. However, even if by accident your sample has dried up, it is possible to relax it using hot water ca. 80-85°C. Please see to it that all animals sink to the bottom, so sometimes it is advisable first to break the specimens into 2-3 pieces to remove all air from inside. After the animals are relaxed, dry them carefully with filter paper and place in 75% alcohol [Hoffman, personal communication]. This restoration technique is particularly useful for larger specimens, while smaller, more fragile species will never recover fully.

Identification of a millipede usually requires dissection, which in its turn makes the use both of a quality stereoscope with a focused light beam and jeweler's forceps mandatory. Small-sized diplopods are better to dissect with insect pins or pin-end forceps. The dissected parts (mouthparts, antennae, certain appendages) are mounted either as temporary micropreparations (e.g. in glycerol) or constant slides using such liquid media as Canada balsam or the alcohol-based Euparal, or the toluene-based Eukitt. Make sure the dissected pieces are not dried up before mounting, because air bubbles inside can

strongly hamper the transparency of the preparations. Upon completion of the identification work, all objects from temporary micropreparations are returned into a microtube which is placed inside the vial containing the respective torso where they belonged. Constant slides are labelled in the same way as the dissected specimen, but also indicating all mounted structures therein and a number (e.g. D76 / 1997, which stands for Diplopod Slide ♂ 76 made in 1997). Then the same number must accompany the alcohol material the slide belongs to. The labels on micropreparations are affixed using strong glue; they must be compact too, and somewhat set off from the margins of the object glass so as not to damage when kept in slits of special boxes / cases.

The usual procedure of preparing a constant micropreparation begins with placing all necessary structures on a (cratered) object glass or in a small Petri dish, gradually replacing 75% alcohol with 96-100% alcohol using filter paper and a pipet. Leaving the objects soaked in 96-100% alcohol, start with a new object glass or covering glass, place a drop of the medium you prefer on top of it and then remove the structures, one by one or all at once, using the forceps or pins. Make sure your objects are arranged accordingly and placed at the bottom of the medium drop, remove all possible air bubbles (also by adding 96-100% alcohol on top of the drop), and cover the mount with a covering glass. If your medium was originally dropped in the middle of an object glass, the procedure is over, just label your slide. If you choose a covering glass to mount your object(s) upon, you must gently pick up both covering glasses (with your objects in between) and, keeping them between four fingers, make sure their edges coincide. Then put your mount on top of an object glass and label the latter, yet keeping it horizontal. The difference between a usual micropreparation (object glass + covering glass) and a two-covering-glass mount is, that in the latter case you can examine your object(s) at higher magnifications from both sides. Upon examination of such a micropreparation, you can easily affix it to the middle of an object glass using water-soluble glue. After that your slide can be kept in the same box with usual micropreparations, but in case you need to re-examine something, you can always place the slide in water and get the mount off in a few hours [Golovatch, personal communication].

Another trick lies in using half-dry to dry Canada balsam. This medium is usually disfavoured at present, because it takes years to harden its liquid even in a thermostate at ca. 40°C. However, the use of crumble-dry Canada balsam removes this problem. Place several medium-sized crumbles in the middle of an object or covering glass, then wet them several times with 100% ethanol and wait until the "boiling" is over. When everything settles down, you will see a completely clear center (only sometimes the peripheries / edges remain milky, opaque

for some more time) filled with smaller and rounded grains interspersed with a film layer of fully diluted Canada balsam. Place your objects between the grains, arrange them accordingly and cover the mount with a covering glass pressing it rather hard to almost smash the grains (this will force most if not all possible air bubbles out) but leaving the objects intact. Even if a few air bubbles have not escaped, do not worry, because next day you will see them fully dissolved, the Canada balsam almost entirely homogeneous and solid enough to keep in the usual boxes without further drying [Golovatch, personal communication].

The gonopods of some larger forms (e.g. *Diplommaragna* species) are easier to examine when they are dry. Generally the same concerns some peripheral characters (e.g. metazonital striations, shape of the epiproct, etc.), but usually it suffices to remove the film of alcohol from the surface using filter paper. In any case, material is best preserved when kept in 75% alcohol.

When quantitatively assessing a millipede population, standard methods of soil zoological investigations are to be used [Methods..., 1975; Quantitative methods..., 1987].

A brief account of millipede morphology

Below is only a very brief presentation of millipede anatomy. More information is available in some recent treatises [e.g. Hopkin & Read, 1992]. In addition, the account below is valid first of all concerning the fauna in question.

Generally, adult diplopods range between 2-2.5 and 280 mm in size. The length of the species encountered in the Far East of Russia does not exceed 70 mm.

Body elongate, usually worm-like, cylindrical or flattened dorsoventrally. Species from the orders Polyzoniida and, especially, Polyxenida are short-bodied. No oniscomorph diplopods have hitherto been recorded in the region concerned. Colour from whitish pallid to brown-blackish, sometimes rather vivid (e.g. pink, yellow, etc.), often with various patterns of bands, stripes or spots. Larvae usually completely pallid to much lighter than adults.

Most diplopods are with solid, calcinated (= impregnated) teguments, only Polyxenida are soft-covered.

The body consists of a head and a trunk, the latter composed of numerous segments (sometimes termed as rings) (Fig. 2). Head rounded, only in species of Polyzoniida elongated anteriorly into a subtriangular rostrum (Fig. 29). A head capsule and cephalic appendages (antennae and mouthparts) are distinguished. Anteriorly, the head capsule is delimited by a labrum, usually tridentate and supplied with a row of labral setae, followed by a clypeus which often supports supralabral setae. More caudally, a frons and a vertex are distinguished, the latter usually

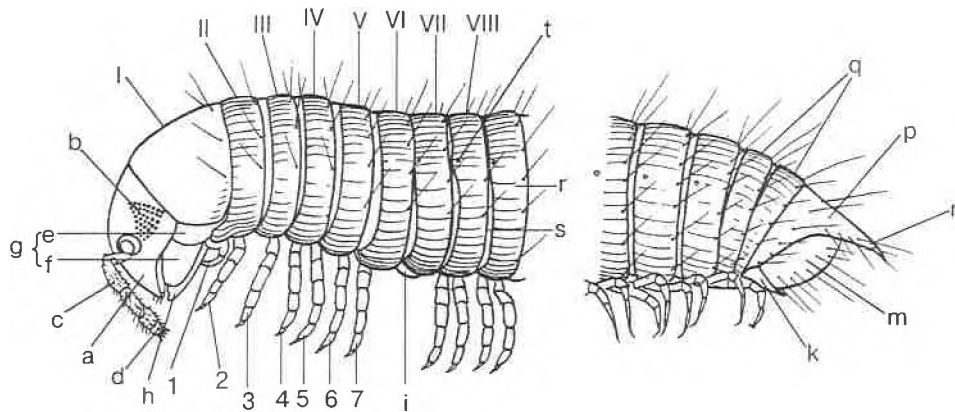
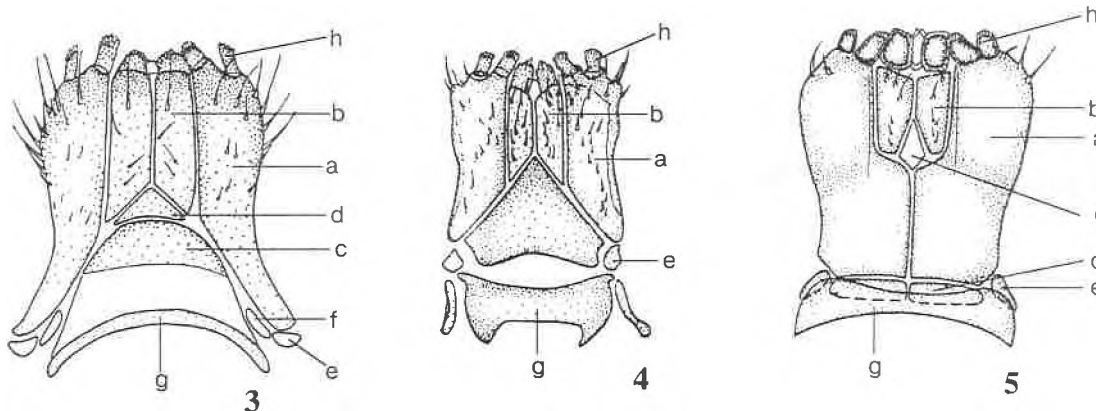


Fig. 2. A sketch of millipede external structures: a — labrum; b — eyepatch with ocelli; c — antenna; d — sensory bacilli (=sensory cones); e — cardo; f — stipes (=stipetes); g — basal lobes of mandible (=genae); h — gnathochilarium; 1 — modified ♂ leg-pair 1; 2-7 — numbers of leg-pairs; i — gonopods; k — anal scale; m — anal valve; n — epiproct with claw; p — preanal ring; q — legless (=apodous) segments (=proliferation zone); r — metazonite; s — prozonite; t — ozopore; I — first segment of body (collum); II-VIII — numbers of subsequent body segments (after Blower [1985] with changes).

Рис. 2. Схема внешнего строения диплопода: а — верхняя губа; в — глазное поле с глазками; с — антенна; d — чувствительные конусовидные палочки (обонятельные конусы); е — кардо; f — стволик; g — щека (основание мандибулы); h — гнатохиларий; 1 — видоизмененная ♂ нога 1-й пары; 2-7 — номера пар ног; i — гоноподии; k — анальный клапан; m — анальная лопасть; n — хвостик с коготком; p — кольцевидная часть тельсона; q — безногие сегменты (пролиферационная зона); r — метазонит; s — прозонит; t — пора защитной железы; I — первый сегмент тела (коллум); II-VIII — номера последующих сегментов тела (по [Blower, 1985] с изменениями).



Figs 3-5. Millipede gnathochilarium and hypostoma: 3 — Chordeumatida; 4 — Polydesmida; 5 — Julida; a — stipes; b — lamellae linguales; c — mentum; d — praementum; e — cardo; f — nodus; g — hypostoma; h — palp (after Lokšina [1969] with some changes).

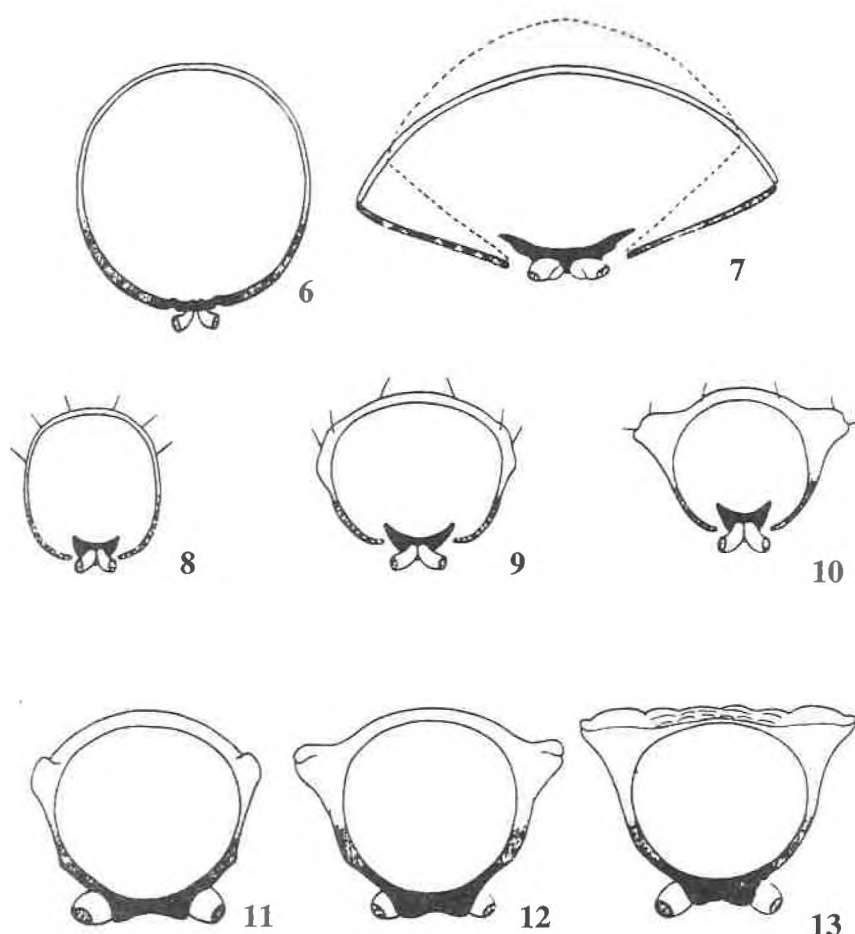
Рис. 3-5. Гнатохиларий и гипостома диплопода: 3 — Chordeumatida; 4 — Polydesmida; 5 — Julida; а — стволик; b — язычковая пластинка; с — ментум; d — проментум; е — кардо; f — нодус; g — гипостома; h — щупик (по [Локшина, 1969] с некоторыми изменениями).

with an axial vertigial suture. An occiput forms the caudal wall of the capsule. Laterally of the frons, the head supports a pair of antennae placed in antennal sockets. Behind them, often there are ocellaria, i.e. fields of dark ocelli. The mouthparts lie beneath the head.

The antennae are always uniramous, fili- to claviform, 8-segmented, the terminal antennomere (= antennal segment) is represented by sensory cones, usually 4 in number. The mouthparts consist of a pair of mandibles and an unpaired plate termed gnathochilarium which is homolog to maxillae II (the maxillulae are fully reduced in the course of embryonic development). The mandible is com-

posed of two pieces: a 2-segmented gena, or basillare, and a stout premandibular part also consisting of several segments. In the suctorial Polyzoniida, the gena is strongly reduced into a narrow longitudinal filament. The gena is the only piece of the mandibles which can be observed in lateral and dorsal views in an intact millipede, while the premandibular part is always covered with the gnathochilarium and poorly visible only in frontal view.

The conformation of the gnathochilarium (Figs 3-5) is characteristic of each order but, basically, it is composed of a pair of stipetes (a), a pair of separated or fused lamellae linguales (b), a mentum (c) sometimes divided by a transverse suture into a basal



Figs 6-13. A sketch of diplosomite cross-section: 6 — Julida; 7 — Polyzoniida; 8, 9, 10 — Chordeumatida; 11, 12, 13 — Polydesmida. Sternites black, pleurites stippled, tergites plain (after Blower [1985]).

Рис. 6-13. Схема поперечного разреза диплосегментов: 6 — Julida; 7 — Polyzoniida; 8, 9, 10 — Chordeumatida; 11, 12, 13 — Polydesmida. Стерниты закрашены черным цветом, плейриты — мелкими точками, тергиты незакрашенные (по [Blower, 1985]).

eumentum and a proximal promentum (d), a pair of cardo (e), and an unpaired praebasilar (with its rudiments termed nodi) (f). The caudal edge of the mentum borders a transverse plate termed hypostoma, or gula (g) often considered as the sternum of the collar body segment. The front edge of the gnathochilarium is supplied with three pairs of palps (h) usually surmounted by sensory cones. Each stipe bears two such palps, largely subcylindrical, whereas each lingual lamella supports a single, lobe-shaped palp.

In Julida, Chordeumatida and Polydesmida, the always present lamellae linguales and mentum are separated from each other; the stipes (= stipes) are elongate and narrow in Chordeumatida but broadened and contiguous at base in Julida. The mentum is divided in Julida and some Chordeumatida. In most Polyzoniida, all gnathochilarial parts are fused, while in the small Polyxenida the dividing sutures are obscure.

Eyes are either absent (Polydesmida, some Julida) or ocellaria of varying shape (lineiform, round-

ed, subtriangular) are present.

The trunk is composed of numerous segments, their number growing either steadily from molt to molt throughout the millipede lifetime (Julida and Polyzoniida with highly inconstant number counts) or only to a certain stage, usually (sub)-adult, to remain stable at all subsequent molts if any, so that adults/species are characterized by definitive segment numbers (Polydesmida, Chordeumatida, Polyxenida, the hemianamorphic Glomerida). Hence the larva (=immature) is always with a lesser body segment count than the adult.

Basically, each body segment, or somite, or ring, consists of a number of sclerites: tergite, or tergum (dorsal, sometimes divided by an axial suture), a pair of pleurites, or pleura (lateral, often coalesced with the tergite), and a pair of sternites, or sterna (ventral, often fused either with each other or coalesced with the pleura, or both). Sterna support appendages.

In Polyzoniida, all sclerites are free, and the tergum is devoid of an axial suture.

In Polydesmida all sclerites are fused into a single solid ring, in Julida all sclerites are likewise fused into a single ring, but the borders of the sternites are evident, while in Chordeumatida the axially divided pleurotergum (= both pleurites and the tergite are fused into a single arch) is completely free from the sternites (Figs 6-13). When free, the sternites can shift anteriorly or posteriorly, hence obscuring the attribution of the sternal pair and its legs to a certain somite.

Segment 1 has only a tergite, or collum, while neither pleura nor sterna can be distinguished. Segments 2 and 3 each are full but with a single pair of always free sterna. All segments behind the 4th but telson are diplopodous, that is, each carries two sterna and two legpairs. Typically, each diplosegment is divided by a transverse suture into two halves, the anterior one termed prozonum, or prozonite, and the posterior one, metazonum, or metazonite. The prozonite is always less in diameter than the metazonite, hence it is partly or almost fully

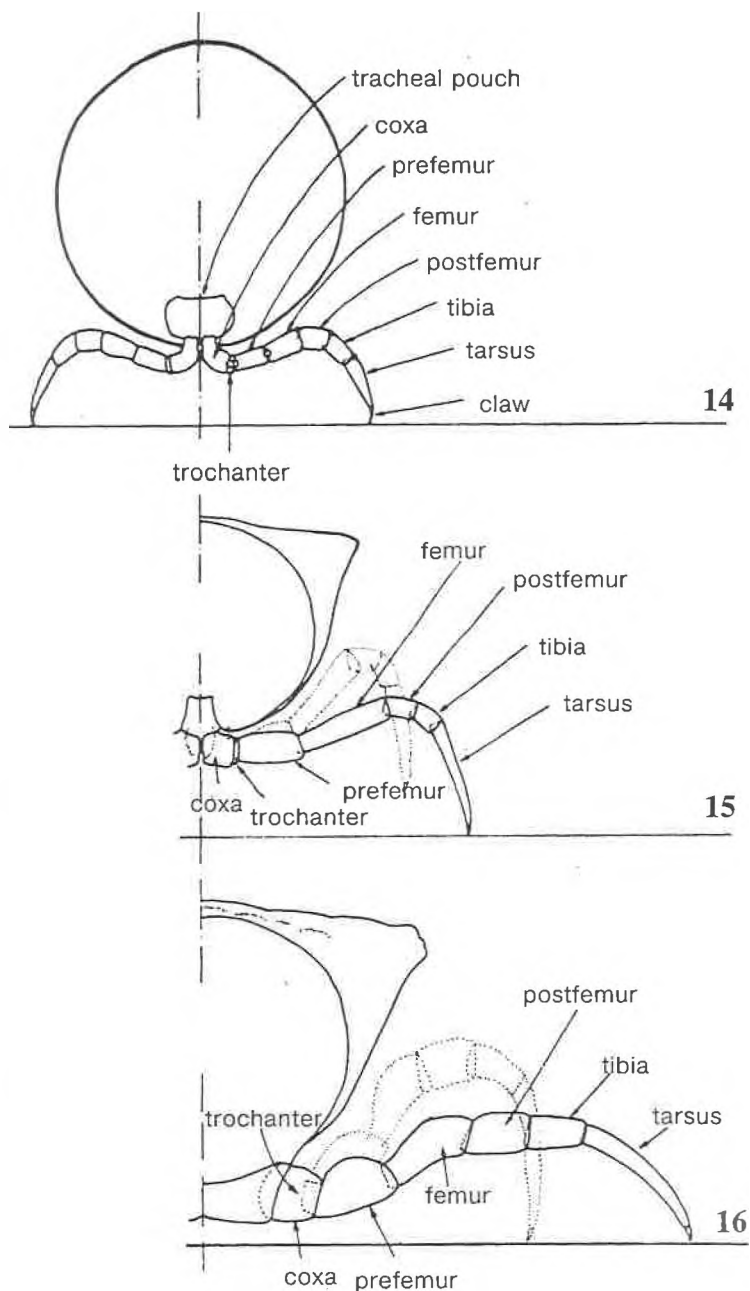
withdrawn in a telescope-like way inside the lumen of the preceding metazonum. In no way does a prozonite correspond to the anterior monosegment of a body ring, same as the straightforward homology of the metazonite to the posterior monosegment is completely wrong.

The prozonital surface can be smooth or finely reticulate, more seldom striolate. Metazonites are usually more strongly sculptured, often with lateral bulges/keels, or paraterga. The dorsal part of the metazonites, or metatergum, can be smooth, tuberculate, granulate, striate, setose, etc., while the paraterga smooth, bordered, incised or even serrate laterally (Figs 49, 166, 196, 224).

Starting from segment 5 or 6, repugnatorial pores, or ozopores, can flush open on the metazonital surface. These pores are absent from Polyxenida and Chordeumatida, present only on certain somites (the so-called pore formula), like in Polydesmida, or on (almost) all subsequent somites, like in Polyzoniida and Julida. When present, ozopores function as the outlets for the repugnatorial glands secreting a repelling, often stinking liquid protecting the millipede from enemies. Ozopores are located either on certain paraterga in Polydesmida or laterally near the suture dividing the somite into a pro- and a metazonite (Julida, Polyzoniida).

Typically, the telson (Fig. 242) consists of a ring (the so-called preanal ring) which sometimes can end up in a tail, or epiproct, a ventral plate (the so-called subanal scale, or hypoproct), and a pair of anal valves, or paraprocts. No subanal scale is present in Polyzoniida, while in Chordeumatida there are 1-3 pairs of tiny spinnerets beneath the epiproct (Fig. 144).

Collum, telson and largely up to a few intercalary segments immediately in front of the preanal



Figs 14-16. A sketch of diplopod leg structure: 14 — Julida; 15 — Chordeumatida; 16 — Polydesmida (after Blower [1985]).

Рис. 14-16. Схема строения ходильных ног диплопод: 14 — Julida; 15 — Chordeumatida; 16 — Polydesmida (по [Blower, 1985]).

ring (the so-called proliferation zone representing the site of anamorphic growth) are legless. Among the legged somites, segments 2-4 are monopodous, while the others diplopodous. The fully missing legs of the collum and the presence of only a single legpair of each of somites 2-4 (these are sometimes referred to as the thorax) are more commonly conceived of as belonging to usual diplosegments. However, the appendages of these anteriormost somites must have been affected in the course of evolution by an increasingly strong reduction/

suppression toward the mouthparts, apparently because the head in diplopods is virtually always strongly bent ventrad.

A millipede walking leg is always uniramous, consisting of 6-7 articles, or podomeres (Figs 14-16). The coxa is the basalmost joint attached to the sternum, while the remaining podomeres combined are termed telopodite. The following telopodomeres are distinguished from base to tip: trochanter, praefemur (= prefemur), femur, postfemur, tibia, and tarsus. Sometimes certain podomeres can get either coalesced or, on the contrary, secondarily subdivided. Usually the tarsus is crowned with a claw. Legs 1 and 2 are largely devoid of a trochanter. The claw is dentiform to phylloid, sometimes with an additional claw spike at base (Figs 17-19). The ventral side of leg segments, especially the male tarsus, with various modifications such as sole pads, brushes of particularly dense setae, specialized setae (e.g. sphaerotrichs which are strong, sometimes plumose palmate setae each surmounting a tubercle), etc. Coxae ventrally can be supplied with the so-called coxal glands with eversible sacs (all Polyzoniida, certain male legs in Chordeumatida) considered as a primitive character. In many millipede species, some to most male legs are somewhat enlarged compared to the female ones, a function deemed associated with the male clasping the female during mating (Polydesmida, Chordeumatida). In general, male legs tend to be modified more strongly than female ones. Thus, male legpair 1 in Julida is either more or less drastically reduced, mostly unciform, or greatly enlarged, often plate-like.

Paired vasa deferentia, or genital ducts, open behind legpair 2. In the male, they flush open either on a usually independent, medially fused structure termed "penes" (which is incorrect since they take no part in direct sperm transfer but function only as gonopores) (e.g. Julida, some Polyzoniida, etc.) or pierce coxae 2 (sometimes forming a complex orifice, e.g. in Polydesmida). In the female, each of the oviducts opens into a poorly sclerotized structure termed "vulva".

Copulation occurs in most but not all millipedes. Thus, the Polyxenida, by a whole combination of features (e.g. non-impregnated cuticle, retention of trichobothria, etc.) being one of the most primitive millipede groups, is characterized by indirect fertilization with no direct contact between the male and the female. In Glomerida, another primitive group, mating does take place but male mouthparts, not legs, are involved in sperm transfer. In the remaining, helminthomorphous millipedes, certain male legs termed gonopods are modified, often highly conspicuously, for carrying out the function of direct sperm transfer during copulation. The stronger the gonopods resemble the usual walking legs and the more gradual the metamorphosis, the more primitive the group. Earlier immature male instars have usual walking legs in place of gonopods, while later to



Figs 17-19 Variation in claw shapes of diplopod legs (orig)
Рис. 17-19. Вариации формы коготков ходильных ног
диплупногих многоножек (оригинал)

penultimate instars display their primordia.

Gonopods function as pipets, or spermatopositors, i.e. as the apparatus by which sperm is introduced into the female. Prior to mating, the sperm ejected through the gonopores, or penes, is picked or sucked up by the gonopods. During copulation, the gonopods containing the sperm enter the vulvae of the female and inseminate it. The structure of the gonopods is of paramount importance in millipede systematics, often being the only reliable means of identification. The vulvae are sometimes species-characteristic as well, but they are poorly sclerotized, usually hidden inside the body cavity (each in a special sac), much more monotonous in structure, so their taxonomic value is by far more limited. Basically, each vulva consists of a bursa and an operculum. The bursa is composed of two valves sometimes connected ventrally with a keel- to fringe-like membrane, sometimes with a deep gutter in between. The operculum lies frontally. Both valves and operculum are usually characteristically setose. Inside the vulva, a seminal duct is usually traceable, which ends up in 1-2 ampullae serving as seminal receptacles.

In Polydesmida, only male legpair 8, or the first pair on somite 7, is modified into gonopods. Though they retain primary articulation between the coxa and a relatively simple telopodite, the group can hardly be considered as rather primitive because of a whole number of such apparently derived characters as the loss of eyes, the complete fusion of the sclerites in body rings, the drastic gonopod metamorphosis from minute and completely non-articulated primordia, etc. A typical polydesmidan gonopod (Fig. 197) consists of a voluminous hollow coxa (cx), or coxite which stores the sperm shortly before mating, a pipe-like coxal horn, or cannula (ca) which serves as a conduit for sperm transmission between the coxite and the telopodite, and a telopodite which is solely by convention, without any phylogenetic connotations, subdivided into a densely setose prefemur and a more complex acropodite (= all subsequent leg segments, in this case femorite + tibiotarsus). Mostly a special distal branch is developed, termed solenomerite, carrying the seminal canal, or seminal groove (which it is as never being closed). Gonopod coxites can be free (a more primitive condition) or fused, the sternal

elements are always strongly reduced.

In Chordeumatida, both very strongly to dramatically modified male legpairs of somite 7 serve as gonopods. Sometimes also certain adjacent/neighbouring male legs can be quite strongly transformed. Then one may term this as a single gonopod complex. The anterior gonopods, or legs 8, are always fused medially and less leg-like than the often independent posterior gonopods, or legs 9 (Fig. 85). Gonopod primordia are often articulated. Coupled with the retention of an axial dorsal suture, free sternites, ocellaria, coxal glands on certain male legs, etc., all this is evidence of a relatively primitive condition represented by the Chordeumatida in millipede phylogeny.

The gonopods in the Julida are likewise modified male legpairs 8 and 9. The anterior gonopods, or peltogonopods (a term emphasizing their protecting function) are usually plate-like, covering the more delicate posterior, or true, gonopods frontally and from below. While a reduced to rudimentary telopodite is usually retained by the peltogonopods, this is exceptional in the posterior gonopods. The julidan gonopod complex is always divided into 2-3 parts, in most cases the gonopods are (almost) fully sunk into a special cavity inside somite 7. The anterior piece, often termed promerite, fully corresponds to the peltogonopods, hence the homologue of legpair 8. Typically, each promerite retains a sternite, a flagellum (homologous to the coxal gland) and, usually, a more or less strongly reduced telopodite. The posterior gonopods can be either unipartite (a more primitive condition, hence the complete homologue to legpair 9) or deeply split into two pieces, the anterior of which is termed mesomerite, while the posterior one, or opisthome-rite, usually supports a seminal groove on a solenomerite branch. Since almost all sterna are fused to the ring-like pleuroterga (though retain a suture), the gnathochilarium is most strongly derived, the gonopod buds are non-articulated, the coxal glands are missing, etc., the Julida is generally considered as one of the most highly advanced millipede groups.

In Polyzoiiida, the gonopods correspond to legpairs 9 and 10. They are extremely leg-like (Figs 26, 27). Coupled with retention of completely free body sclerites, a gradual transformation of the gonopods into mature ones, and some other characters, this allows to consider this order among the most primitive millipede groups.

Classification

As noted above, the Diplopoda represents one of the largest classes of terrestrial arthropods. Its over 10,000 currently described species are classified into over 2,200 genera, about 170 families, and 15-16 orders. However, the bulk of the group's diversity is tropical or subtropical, while temperate faunas are

seldom particularly rich. Thus, the millipede fauna of the Far East of Russia currently includes only 63 species from 21 genera, 15 families, and five orders (see List below). The number of species per locality usually ranges between a few and a dozen species, the most preferable habitats being in mixed broad-leaved-coniferous and purely deciduous forests.

Below is a list of the diplopods encountered in the the Far East of Russia:

ORDER POLYZONIIDA

FAMILY POLYZONIIDAE

Genus *Angarozonium* Shelley, 1998

1. *Angarozonium aduncum* (Mikhaljova, 1995)
2. *Angarozonium amurense* (Gerstfeldt, 1859)
3. *Angarozonium bonum* (Mikhaljova, 1979)
4. *Angarozonium kurtischevae* (Mikhaljova, 1983)
5. *Angarozonium valerii* (Mikhaljova, 1981)

ORDER JULIDA

FAMILY BLANIULIDAE

Genus *Nopoiulus* Menge, 1851

6. *Nopoiulus kochii* (Gervais, 1847)

FAMILY JULIDAE

Genus *Anaulaciulus* Pocock, 1895

7. *Anaulaciulus golovatchi* Mikhaljova, 1982

Genus *Cylindroiulus* Verhoeff, 1894

8. *Cylindroiulus latestriatus* (Curtis, 1845)

Genus *Pacifiulus* Mikhaljova, 1982

9. *Pacifiulus amurensis* (Gerstfeldt, 1859)

FAMILY MONGOLIULIDAE

Genus *Kopidoiulus* Attems, 1909

10. *Kopidoiulus continentalis* Golovatch, 1979

11. *Kopidoiulus khasanicus* Mikhaljova, 1997

Genus *Skleroprotopus* Attems, 1901

12. *Skleroprotopus coreanus* (Pocock, 1903)

13. *Skleroprotopus schmidtii* Golovatch, 1979

Genus *Ussuriulus* Golovatch, 1980

14. *Ussuriulus pilifer* Golovatch, 1980

FAMILY NEMASOMATIDAE

Genus *Orinisobates* Lohmander, 1933

15. *Orinisobates microthylax* Enghoff, 1985

16. *Orinisobates soror* Enghoff, 1985

ORDER CHORDEUMATIDA

FAMILY CASEYIDAE

Genus *Underwoodia* Cook & Collins, 1895

17. *Underwoodia kurtischevae* Golovatch, 1980

FAMILY CONOTYLIDAE

Genus *Crassotyla* Golovatch, 1980

18. *Crassotyla amurica* Golovatch, 1980

FAMILY DIPLOMARAGNIDAE

Genus *Diplomaragna* Attems, 1907

19. *Diplomaragna anuchino* Shear, 1990

20. *Diplomaragna basarukini* Mikhaljova, 1995

21. *Diplomaragna bureyinskaya* Mikhaljova, 1997

22. *Diplomaragna cristofer* Mikhaljova, 1993

23. *Diplomaragna curvata* Mikhaljova, 1995

24. *Diplomaragna dalnegorica* Mikhaljova, 1993

25. *Diplomaragna ganini* Mikhaljova, 1993

26. *Diplomaragna globulifera* Mikhaljova, 1995

27. *Diplomaragna kedrovaja* Mikhaljova, 1993

28. *Diplomaragna kuruma* Mikhajlova, 1997
29. *Diplomaragna lysaya* Shear, 1990
30. *Diplomaragna mikhajlovae* Shear, 1990
31. *Diplomaragna molodovae* (Golovatch, 1976)
32. *Diplomaragna picea* Shear, 1990
33. *Diplomaragna reducta* Shear, 1990
34. *Diplomaragna sakhalinica* Mikhajlova, 1995
35. *Diplomaragna schawalleri* Mikhajlova, 1993
36. *Diplomaragna terricolor* (Attems, 1899)
37. *Diplomaragna tuberculata* Mikhajlova, 1995
38. *Diplomaragna turova* Mikhajlova, 1997
39. *Diplomaragna yakovlevka* Shear, 1990
40. *Diplomaragna zimoveinaya* Mikhajlova, 1997

FAMILY GOLOVATCHIIDAE

Genus **Golovatchia** Shear, 1992

41. *Golovatchia magda* Shear, 1992

FAMILY HOFFMANEUMATIDAE

Genus **Hoffmaneuma** Golovatch, 1978

42. *Hoffmaneuma exiguum* Golovatch, 1978

FAMILY MEGALOTYLIDAE

Genus **Megalotyla** Golovatch, 1978

43. *Megalotyla brevichaeta* Golovatch & Mikhajlova, 1978

ORDER POLYDESMIDA

FAMILY PARADOXOSOMATIDAE

Genus **Cawjeekelia** Golovatch, 1980

44. *Cawjeekelia koreana* (Golovatch, 1980)

Genus **Oxidus** Cook, 1896

45. *Oxidus gracilis* (C.L. Koch, 1847)

Genus **Sichotanus** Attems, 1914

46. *Sichotanus eurygaster* (Attems, 1898)

FAMILY POLYDESMIDAE

Genus **Epanerchodus** Attems, 1901

47. *Epanerchodus bifidus* Takakuwa, 1954
48. *Epanerchodus cuspidatus* Mikhajlova, 1996
49. *Epanerchodus kunashiricus* Mikhajlova, 1988
50. *Epanerchodus polymorphus* Mikhajlova & Golovatch, 1981

Genus **Uniramidesmus** Golovatch, 1979

51. *Uniramidesmus aberrans* Mikhajlova, 1979
52. *Uniramidesmus alveolatus* Mikhajlova, 1979
53. *Uniramidesmus constrictus* Mikhajlova, 1998
54. *Uniramidesmus cornutus* Mikhajlova, 1984
55. *Uniramidesmus dentatus* Mikhajlova, 1979
56. *Uniramidesmus deterius* Golovatch, 1979
57. *Uniramidesmus septimus* Mikhajlova, 1990

FAMILY XYSTODESMIDAE

Genus **Levizonus** Attems, 1898

58. *Levizonus distinctus* Mikhajlova, 1990
59. *Levizonus laqueatus* Mikhajlova, 1981
60. *Levizonus malewitschi* Lokšina & Golovatch, 1977
61. *Levizonus thaumasius* Attems, 1898
62. *Levizonus variabilis* Lokšina & Golovatch, 1977

ORDER POLYXENIDA

FAMILY POLYXENIDAE

63. *Polyxenus* sp.

It seems necessary to emphasize that even the present, most complete list will definitely grow with

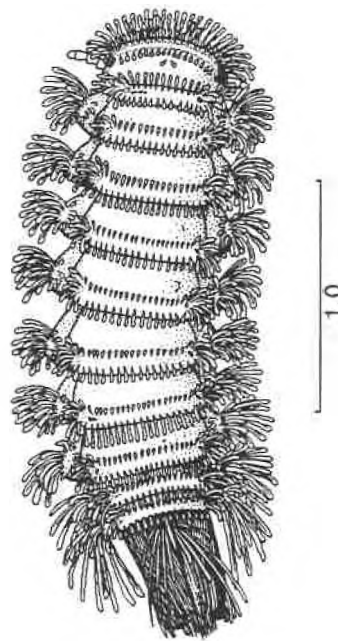


Fig. 20. *Polyxenus lagurus* (L.). — Scale in mm (after Blower [1985]).

Рис. 20. *Polyxenus lagurus* (L.). — Масштаб в мм (по [Blower, 1985]).

further studies in the millipede fauna of the Russian Far East. A number of new species are likely to be found/described, this holding true at least concerning the yet closer unidentified *Polyxenus* (see below).

Keys and accounts

Below are keys to the subclasses, orders, families, genera, and species of the millipedes encountered in the region concerned.

KEY TO THE SUBCLASSES OF DIPLOPODA:

- 1(2) Cuticle soft, not impregnated with calcites. Head, most of pleura and telson with bundles tufts of hollow serrate setae (trichome) (Fig. 20). Body small, up to 4 mm in length Penicillata
- 2(1) Cuticle hard, impregnated with calcites. Such a trichome absent, body bare or with simple setae. Body usually larger Helminthomorpha

Subclass Penicillata Latreille, 1802/03

This subclass comprises the only order Polyxenida Lucas, 1840, or the so-called bristly millipedes, which includes four families. This group is cosmopolitan, mostly tropical in distribution.

Only the family Polyxenidae Lucas, 1840 occurs in the Far East of Russia, represented by a single, closer unidentified species of the Holarctic genus *Polyxenus* Latreille, 1802/03. These small, whitish, relatively swiftly moving millipedes live in rotten wood, under the bark of dead trees, in lichens, under stones, in ant hills, forest litter, etc. They look very different from other

diplopods first of all in lack of a solid cuticle and the presence of a particular trichome. One of the congeners, the West Palearctic + Nearctic *P. lagurus* (Linnaeus, 1758), displays parthenogenesis but, judged from only very few samples taken in the Russian Far East, this is hardly true concerning our *Polyxenus* sp. The geographically closest, endemic congeners are known from Korea, China and Japan [Ishii, 1983; Ishii & Choi, 1988; Ishii & Liang, 1990], but Ishii [in preparation] believes that we face a new species to be described.

Subclass Helminthomorpha Pocock, 1894

This group includes 11-12 orders, of which only four occur in the Far East of Russia.

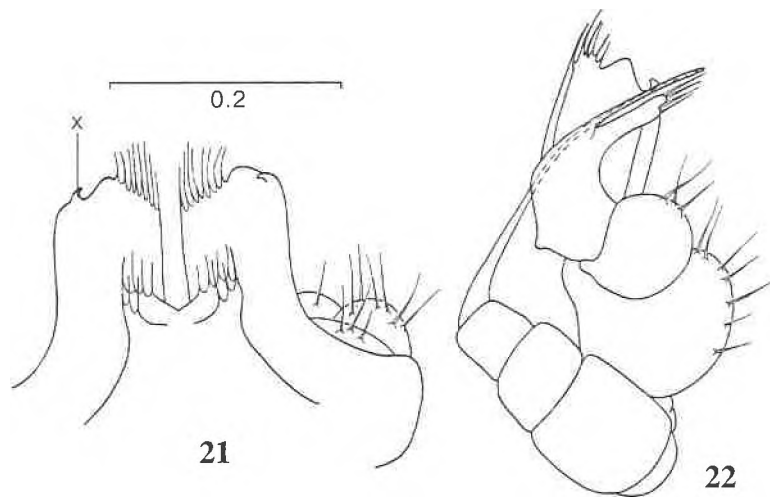
KEY TO ORDERS OF HELMINTHOMORPHA:

- 1(2) Head very small, elongated anteriorly into a rostrum (Fig. 29). Body strongly flattened dorsoventrally. Tergites semi-circular, pleurites and sternites free (Fig. 7). Body not exceeding 12 mm in length *Polyzoniida*
- 2(1) Head larger, more or less ovoid, devoid of a rostrum. Body more or less cylindrical, with or without paraterga. Tergopleurites more strongly arched, sternites free or not (Figs 8-10) 3
- 3(4) Head with a "neck" in front of collum. Telson with a pair of spinnerets (Fig. 144). Each metatergite with 3+3 macrochaetae (Figs 128, 143), axial suture evident *Chordeumatida*
- 4(3) Head without such a "neck" in front of collum, both head and collum as if continuing the same convex outline. Spinnerets absent. Metaterga with simple setae at most (Fig. 304), axial suture absent 5
- 5(6) Metatergites with dorsolateral bulges, keels/wings (= paratergites, or paraterga) (Fig. 167, 224). Eyes absent. Adult body with 20 segments at most, including telson *Polydesmida*
- 6(5) Entire body cylindrical, devoid of dorsolateral projections (Fig. 304). Adult body with usually well over 30 segments. Eyes usually present at least as individual ocelli, more seldom completely reduced *Julida*

Order Polyzoniida Newport, 1844

Distributed worldwide, four families. The Far East of Russia supports a single Holarctic family.

The main distinguishing characters of the group are as follows: head small, subtriangular, with a few black ocelli on each side; body strongly flattened, more or less leech-like, all somital sclerites free, tergite usually undivided by an axial suture; legs with coxal pouches + glands; gonopods strongly leg-like, represented by modified ♂ legs 9 and 10.



Figs 21-22. *Angarozonium aduncum* Mikh.: 21 — gonopods (front view); 22 — gonopods (caudal view); x — outgrowth of external edge of coxal process. — Scale in mm (after Mikhajlova & Basarukin [1995]).

Рис. 21-22 *Angarozonium aduncum* Микх.: 21 — гоноподии (спереди); 22 — гоноподии (сзади); x — вырост наружного края коксального отростка — Масштаб в мм (по [Михалева, Басарукин, 1995]).

Family Polyzoniidae Newport, 1844

Three genera (one each in the eastern Nearctic, Europe, and Palearctic Asia) in Polyzoniinae and further three, all in the western Nearctic, in Buzoniinae [Shelley, 1998]. Only one genus occurs in the Far East of Russia.

The family is characterized as follows: bare tergites very short but very broad, strongly attached to each other, building up a uniform smooth surface interrupted by neither bulges nor deep sutures; telson narrow, not concealed under penultimate tergite; tarsal claws simple.

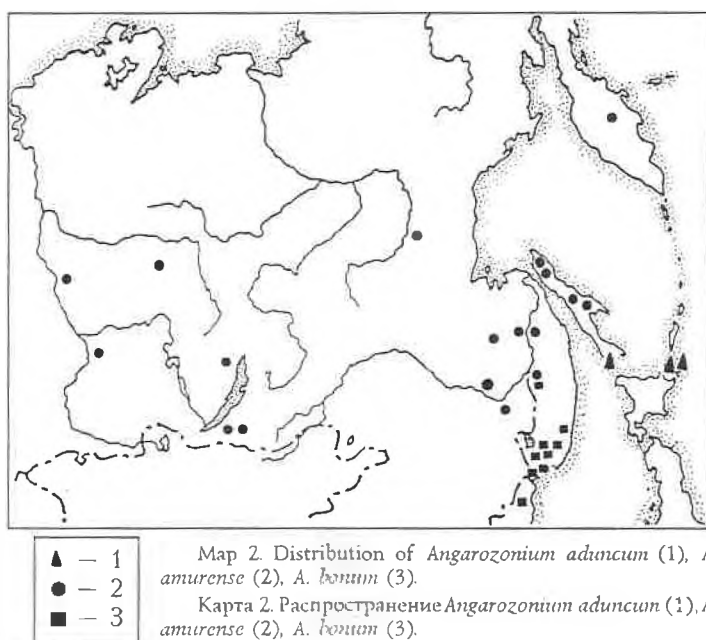
Genus *Angarozonium* Shelley, 1998

Five species in Siberia and the Far East, including North Korea. The Far East of Russia appears to support a surprisingly rich variety of polyzoniid species, one exceeding that of entire Europe and about equal to that of the entire Nearctic [cf. Shelley, 1998].

The main distinguishing characters of the genus: hirsute and simple distal podomere of anterior gonopods.

KEY TO *ANGAROZONIUM* SPECIES:

- 1(6) Coxal process of anterior gonopods not bifid. Ozo- pores strongly shifted off suture dividing pro- and metazona. Fore and marginal parts of telson brown 2
- 2(3) External edge of coxal process of anterior gonopods with a small unciform outgrowth (x) (Fig. 21) *A. aduncum*
- 3(2) External edge of coxal process of anterior gonopods devoid of any outgrowths 4
- 4(5) Coxal process of anterior gonopods cyathiform, i.e. cup-shaped; distal part of telopodite bifid (Figs 26, 27) *A. amurense*



- 5(4) Coxal process of anterior gonopods petal-shaped, distal part of telopodite not bifid (Figs 33, 34)
..... *A. valerii*
- 6(1) Coxal process of anterior gonopods bifid. Ozopores lying very close to suture dividing pro- and metazona. Telson colourless 7
- 7(8) Coxal process of anterior gonopods with an internal branch by 1/4 shorter than external one, sternite with a few setae on tubercles (Fig. 40) .. *A. bonum*
- 8(7) Coxal process of anterior gonopods with an internal branch by 3/4 shorter than external one, sternite with numerous long setae on tubercles (Fig. 46) ...
..... *A. kurtschevae*

Angarozonium aduncum (Mikhajlova, 1995)
Figs 21-22, Map 2.

Polyzonium aduncum Mikhajlova in: Mikhajlova & Basarukin, 1995: 91, figs, map.

Angarozonium aduncum — Shelley, 1998: 30.

DESCRIPTION. Adult ♂ 6-10 mm in length, 0.9-1.9 mm in width, up to now with a maximum recorded body segment number of 39; adult ♀ 6-9 mm in length, 0.8-1.5 mm in width, up to now with maximum recorded body segment numbers of 33. Minimum segment counts in adults 30.

General colouration of dorsum from beige to brown, of venter from beige to yellowish. Collum with an unpaired median marbled spot and paired lateral spots. Pale marbled bands of varying width along suture dividing pro- and metazona. Ozopores lying in the middle of a marbled spot. Legs beige, in ♂ legs entirely, in ♀ tarsi and distal parts of tibiae light brown dorsally, prefemora beige to brown ventrally. Antennae dark brown. Central part of telson beige, peripheral edges brown. Ocelli black.

Head with a rostrum, setose along external margins only. Ocellaria comma-shaped with 3 ocelli in lower row and 1-2 setigerous knobs in upper row. Length ratios of antennomeres 2-7 as 0.9:1.1:1.2:0.9-1.4:1, width ratios as 0.8:1.1:1.1:1.1:1.1:2.1, respectively. Collum ellipsoid, much

broad than head. Ozopores from somite 6 on set off behind suture dividing pro- and metazona, not touching this suture, only on somite 5 lying either right upon or touching the suture.

Legs slender. Vasa deferentia opening on conical penes behind ♂ legpair 2. Claws of ♂ legs 1 and 2 phylloid.

General habitus and gonopod structure much like in *A. amurense*. Anterior gonopods (Fig. 21) 5-segmented. Coxal processes like half-cylinders. External edge of coxal process with an unciform outgrowth (x), internal edge with long and strong setae but without fold. External sides of of segments 2-4 setose, femur with a setose pad. Terminal segment bipartite, interior branch (=solenomerite) with seminal groove terminating at tip, exterior branch about half as short and supplied with a few long setae distally. Posterior gonopods (Fig. 22) also 5-segmented, terminal segment particularly long and slender, foveolate at. and with a poor incision before, tip.

HABITATS. Woodlands, in mosses and

litter, also on banks of lakes.

DISTRIBUTION (Map 2). Southern Sakhalin Island (near Aniva and River Ulyanovka), Kunashir Island (near Yuzhno-Kurilsk [type locality!], Golovnino, Mendelevo and Alekhino) and Shikotan Island (near River Svobodnaya).

Angarozonium amurense (Gerstfeldt, 1859)
Figs 23-28, Map 2.

Platydesmus amurensis Gerstfeldt, 1859: 273.

Polyzonium amurense — Mikhajlova, 1979a: 1591; 1993: 9.

Polyzonium bonum — Ursova, 1983: 305.

Polyzonium cyathiferum Mikhajlova, 1981b: 781, figs.

Polyzonium cyathiferum — Mikhajlova, 1983a: 309; Ryabinin et al., 1988: 29; Mikhajlova, 1990: 137; 1993: 8; Mikhajlova & Basarukin, 1995: 89, map; Ganin, 1997: 12.

Angarozonium amurense — Shelley, 1998: 29; Mikhajlova, 1998: 4.

DESCRIPTION. Adult ♂ 4-11 mm in length, 1-1.9 mm in width, up to now with maximum recorded body segment numbers of 47; adult ♀ 4-12 mm in length, 1.1-2.0 mm in width, up to now with maximum recorded body segment numbers of 43. Segment counts in adults always over 25.

General colouration increasingly pallid toward telson, dorsum castaneous-brown with a dark axial stripe which can be obscure or consist of small individual spotlets. Venter yellowish, caudalmost edges of pleura light brown, growing increasingly brown toward telson. Immatures pale. Collum with an unpaired median marbled spot and paired lateral marbled spots. Prozona brown with narrow triangular spots lying between lateral sides and axial line. A pale band broadening dorsad and turning near axis into a marbled spot along suture dividing pro- and metazona. Each metazonite with a pair of large marble spots. Ozopores lying in the middle of a round pale spot. Lateral sides of metaterga with more or less distinct, whitish, oblique stripes extending from ozopore spot down to caudal corner. Legs pale, tarsi and

distal parts of tibiae brownish. ♂ prefemora brown ventrally, pallid in ♀ and juveniles. Antennae dark brown. Central part of telson colourless, fore and lateral parts brown. Ocelli black.

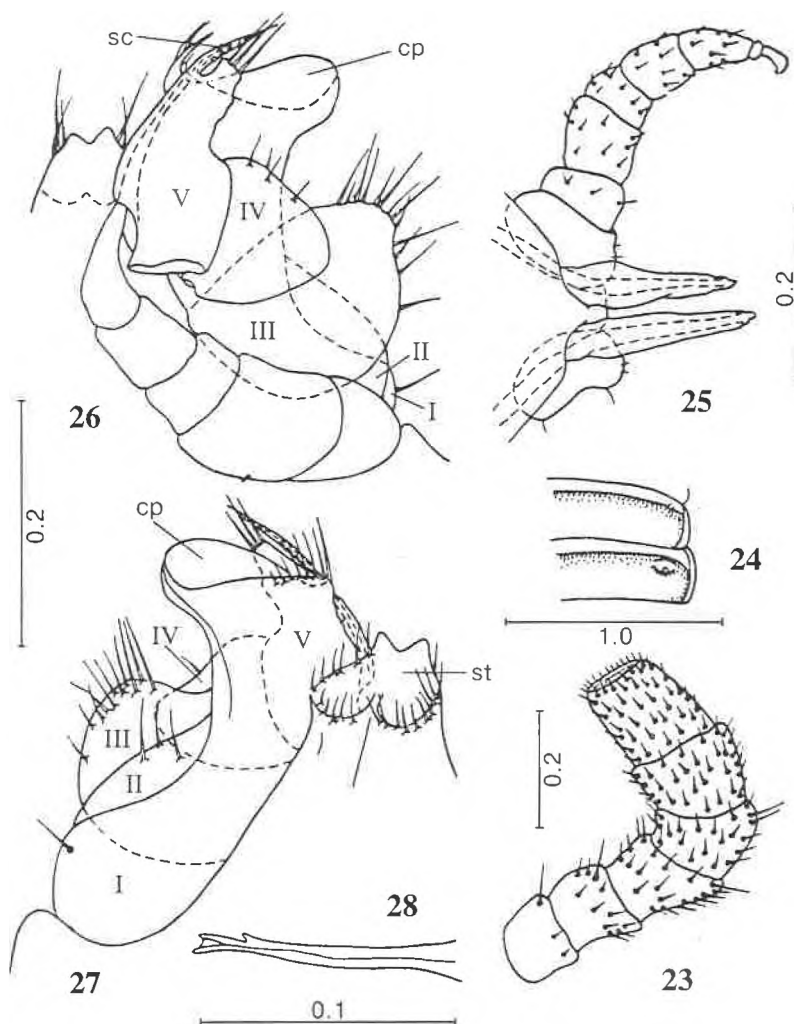
Head with a rostrum, sparsely setose along external margins only. Ocellaria comma-shaped with 3 ocelli in lower row and 1-2 setigerous knobs in upper row. Antennae long, densely setose (Fig. 23). Length ratios of antennomeres 2-7 as 1.2:2.0:1.7:1.9:1.9:1, width ratios as 1.2:1.5:1.6:1.6:1.4:1, respectively. Collum ellipsoid, considerably broader than head. Ozopores set off behind suture dividing pro- and metazona by a low and narrow ridge. On somite 5, ozopores located on prozonite right upon suture dividing pro- and metazona (Fig. 24).

Legs slender, coxae close but not contiguous. Vasa deferentia opening on narrow conical penes behind ♂ legpair 2 (Fig. 25). Claws of ♂ legs 1 and 2 phylloid.

Anterior gonopods (Fig. 27) 5-segmented. Coxite extended into a cup-like process (cp) almost fully concealed and beset with strong setae of varying length mesally. Segment 2 narrow, strongly attached to coxite. Segments 1-4 setose laterally, with a setigerous pad on segment 3. Telopodite bifid apically. external branch with several setae. A styloloid interior branch serving as solenomerite for seminal groove (sc) opening terminally. Sternite (st) apically like a double fovea beset with setae at fore edge but elevated and bipartite caudally. Posterior gonopods (Figs 26, 28) 5-segmented, terminal segment particularly long and slender, foveolate at, and with a poor incision before, tip.

HABITATS. Litter and rotten wood in various forest types, also on/in mushrooms. The maximum abundance recorded in the south of Khabarovsk Prov. is 21.0 ind. per sq.m., the minimum 1.1 ind. per sq.m. [Ganin, 1997]. This species can serve as bioindicator of sulphuric industrial pollution [Ryabinin et al., 1988; Ganin, 1997].

DISTRIBUTION (Map 2). Described from near the mouth of Songari River, China [Gerstfeldt, 1859], this species has long been suspected to actually represent a senior synonym of the trans-Siberian *Polyzonium cyathiferum* Mikhaljova, 1981b [e.g., Mikhaljova, 1993]. However, the formal synonymy has been advanced only very recently [Shelley, 1998], reconfirmed by examination of a sample of what might be considered as near-topotypes [Mikhaljova, 1998].



Figs 23-28. *Angarozonium amurense* (Gerstf.): 23 — antenna; 24 — sides of body segments 5 and 6; 25 — ♂ leg 2; 26 — gonopods (caudal view); 27 — gonopods (front view); 28 — last segment of posterior gonopod telopodite; cp — coxal process; sc — seminal canal; st — sternite; I-V — anterior gonopod segments. — Scales in mm (after Mikhaljova [1981b]).

Рис. 23-28. *Angarozonium amurense* (Gerstf.): 23 — антенна; 24 — боковые края 5 и 6 сегментов тела; 25 — 2-я пара ног у ♂; 26 — гоноподии (вид сзади); 27 — гоноподии (вид спереди); 28 — последний членик телоподита задних гоноподий; cp — коксальный отросток; sc — семенной канал; st — стернит; I-V — членики передних гоноподий. — Масштаб в мм (по [Михалева, 1981b]).

Angarozonium valerii (Mikhaljova, 1981) Figs 29-35, Map 3.

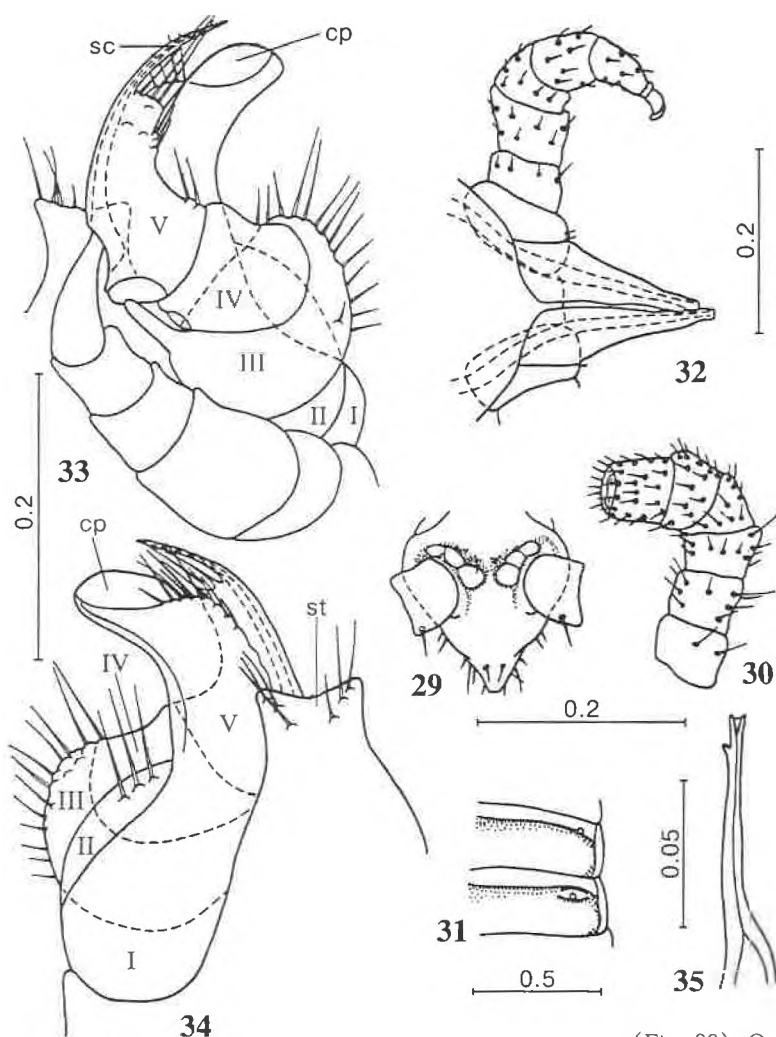
Polyzonium valerii Mikhaljova, 1981b: 779, figs.

Polyzonium valerii — Mikhaljova, 1993: 9, map; Ganin, 1997: 126.

Angarozonium valerii — Shelley, 1998: 29.

DESCRIPTION. Adult ♂ 4-9.5 mm in length, 0.8-1.1 mm in width, up to now with maximum recorded body segment numbers of 43; adult ♀ 3.5-10.5 mm in length, 0.9-1.4 mm in width, up to now with maximum recorded body segment numbers of 40. Minimum segment counts in adults 24.

General colouration increasingly pallid toward telson, dorsum castaneous brown with a dark axial stripe. Venter yellowish. Caudalmost edges of pleura light brown, growing increasingly brown toward telson. Imma-



Figs 29-35. *Angarozonium valerii* (Mikh.): 29 — head; 30 — antenna; 31 — sides of body segments 5 and 6; 32 — ♂ leg 2; 33 — gonopods (caudal view); 34 — gonopods (front view); 35 — last segment of posterior gonopod telopodite; cp — coxal process; sc — seminal canal; st — sternite; I-V — anterior gonopod segments. — Scales in mm (after Mikhaljova [1981b]).

Рис. 29-35. *Angarozonium valerii* (Mikh.): 29 — голова; 30 — антенна; 31 — боковые края 5 и 6 сегментов тела; 32 — 2-я пара ног у ♂; 33 — гоноподии (вид сзади); 34 — гоноподии (вид спереди); 35 — последний членик телоподита задних гоноподий; cp — коксальный отросток; sc — семенной канал; st — стернит; I-V — членики передних гоноподий. — Масштаб в мм (по [Михалева, 1981b]).

tures pale. Collum with an unpaired median marbled spot and paired lateral marbled spots. Prozona brown with pale triangular spots lying between lateral sides and axial line. A pale band broadening dorsad and turning near axis into a marbled spot along suture dividing pro- and metazona. Each metazonite with a pair of large diffuse marble spots. Lateral sides of metaterga whitish with markings. Ozopore lying in the middle of a round pale spot. Legs pale, tarsi and distal parts of tibiae light brown. ♂ prefemora brown ventrally, pallid in ♀ and juveniles. Antennae brown. Central part of telson colourless, fore and lateral parts brown. Ocelli black.

Head with a rostrum, sparsely setose along external margins only

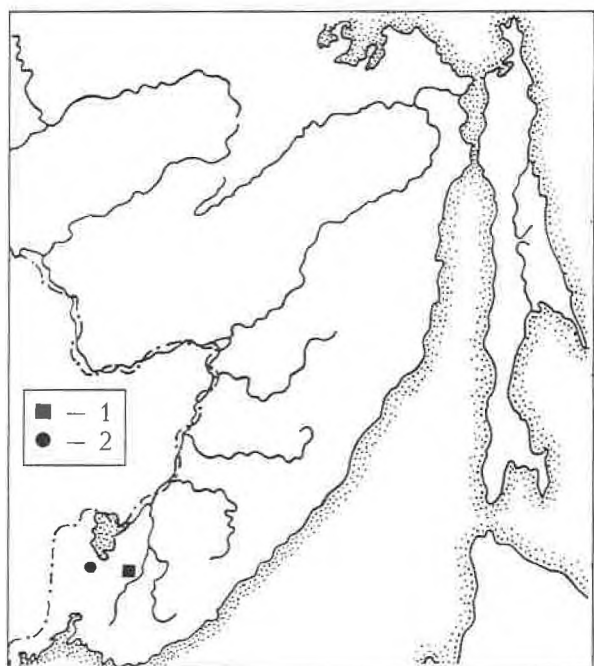
(Fig. 29). Ocellaria comma-shaped with three ocelli in lower row and 1-2 setigerous knobs in upper row. Antennae densely setose (Fig. 30). Length ratios of antennomeres 2-7 as 5.7:7.0:5.7:5.0:7.0:1, width ratios as 1.7:1.9:2.1:1.9:1.7:1, respectively. Collum ellopsoid, much broader than head. Ozopores set off behind suture dividing pro- and metazona by a low and narrow ridge. On somite 5, ozopores located on prozonite right upon suture dividing pro- and metazona (Fig. 31).

Legs slender, coxae close but not contiguous. Vasa deferentia opening on narrow conical penes behind ♂ legpair 2 (Fig. 32). Claws of ♂ legs 1 and 2 phylloid.

Anterior gonopods (Fig. 34) 5-segmented. Coxite extended into a petal-like, broadly opening process (cp) beset with strong setae mesally. Prefemur narrow, strongly attached to coxite. Aeropodite setose laterally, with a setigerous pad on segment 3. Telopodite with only interior branch serving as solenomerite, seminal groove (sc) opening terminally. Sternite (st) without processes, with a shallow mesal hollow beset with long subapical setae. Posterior gonopods (Figs 33, 35) also 5-segmented, terminal segment particularly long and slender, foveolate at, and with a poor incision before, tip.

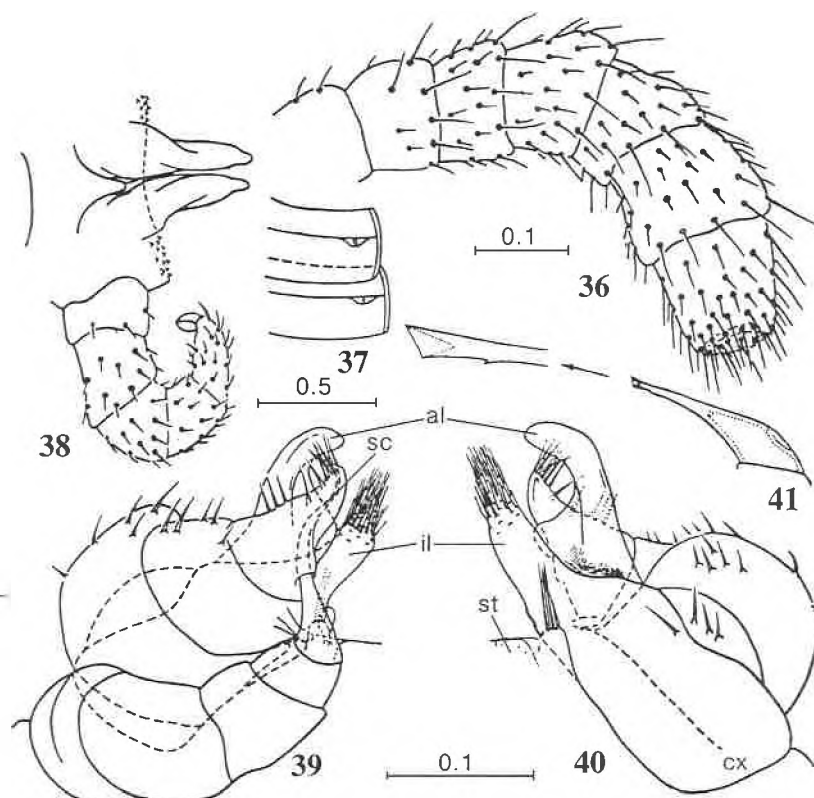
Map 3. Distribution of *Angarozonium kurtischevae* (1) and *A. valerii* (2).

Карта 3. Распространение *Angarozonium kurtischevae* (1) и *A. valerii* (2).



Figs 36-41. *Angarozonium bonum* (Mikh.): 36 — antenna; 37 — sides of body segments; 38 — ♂ leg 2; 39 — gonopods (caudal view); 40 — gonopods (front view); 41 — last segment of posterior gonopod telopodite; al — external lobe of coxal process; cx — coxite; il — internal lobe of coxal process; sc — seminal canal; st — sternite. — Scales in mm (after Mikhajlova [1979a] with some changes)

Рис. 36-41. *Angarozonium bonum* (Мих.): 36 — антенна; 37 — боковые края туловищных сегментов; 38 — 2-я пара ног у ♂; 39 — гоноподии (вид сзади); 40 — гоноподии (вид спереди); 41 — последний членик телоподита задних гоноподий; al — наружная лопасть коксального отростка; cx — коксит; il — внутренняя лопасть коксального отростка; sc — семенной канал; st — стернит. — Масштаб в мм (по [Михалева, 1979а], с некоторыми изменениями).



HABITATS. Mushrooms in a *Quercus* forest with *Betula* and *Populus*.

DISTRIBUTION (Map 3). Described from near Blagodatnoye, Khorol Distr., Maritime Prov., this species seems to be restricted to its terra typica.

Angarozonium bonum (Mikhajlova, 1979)

Figs 36-41, Map 2.

Polyzonium bonum Mikhajlova, 1979a: 1592, figs.

Polyzonium bonum — Lokšina & Golovatch, 1979: 382; Kurcheva & Mikhajlova, 1980: 121; Mikhajlova, 1983a: 309; 1983b: 82; 1988b: 70; 1993: 4; 1997a: 145; Mikhajlova & Petukhova, 1983: 52; Ganin, 1997: 105.

non *Polyzonium bonum* — Ursova, 1983: 305.

Angarozonium bonum — Shelley, 1998: 29, figs.

DESCRIPTION. Adult ♂ 4-10 mm in length, 0.8-1.0 mm in width; adult ♀ 7-12 mm in length, 1.0-1.7 mm in width. Body segment counts of ♂ and ♀ ranging between 32 and 54.

General colouration yellowish, each metazonite with light brown stripes. ♀ usually brownish. Antennae light brown to pale. Ocelli black. Head small with a rostrum, sparsely setose along external margins only.

Ocellaria comma-shaped with three ocelli in lower row and 1-2 setigerous knobs in upper row. Early instar juveniles with reduced numbers of ocelli.

Antennae long, densely setose (Fig. 36). Length ratios of antennomeres 2-7 as 3.0:3.4:3.9:3.7:3.5:1, width ratios as 2.2:2.5:2.6:2.7:2.2:1, respectively. Collum semi-circular. Ozopores located on metazonite right upon or near suture dividing pro- and metazona (Fig. 37).

Legs slender, coxae close but not contiguous. Vasa deferentia opening on narrow conical penes behind ♂ legpair 2 (Fig. 38). Immature ♂ without penes. Claws of ♂ legs 1 and 2 phylloid. Coxae of ♂ leg 2 with short and strong setae ventrally.

Anterior gonopods (Fig. 40) 5-segmented. Coxite (cx) with a large process bifid apically (Figs 39, 40), interior branch (il) with long and strong setae. Bare

external branch (al) unciform and curved mesad. Telopodite pointed apically, with long and styloid setae, serving as solenomerite; seminal groove (sc) opening terminally. Sternite (st) with a pair of setigerous knobs. Posterior gonopods (Figs 39, 41) also 5-segmented, terminal segment particularly long and slender, foveolate at, and with a poor incision before, tip.

Legpairs 9 and 10 of immature ♂ at a stage of 28-31 body segments representing underdeveloped 5-segmented gonopods, with coxites with no prominent outgrowths and terminal telopoditomers devoid of awl-shaped setae.

HABITATS. Litter, soil and rotten wood in broadleaved, mixed and coniferous forests. Both adults and juveniles occur in the soil up to 40 cm in depth [Mikhajlova, 1983b]. The maximum abundance recorded in the south of the Maritime Province is 47.5 ind. per sq. m, the minimum 0.8 ind. per sq. m [Mikhajlova, 1988b].

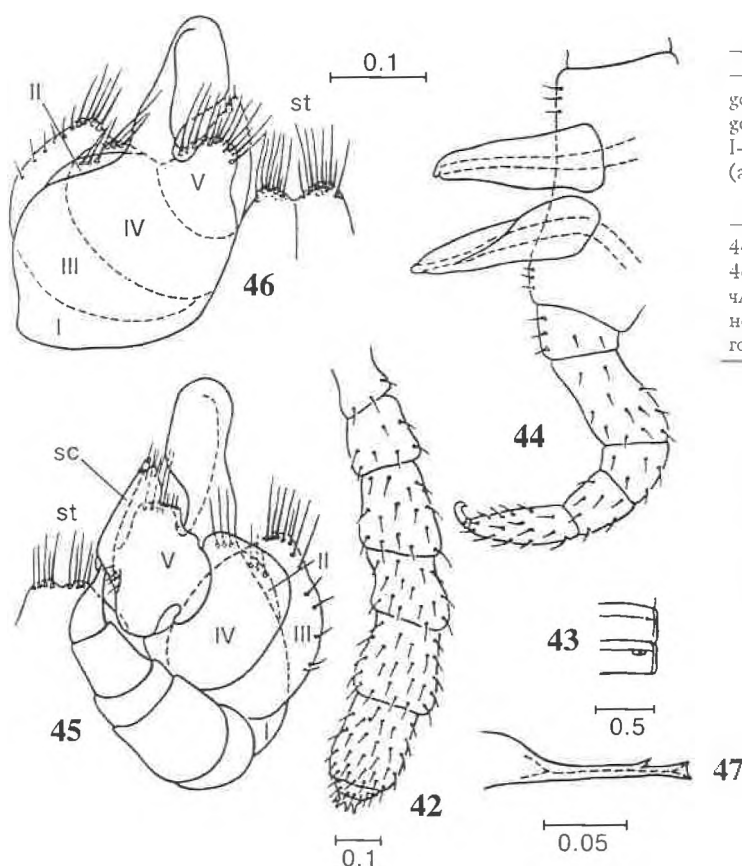
DISTRIBUTION (Map 2). Originally described from the Kedrovaya Pad and Ussuriyskii nature reserves, the Chuguyevka, Anuchino and Dalnegorsk districts, all in the Maritime Province, this species appears to be quite common there. In addition, it has since been reported from the Sikhote-Alin Nature Reserve, Ternei Distr., Maritime Prov., from SE of Boitsovo, Bikin Distr., Khabarovsk Prov., and from North Korea [Golovatch, 1980b; Mikhajlova & Kim, 1993].

Angarozonium kurtschevae (Mikhajlova, 1983) Figs 42-47, Map 3.

Polyzonium kurtschevae Mikhajlova, 1983a: 309, figs.

Polyzonium kurtschevae — Mikhajlova & Bakurov, 1989: 40; Mikhajlova, 1993: 9, map; Ganin, 1997: 123.

Angarozonium kurtschevae — Shelley, 1998: 29.



Figs 42-47. *Angarozonium kurtchevae* (Mikh.): 42 — antenna; 43 — sides of body segments 5 and 6; 44 — ♂ leg 2; 45 — gonopods (caudal view); 46 — gonopods (front view); 47 — last segment of posterior gonopod telopodite; sc — seminal canal; st — sternite; I-V — anterior gonopod segments. — Scales in mm (after Mikhajlova [1983a]).

Рис. 42-47. *Angarozonium kurtchevae* (Mikh.): 42 — антенна; 43 — боковые края 5 и 6 сегментов тела; 44 — 2-я пара ног у ♂; 45 — гоноподии (вид сзади); 46 — гоноподии (вид спереди); 47 — последний членик телоподита задних гоноподий; sc — семенной канал; st — стернит; I-V — членики передних гоноподий. — Масштаб в мм (по [Михалева, 1983а]).

interior knob-like process. Latter beset with long setae and 3/4 as stout as former. Telopodite bifid apically, with short setae. Seminal groove (sc) opening at tip of a very small, inner outgrowth of telopodite. Sternite (st) with a pair tubercles beset with long setae. Posterior gonopods (Figs 45, 47) also 5-segmented, terminal segment particularly long and slender, foveolate at. and with a poor incision before, tip.

HABITATS. Litter and uppermost soil (0-10 cm deep) in mixed forests. The maximum abundance recorded in this species in the Maritime Province is 14 ind. per sq. m. the maximum locomotor activity is in the second half of September [Mikhajlova & Bakurov, 1989].

DISTRIBUTION (Map 3). Originally described from the Anuchino Distr., Maritime Prov., this species seems to be restricted to its terra typica.

Order Chordeumatida C.L. Koch, 1847

Distributed mainly in the Holarctic, with relatively minor representation in the Oriental realm, Australia, Tasmania, New Zealand, Madagascar, Central America, and the extreme south of South America. The Far East of Russia supports six of about 50 existing families.

The main distinguishing characters of the group are as follows: fixed number of body segments in adults (28, 30 or 32, very seldom 31, including telson); somites subcylindrical, pleurites coalesced with tergites, forming a pleurotergal arch (Figs 8-10) with its ventral edges visible in lateral view; metazonites either (fully) devoid of paraterga or only with poorly developed lateral to dorsolateral bulges, or with well-developed, wing-like, paraterga (Figs 49, 128, 143); each metatergite laterally with 3+3 macrochaetae of varying length; axial suture evident; telson with spinnerets (Fig. 144); certain ♂ legs (except for legs 1 and 2) sometimes with tarsal papillae on ventral surface: ♂ legs 8 and 9 modified into gonopods, ♂ legs 10 or 10 and 11 with coxal glands, some other ♂ legs often also modified, sometimes adjacent ones approaching gonopods in structural complexity and forming so-called near-gonopods (Nebengonopoden).

KEY TO FAMILIES AND GENERA OF CHORDEUMATIDA:

- 1(4) Body segments with well-developed paraterga (Fig. 49). Adults with 30 or 32 somites 2
- 2(3) Adults with 32 somites. Anterior gonopods (pair 8)

DESCRIPTION. Adult ♂ 7-11 mm in length, 1.7-2.2 mm in width, up to now with maximum recorded body segment number of 48; adult ♀ 7.8-12 mm in length, 1.9-2.7 mm in width. Segment counts in adult ♂ always over 31.

General colouration yellow-brown, dorsum with a broad pale axial stripe and a pattern of bands and spots. Collum with an unpaired median marbled spot and paired lateral marbled spots. Prozona brownish with a pair of central, triangular, brown spots. Each metazonite with a pair of small dark spots lying between lateral sides and axial line. Lateral sides of metaterga whitish with markings. Legs pale. ♂ prefemora brownish ventrally, pallid in ♀. Telson pallid. Antennae brown. Ocelli black. Colouration equally strong all along body, in most samples pattern indistinct and poorly traceable, only in larger specimens bright and well-developed. In juveniles only posterior edges of metazonites brown.

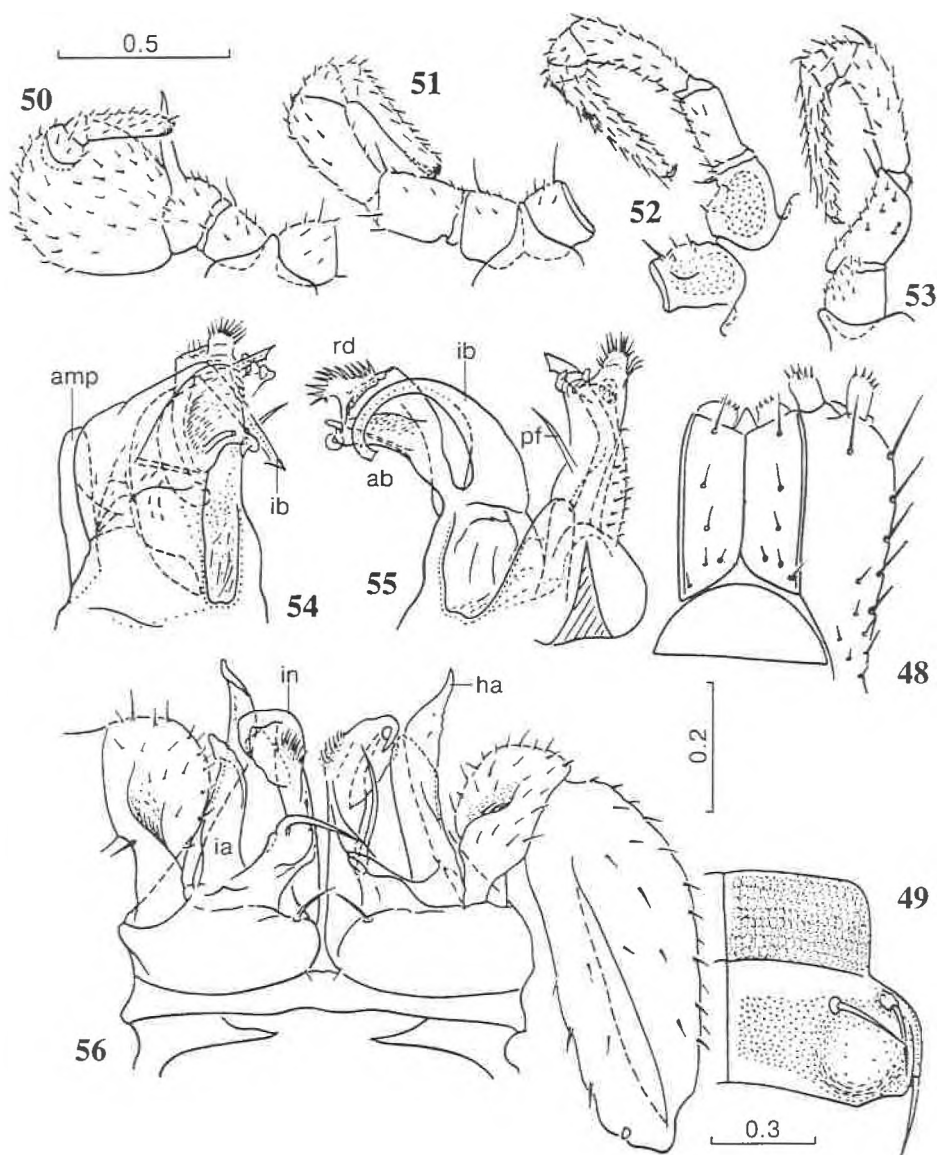
Head small with a rostrum, sparsely setose along external margins only. Ocellaria comma-shaped with three ocelli in lower row and 1-2 setigerous knobs in upper row. Antennae long, densely setose (Fig. 42). Length ratios of antennomere 2-7 as 1.2:1.7:1.5:1.9:1, width ratios as 1.5:1.8:1.9:2.0:1.5:1, respectively. Collum ellipsoid, much broader than head. Ozopores set off behind suture dividing pro- and metazona by a low and narrow ridge. On somite 5, ozopores located right upon suture dividing pro- and metazona (Fig. 43).

Legs slender. Vasa deferentia opening on conical penes behind ♂ legpair 2 (Fig. 44). Claws of ♂ legs 1 and 2 phylloid.

Anterior gonopods (Fig. 46) 5-segmented. Prefemur narrow, strongly attached to coxite. Acropodite setose laterally. Coxite with an external lobe-shaped and an

Figs 48-56. *Crassotyla amurica* Gol.: 48 — ♂ gnathochilarium; 49 — mid-body segment; 50-51 — ♂ legs 3 and 4; 52-53 — ♂ legs 10 and 11; 54 — anterior gonopods (lateral view); 55 — anterior gonopods (sublateral view); 56 — posterior gonopods (anterior view); ab — external branch; amp — anteromedial sternal process; ha — caudo-external branch; ia — intermediate external branch; ib — internal branch; in — interior branch; pf — flagelliform process; rd — comb of spinicles. — Scales in mm (after Golovatch [1980a]).

Рис. 48-56. *Crassotyla amurica* Gol.: 48 — ♂ гнатохиларий; 49 — срединный сегмент тела; 50-51 — 3-я и 4-я пары ног у ♂; 52-53 — 10-я и 11-я пары ног у ♂; 54 — передние гоноподии (вид сбоку); 55 — передние гоноподии (вид в полупрофиль); 56 — задние гоноподии (вид спереди); ab — наружная ветвь; amp — переднемедиальный стернальный отросток; ha — задне-наружная ветвь; ia — промежуточно-наружная ветвь; ib — внутренняя ветвь; in — внутренняя ветвь; pf — жгутиковидный отросток; rd — гребень из шипиков. — Масштаб в мм (по [Головач, 1980а]).



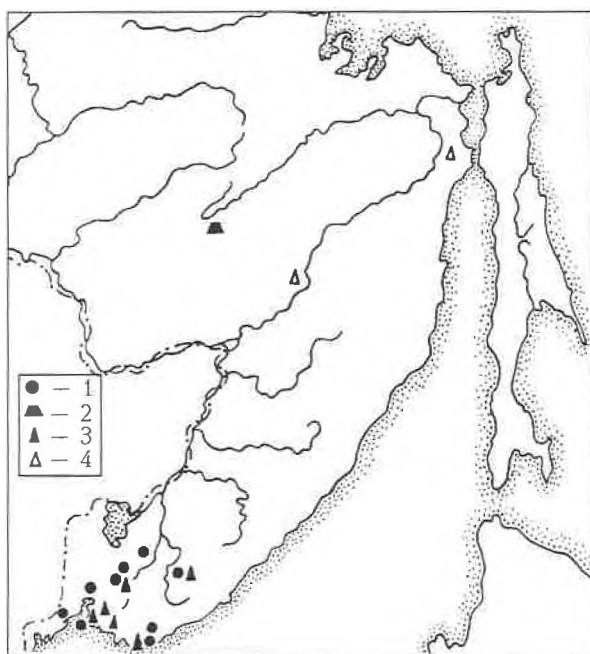
- consisting of a coxosternum with a T-shaped coxal part and a subflagelliform telopodite (Figs 63, 64, 69, 72, 75, 81, 84)
 ... Family Diplomaragnidae (genus *Diplomaragna*)
 3(2) Adults with 30 body segments. Anterior gonopods biramous, with a large, digitiform, median process on sternum (Figs 54, 55)
 ... Family Conotylidae (genus *Crassotyla*)
 4(1) Body segments either without paraterga or with poorly developed dorsolateral bulges. Adults with 28 or 30 somites 5
 5(6) Adults with 28 body segments. Ocelli arranged in a single row
 ... Family Hoffmancumatidae (genus *Hoffmaneuma*)
 6(5) Adult with 30 body segments. Ocellaria like a subtriangular patch 7
 7(8) Anterior gonopods with a 2-segmented telopodite, last segment being very small (Fig. 136). ♂ leg 10 with strongly enlarged lobulated coxae (Fig. 137). Body length 15 mm.
 ... Family Golovatchiidae (genus *Golovatchia*)

- 8(7) Anterior gonopods, ♂ coxae 10 and body length different 9
 9(10) Body length 7-11 mm. Telopodite of posterior gonopods 1-segmented (Fig. 141). Metazonites devoid of bulges laterally, body subcylindrical
 ... Family Caseyidae (genus *Underwoodia*)
 10(9) Body length 25-28 mm. Telopodite of posterior gonopods 2-segmented (Figs 147, 148). Metazonites with poorly developed bulges dorsolaterally (Fig. 143) ... Family Megalotylidae (genus *Megalotyla*)

Family Conotylidae Cook, 1896

Known from North and Central America (10 genera), Japan (2 genera), and the Russian Far East (1 genus).

The main distinguishing characters of the family are as follows: coxites and telopodites of anterior gonopods fused mesally, forming structures of various degrees of division in different species; sternite of anterior gonopods well-developed, plate- to ribbon-like, rarely membranous; posterior gonopods with complex colpocoxites.



Map 4. Distribution of *Hoffmanseuma exiguum* (1), *Golovatchia magna* (2), *Megalotyla brevichaeta* (3), *Crassotyla amurica* (4).

Карта 4. Распространение *Hoffmanseuma exiguum* (1), *Golovatchia magna* (2), *Megalotyla brevichaeta* (3), *Crassotyla amurica* (4).

Genus *Crassotyla* Golovatch, 1980

Monobasic, known only from the Khabarovsk Province, Far East of Russia. Some remarks on the relationships of the genus within Conotylidae can be found in Mauriès [1982] and Shear [1987].

The genus is distinguished by the presence of the large anteromedian process (amp) on the membranous sternite of the anterior gonopods (Figs 54, 55), the highly complex triramous colpocoxites of the posterior gonopods with 2-segmented telopodites, and the hypertrophied ♂ legpair 3 (Fig. 50).

Crassotyla amurica Golovatch, 1980

Figs 48-56, Map 4.

Crassotyla amurica Golovatch, 1980a: 202, figs.
Crassotyla amurica — Ganin, 1989a: 145; 1997: 50; Mikhajlova, 1993: 18.

DESCRIPTION. Body 9-11 mm long (♂, ♀), with 30 segments, moniliform. Metazonites with paraterga. Colouration beige cream to whitish, with a bit infusate anterior and posterior body portions and metazona, thus providing a slightly cingulate pattern.

Ocelli black, about 15 in subtriangular ocellaria from each side of head. Antennae very long and slender. Gnathochilarium without prömentum (Fig. 48). Vertical suture well-developed. Paraterga like well-developed dorsolateral bulges (Fig. 49).

Legs long and slender, tarsi with a small auxiliary claw and a long seta at latter's base. ♂ legpair 3 very strongly hypertrophied (Fig. 50), especially so due to a swollen femur: prefemur with a long, digitiform, mesal

process; ♂ tarsi 4-7 each with papillae over distal 1/3 extent (Fig. 51). Only ♂ legs 10 with coxal glands (Fig. 52), ♂ legs 11 with a small, dorsomesal, coxal process (Fig. 53).

Anterior gonopods (Figs 54, 55) biramous, placed on a membranous sternite with a large, anteromedian, digitiform process (amp). Inner branch (ib) bare, unciform, while outer branch with a comb (rd) of long, thin and sharp spines apically, a flagelliform outgrowth (pf) caudally, and beset with short setae laterally. Posterior gonopods (Fig. 56) with 2-segmented telopodites and highly complex, triramous colpocoxites. Posterolateral branch (ha) hyaline, adjacent to a membranous postero-intermediate branch (ia). Inner branch (in) with a flagelliform outgrowth parabasally and a short front uncus apically. Each coxite frontally with a medium-sized seta.

Vulvae strongly setose.

HABITATS. A forest-dweller preferring to live in the litter stratum.

DISTRIBUTION(Map 4). Originally described from the Ulehsksii District of the Khabarovsk Province, this species has since been recorded also in the Nanaisky District of the same Province.

Family Diplomaragnidae Attems, 1907

Known by a single currently accepted genus distributed in Mongolia, Siberia, the Russian Far East, Korea, Japan and perhaps even Taiwan. In addition, it undoubtedly occurs, though is not yet formally recorded, in the adjacent parts of China.

The main distinguishing characters of the family are as follows: metazonites largely with well-developed paraterga; anterior gonopods consisting of a coxosternum (sternum fused with the coxae which have also fused in the midline and rotated posteriorly around its transverse axis) with a T-shaped coxal part and mostly flagelliform or, only relatively seldom, broad 1- or 2-segmented telopodites. Latter attached to or lying inside sheathing grooves on posterior surfaces of posterior gonopod colpocoxites. Angiocoxites (coxal walls) of posterior gonopods of varying degrees of development, with processes (Figs 84, 85, 88, 90) or without one of these (posterior or anterior) (Fig. 124). Telopodites of posterior gonopods hypertrophied, basically 2-segmented, though often with a rudimental, claw-shaped 3rd telopoditomere.

Genus *Diplomaragna* Attems, 1907

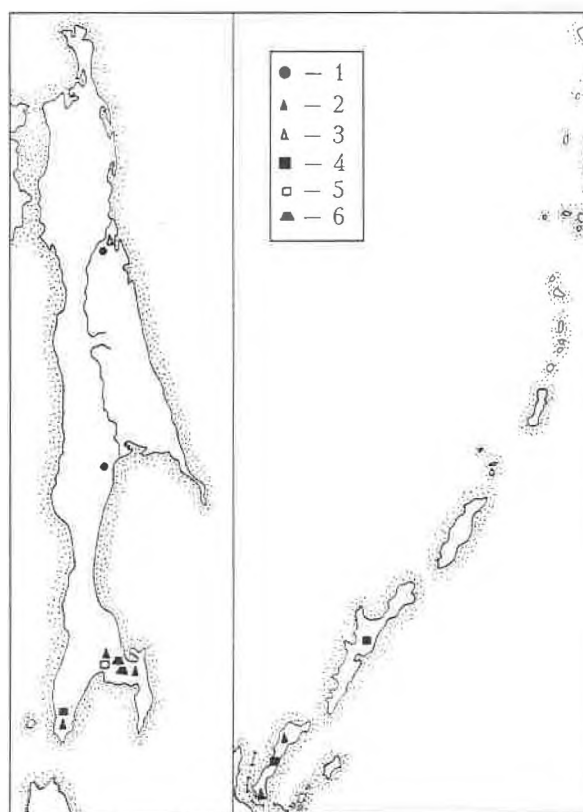
About 50 species ranging from Cisuralia in the west to Korea, Japan and perhaps even Taiwan in the east; 22 species have been encountered in the Far East of Russia.

The main distinguishing characters as in the family. Species identification requires dissection of the gonopods. Due to their mostly large size, these are more easy to examine when dried, without being mounting in constant micropreparations.

KEY TO SPECIES OF *DIPLOMARAGNA*:

- 1(12) Posterior gonopod colpocoxite with a large front projection (b) (Figs 61, 62) 2
- 2(3) Flagelliform telopodites of anterior gonopods spiralling; distal part of posterior gonopod colpocoxites with an external distal branch (exb) (Fig. 62)
..... *D. basarukini*

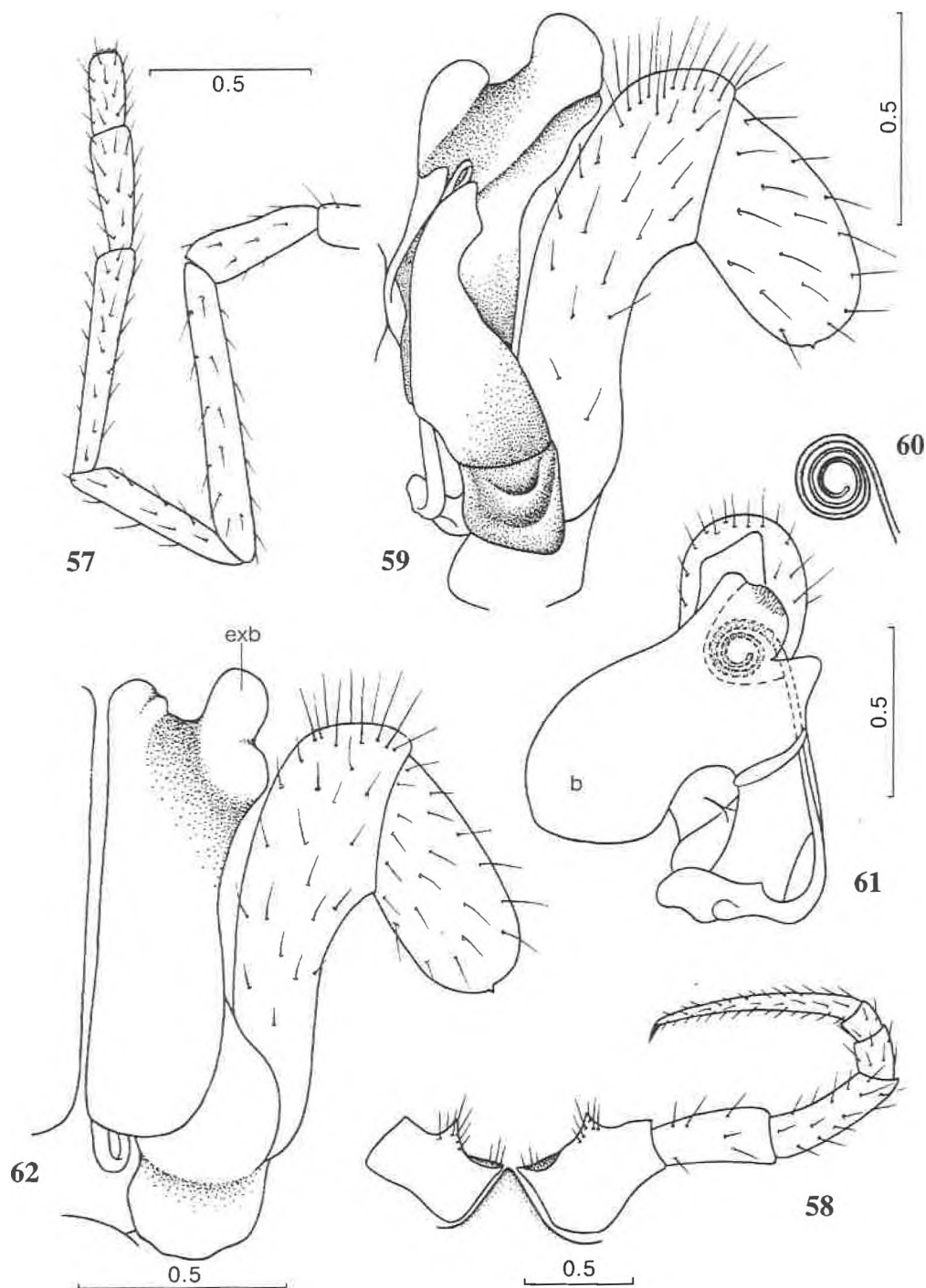
- 3(2) Flagelliform telopodites of anterior gonopods not coiled into a spiral; distal part of posterior gonopod colpocoxites without external distal branch 4
- 4(5) ♂ coxa 11 with a digitiform process. Lateral process of sheathing groove (lp) of posterior gonopod colpocoxites tuberculiform (Figs 65, 66)..... *D. tuberculata*
- 5(4) ♂ coxa 11 without processes. Lateral process of sheathing groove (lp) of posterior gonopod colpocoxites different 6
- 6(7) Lateral process of sheathing groove (lp) of posterior gonopod colpocoxites globuliform (Figs 69, 70) ...
..... *D. globulifera*
- 7(6) Lateral process of sheathing groove of posterior gonopod colpocoxites different 8
- 8(9) Front projection of colpocoxite (b) well-developed, distinctly delimiting a distal hollow (dg). Lateral process of sheathing groove of colpocoxite cylindrical, curved (Fig. 73) *D. curvata*
- 9(8) Front projection of colpocoxite (b) either poorly expressed or obliterated distally, not demarcated by a hollow (Figs 76, 79). Lateral process of sheathing groove of colpocoxite different 10
- 10(11) Lateral process of sheathing groove (lp) of colpocoxite broad, with a blunt apex (Fig. 76)
..... *D. molodovae*
- 11(10) Lateral process of sheathing groove (lp) of colpocoxite conical, with a pointed apex (Fig. 79)
..... *D. sakhalinica*
- 12(1) Posterior gonopod colpocoxites without large front projection 13
- 13(42) Anterior angiocoxal processes of posterior gonopods present (Figs 83, 87, 90) 14
- 14(37) Anterior angiocoxal processes flagelliform ... 15
- 15(30) Anterior angiocoxal processes exposed 16
- 16(29) Anterior angiocoxal processes passing, sometimes through a foramen, between colpocoxites along midline 17
- 17(18) Colpocoxital apices broad and blunt (Figs 81, 83). Body length 9-10 mm. Anterolateral metatergal macrochaetae clavate *D. ganini*
- 18(17) Colpocoxital apices pointed, sometimes unciform. Body length variable. Anterolateral metatergal macrochaetae different 19
- 19(20) Body length 20-23 mm. Posterior angiocoxal processes (pp) with apical arms of different sizes (Fig. 84) *D. terricolor*
- 20(19) Body less than 20 mm long. Posterior angiocoxal processes different 21
- 21(22) Colpocoxites strongly curved caudad and deeply emarginate at mesal edge, forming a large cordiform foramen (Fig. 87). Body length 12-13 mm.
..... *D. amuchino*
- 22(21) Colpocoxites either not curved strongly caudad or only their tips curved; no deep emargination at mesal colpocoxital edge. Body length different 23
- 23(24) Posterior angiocoxal processes (pp) like a caudad convex plate with an undulate edge, devoid of teeth (Figs 88, 89). Body length 12-12.5 mm.
..... *D. zimoveinaya*
- 24(23) Posterior angiocoxal processes different, with arms and outgrowths 25
- 25(26) Posterior angiocoxal processes with apices curved forward, each with a long, slender, median spine (Fig. 92). Gonopods smaller (0.75 x 1.0 mm).
..... *D. dalnegorica*



Map 5. Distribution of *Diplomaragna basarukini* (1), *D. tuberculata* (2), *D. globulifera* (3), *D. curvata* (4), *D. molodovae* (5), *D. sakhalinica* (6).

Карта 5. Распространение *Diplomaragna basarukini* (1), *D. tuberculata* (2), *D. globulifera* (3), *D. curvata* (4), *D. molodovae* (5), *D. sakhalinica* (6).

- 26(25) Posterior angiocoxal processes with apices not curved forward; long and slender spines missing. Gonopods larger 27
- 27(28) Edges of front colpocoxital folds (c) set horizontally to body axis, posterior angiocoxal processes with pointed apices (Figs 94, 95) *D. kedrovaya*
- 28(27) Edges of front colpocoxital folds (c) set obliquely to body axis, posterior angiocoxal processes with blunt apices (Figs 96, 97) *D. yakovlevka*
- 29(16) Anterior angiocoxal processes (ap) passing through external lateral foramina in colpocoxites (Fig. 100)
..... *D. lysaya*
- 30(15) Anterior angiocoxal processes concealed inside colpocoxites (Figs 102, 105, 108) 31
- 31(32) Posterior angiocoxal processes like a caudad convex plate with a long, slender, distal process (bt) (Fig. 101) *D. picea*
- 32(31) Posterior angiocoxal processes different 33
- 33(34) Each of posterior angiocoxal processes like a subrectangularly bent, broad plate devoid of considerable outgrowths/teeth; apices of colpocoxites regularly rounded (Figs 103, 104) *D. turova*
- 34(33) Posterior angiocoxal processes different, with outgrowths and arms, apex of colpocoxites considerably narrowing. Posterior gonopod telopoditomer 2 very small 35
- 35(36) Outgrowths (h) of posterior angiocoxal processes

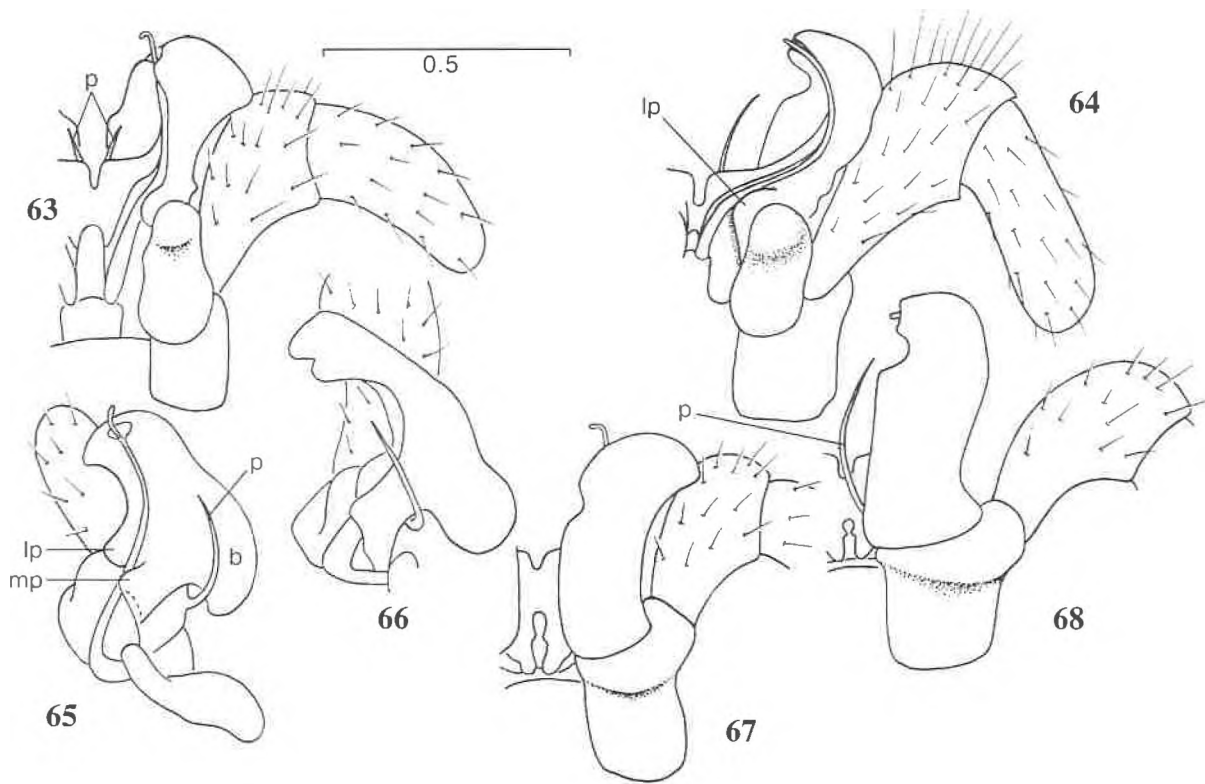


Figs 57-62. *Diplomaragna basarukini* Mikh: 57 — antenna; 58 — ♂ leg 10; 59 — gonopods (caudal view); 60 — distal part of anterior gonopod telopodite (mesal view, enlarged not to scale); 61 — gonopods (mesal view); 62 — gonopods (front view); b — drop-shaped projection of frontal surface of colpocoxite; exb — external branch of posterior gonopod colpocoxite. — Scales in mm (after Mikhajlova [1995]).

Рис. 57-62. *Diplomaragna basarukini* Mikh: 57 — антенна; 58 — 10-я пара ног у ♂; 59 — гоноподии (вид сзади); 60 — дистальная часть телоподита передних гоноподий (вид изнутри, увеличено вне масштаба); 61 — гоноподии (вид изнутри); 62 — гоноподии (вид спереди); b — каплевидное выпячивание передней поверхности колпококсита; exb — наружная ветвь колпококсита задних гоноподий. — Масштаб в мм (по [Михалева, 1995]).

strongly separated (Fig. 107) *D. schawalleri*
36(35) Outgrowths of posterior angiocoal processes
close to each other (Fig. 109) *D. reducta*
37(14) Anterior angiocoal processes digitiform 38

38(41) Lateral sheathing groove processes (lp) of colpo-
coxite well-developed (Figs 111, 116) 39
39(40) Colpocoxites strongly curved forward (Figs 111,
113) *D. bureyinskaya*



Figs 63-68. *Diplomaragna tuberculata* Mikh.: 63, 64 — variations in gonopod structure (caudal views); 65, 66 — variations in gonopod structure (mesal views); 67, 68 — variations in gonopod structure (front views); b — projection of frontal surface of colpocoxite; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; p — angiocoxal process — Scale in mm (after Mikhajlova [1995]).

Рис. 63-68. *Diplomaragna tuberculata* Mikh.: 63, 64 — изменчивость структуры гоноподий (вид сзади); 65, 66 — изменчивость структуры гоноподий (вид спереди); 67, 68 — изменчивость структуры гоноподий (вид спереди); b — выпячивание передней поверхности колпококсита; lp — боковой отросток кроющей бороздки колпококсита; mp — срединный отросток кроющей бороздки колпококсита; p — отросток ангиококсита. — Масштаб в мм (по [Михалева, 1995]).

- 40(39) Colpocoxites not curved strongly forward (Figs 115, 116) *D. mikhajlovae*
 41(38) Lateral sheathing groove processes of colpocoxite absent (Fig. 120) *D. cristofer*
 42(13) Anterior angiocoxal processes of posterior gonopods absent (Fig. 124) *D. kuruma*

Diplomaragna basarukini Mikhajlova, 1995
 Figs 57-62, Map 5.

Diplomaragna basarukini Mikhajlova, 1995: 81, figs.

Diplomaragna basarukini — Mikhajlova & Basarukin, 1995: 94, map.

DESCRIPTION. Adult ♂ 18.5-21 mm long, 1.5-1.7 mm wide without and 2.0-2.3 mm with paraterga. Adult ♀ 19 mm long, 1.5 mm wide without and 2.1 mm with paraterga. Colour light brown with a transverse brown band at hind edge of metazonites. Legs marble-brown, antennae brown, eyes black.

Body with 32 segments. Head setose, vertigial suture deep. Eyepatches triangular, each composed of 28-30 ocelli. Antennae very long and slender (Fig. 57). Collum semi-circular with 3+3 macrochaetae. Both collum and segment 2 narrower than head with genae. Body gradually growing in width until segment 7, parallel-sided on segments 8-23, gradually tapering toward telson further

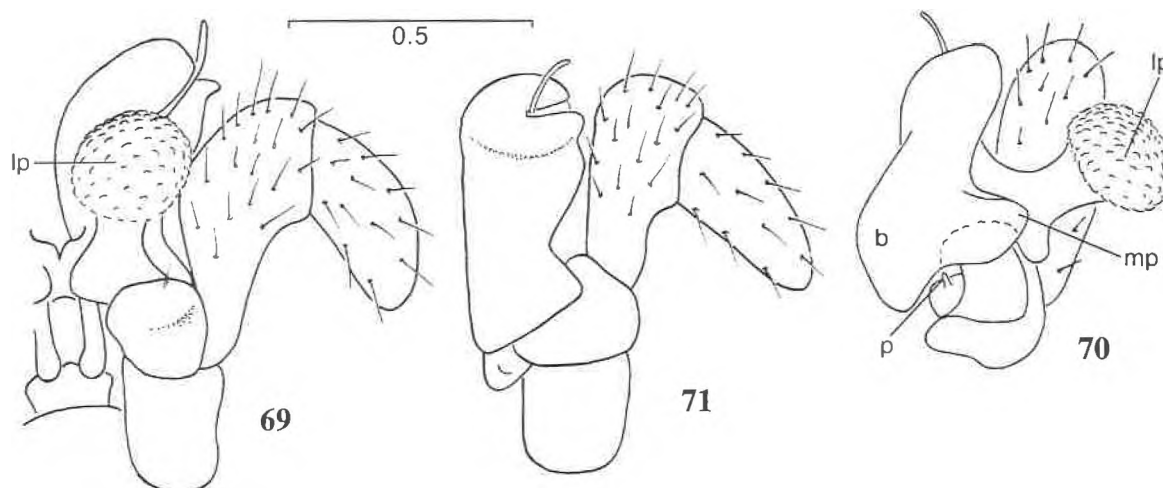
on. Paraterga beginning on segment 2, reduced on segments 28-29, absent from 30-31, on segments 8-27 their caudolateral corners beak-shaped pointed. Anterolateral macrochaetae shorter than others, posterolateral ones longest. Apices of all macrochaetae pointed.

Legs long, claws normal. ♂ coxae 3-6 each with a small ventral swelling, increasing in size to 6 leg. ♂ coxa 7 with a low hoof-shaped swelling. ♂ legs 10-11 each with coxal glands, coxa 10 setose with a coniform process (Fig. 58), coxa 11 with an unciform distal process ventrally.

Anterior gonopod coxosternum with a long T-shaped coxal part. 1-segmented flagelliform telopodites with distal part characteristically spiralling (Fig. 60), more proximally positioned inside a deep open-edged sheathing groove formed by mesal and lateral processes on posterior surface of posterior gonopod colpocoxites (Fig. 59). Distal part of that groove forming a receptacle for the spiral. Posterior gonopod colpocoxites fused medially, each with an external distal branch (exb) and a large, front, drop-shaped projection (b) (Figs 61, 62). Angiocoxites depressed on anterior surface, mesal process short and stylet-shaped. Posterior gonopod telopodite 2-segmented, setose; profemur relatively long and slender.

Vulva tapering caudally.

HABITATS Forest litter, in accumulations of fallen leaves.



Figs 69-71. *Diplomaragna globulifera* Mikh.: 69 — gonopods (caudal view); 70 — gonopods (mesal view); 71 — gonopods (front view); b — projection of frontal surface of colpocoxite; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; p — angiocoxal process. — Scale in mm (after Mikhajlova [1995]).

Рис. 69-71. *Diplomaragna globulifera* Mikh.: 69 — гоноподии (вид сзади); 70 — гоноподии (вид изнутри); 71 — гоноподии (вид спереди); b — выпячивание передней поверхности колпококситы; lp — боковой отросток кроющей бороздки колпококситы; mp — срединный отросток кроющей бороздки колпококситы; p — отросток ангиококситы. — Масштаб в мм (по [Михалова, 1995]).

DISTRIBUTION(Map 5). The species is known only from the original description from the Poronaisk and Nogliki districts, Sakhalin Island.

Diplomaragna tuberculata Mikhajlova, 1995
Figs 63-68, Map 5.

Diplomaragna tuberculata Mikhajlova, 1995: 83, figs.

Diplomaragna tuberculata — Mikhajlova & Basarukin, 1995: 89.

DESCRIPTION. Adult ♂ 13-14 mm long, 0.8-0.9 mm wide without and 1.4-1.5 mm with paraterga. Adult ♀ 14-16 mm long, 0.9-1.0 mm wide without and 1.5-1.6 mm with paraterga. Colour from light beige with thin brownish transverse bands at hind edges of metazonites 1-7 to beige with transverse brown bands of variable width at hind edges of all metazonites. Antennae brown, legs marble-brown, eyes black.

Body with 32 segments. Head setose, vertigial suture visible. Eyepatches triangular, each composed of 26-28 ocelli. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well developed on 5-27, reduced on segments 28-29, onward missing. Macrochaetae in transverse row on segments 30-31, as an extended triangle on preceding segments. Anterolateral macrochaetae slightly shorter than medial ones, posterolateral macrochaetae longest. Apices of all macrochaetae pointed. Axial suture well-developed.

Legs long, slender, claws normal. Legs 1-2 as usual somewhat reduced as compared to subsequent pairs. ♂ legs 10-11 each with coxal glands, coxae 11 with a digitiform process ventrally.

Anterior gonopods with coxosternum and a flagelliform 1-segmented telopodite positioned on posterior surface of posterior gonopod colpocoxites inside a deep, open-edged sheathing groove (Figs 63, 64). Colpocoxital lateral sheath process (lp) tuberculiform, mesal one (mp)

like a low, undulate swelling forming the edge of sheathing groove (Figs 65, 66). Posterior gonopod colpocoxites fused mesally, each with a smooth front projection (b) of different length and height (Figs 67, 68). External edge of distal part of colpocoxite beak-shaped pointed in some specimens only. Angiocoxite with a little globule caudally and a flagelliform mesal process (p) half as short as colpocoxite. Posterior gonopod telopodite 2-segmented, setose.

Vulva small, spherical, bursal valves and operculum with setae.

HABITATS. Forests, seashores, lake coasts.

DISTRIBUTION(Map 5). The species is known only from the original description from the Korsakov Distr. and the environs of Yuzhno-Sakhalinsk, both in Sakhalin Island, and from the Kunashir Island, Kuriles.

Diplomaragna globulifera Mikhajlova, 1995
Figs 69-71, Map 5.

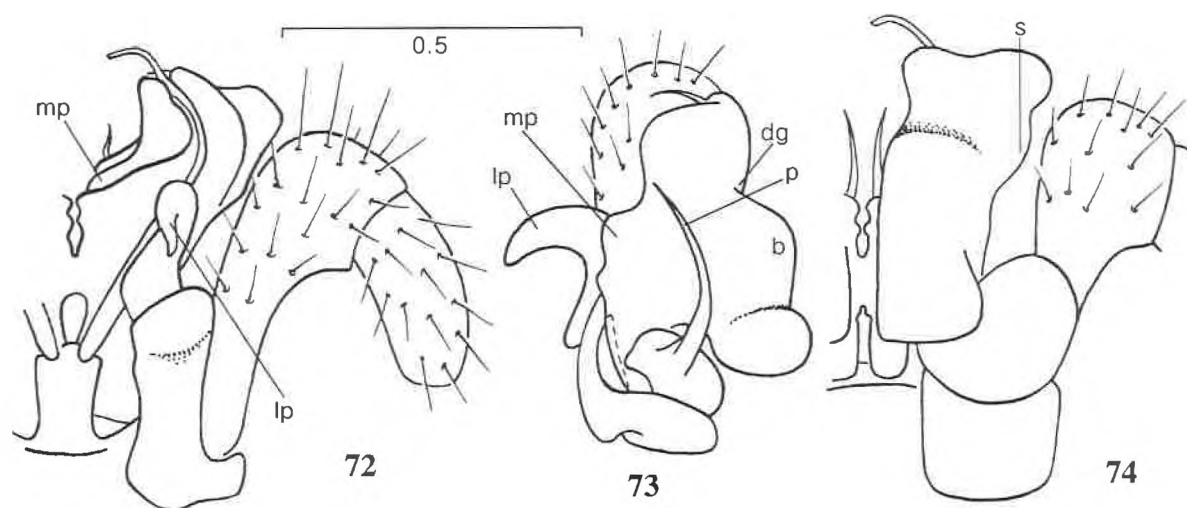
Diplomaragna globulifera Mikhajlova, 1995: 86, figs.

Diplomaragna globulifera — Mikhajlova & Basarukin, 1995: 89.

DESCRIPTION. Adult ♂ 11 mm long, 0.9 mm wide without and 1.3 mm with paraterga. Adult ♀ 12 mm long, 0.9 mm wide without and 1.3 mm with paraterga. Colour pale brown, each prozonite with a brown dorsal spot, each metazonite with a transverse brown band at hind edge. Legs marble-brownish, antennae brown, eyes black.

Body with 32 segments. Forehead bare, only with two setae, vertigial suture visible. Eyepatches triangular, each composed of 26-28 ocelli. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Both collum and segment 2 narrower than head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 5-27, reduced on segments 28-29, onward missing. Axial suture well-developed.

Legs long, slender, claws normal. ♂ legs 10-11 each with coxal glands, coxae without processes.



Figs 72-74. *Diplomaragna curvata* Mikh.: 72 — gonopods (caudal view); 73 — gonopods (mesal view); 74 — gonopods (front view); b — projection of frontal surface of colpocoxite; dg — distal groove of colpocoxite; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; s — external lobe of colpocoxite; p — angiocoxal process. — Scale in mm (after Mikhajlova [1995]).

Рис. 72-74. *Diplomaragna curvata* Mikh.: 72 — гоноподии (вид сзади); 73 — гоноподии (вид изнутри); 74 — гоноподии (вид спереди); b — выпячивание передней поверхности колпококситы; dg — дистальная борозда на колпококсите; lp — боковой отросток кроющей бороздки колпококситы; mp — срединный отросток кроющей бороздки колпококситы; s — наружная лопасть колпококситы; p — отросток ангиококситы. — Масштаб в мм (по [Михалева, 1995]).

Anterior gonopod telopodite 1-segmented flagelliform, positioned inside a deep open-edged sheathing groove on posterior surface of posterior gonopod colpocoxite (Fig. 69), coxosternum with a T-shaped coxal part. Colpocoxite lateral sheath process (lp) with a large, apically papillate, globose outgrowth, mesal one like a broad knob forming the edge of sheathing groove. Posterior gonopod colpocoxites fused medially, each with a front oval projection (b) supplied with a beak-shaped basal part (Figs 70, 71). Angiocoxites with a small globule caudally and a short digitiform mesal process (p). Telopodites of posterior gonopods 2-segmented, setose.

Vulva spherical, setose.

HABITATS. Forest litter.

DISTRIBUTION (Map 5). The species is known only from the Nogliki Distr, Sakhalin Island, its terra typica.

Diplomaragna curvata Mikhajlova, 1995

Figs 72-74, Map 5.

Diplomaragna curvata Mikhajlova, 1995: 84, figs.

Diplomaragna curvata — Mikhajlova & Basarukin. 1995: 94, map.

DESCRIPTION. Adult ♂ 13-15 mm long, 0.8-1.0 mm wide without and 1.3-1.6 mm with paraterga. Adult ♀ 14-16 mm long, 1.0-1.3 mm wide without and 1.6-2.2 mm with paraterga. Colour from beige to pale brown with a thin or wide transverse brown band at hind edges of metazonites; fore body half usually more bright. Legs marble-brown, antennae brown, eyes black.

Body with 32 segments. Head setose, vertigial suture visible. Ocelli 26-28, in a triangular cypatch. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 5-27, reduced on

segments 28-29, onward missing. Macrochaetae in a transverse row on segments 30-31, arranged in an extended triangle on preceding segments. Anterolateral macrochaetae shortest, posterolateral ones longest. Apices of all macrochaetae pointed. Axial suture well-developed.

Legs long, slender, claws normal. ♂ legs 10-11 each with coxal glands, coxae without processes.

Anterior gonopods consisting of a coxosternum and 1-segmented flagelliform telopodites, each latter positioned inside a deep open-edged sheathing groove on posterior surface of posterior gonopod colpocoxite (Fig. 72); coxosternum with a long, T-shaped, coxal part. Anterior gonopod telopodite of variable length. Colpocoxite lateral sheath process (lp) cylindrical, long, curved, with an almost pointed tip, mesal sheath outgrowth (mp) like an undulate swelling forming the edge of sheathing groove. Colpocoxites fused medially, each with a front projection (b) more or less distinctly delimiting a distal hollow (dg) (Figs 73, 74). External edge of colpocoxite with a narrow, more or less long blade (s). Angiocoxites with a small globule caudally and with a flagelliform mesal process (p) more than half as short as colpocoxite. Posterior gonopod telopodite 2-segmented, setose.

Vulva small, oval, setose.

HABITATS. Litter of broadleaved forests with *Sasa* bamboo undergrowth, also on vegetation and sea-shores.

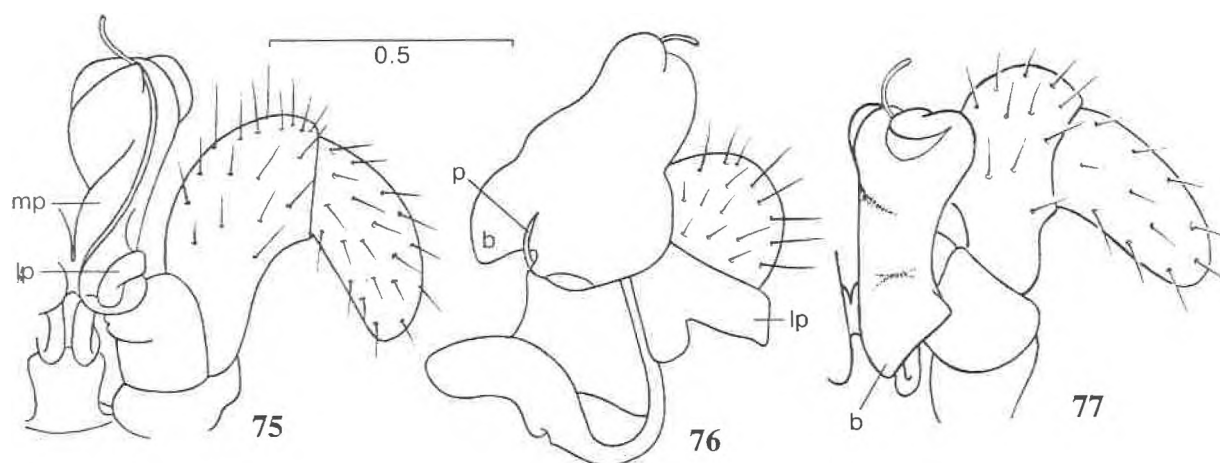
DISTRIBUTION (Map 5). This species is known only from the original description from the Krilyon Peninsula, Sakhalin Island and the Kuriles (Kunashir, Iturup islands).

Diplomaragna molodovae (Golovatch, 1976)

Figs 75-77, Map 5.

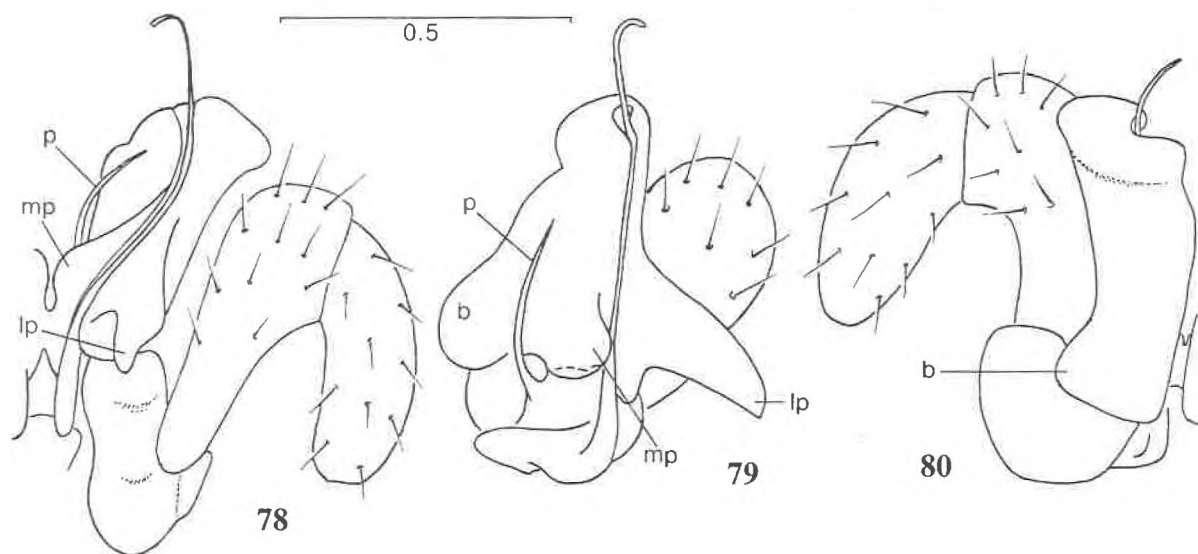
Sakhalineuma molodovae Golovatch, 1976b: 1491, figs.

Sakhalineuma molodovae — Lokšina & Golovatch, 1979: 382.



Figs 75-77. *Diplomaragna molodovae* (Gol.): 75 — gonopods (caudal view); 76 — gonopods (mesal view); 77 — gonopods (front view); b — projection of frontal surface of colpocoxite; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; p — angiocoxal process. — Scale in mm (after Mikhajlova [1995]).

Рис. 75-77. *Diplomaragna molodovae* (Gol.): 75 — гоноподии (вид сзади); 76 — гоноподии (вид изнутри); 77 — гоноподии (вид спереди); b — выпячивание передней поверхности колпококситы; lp — боковой отросток кроющей бороздки колпококситы; mp — срединный отросток кроющей бороздки колпококситы; p — отросток ангиококситы. — Масштаб в мм (по [Михалева, 1995]).



Figs 78-80. *Diplomaragna sakhalinica* Mikh.: 78 — gonopods (caudal view); 79 — gonopods (mesal view); 80 — gonopods (front view); b — projection of frontal surface of colpocoxite; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; p — angiocoxal process. — Scale in mm (after Mikhajlova [1995]).

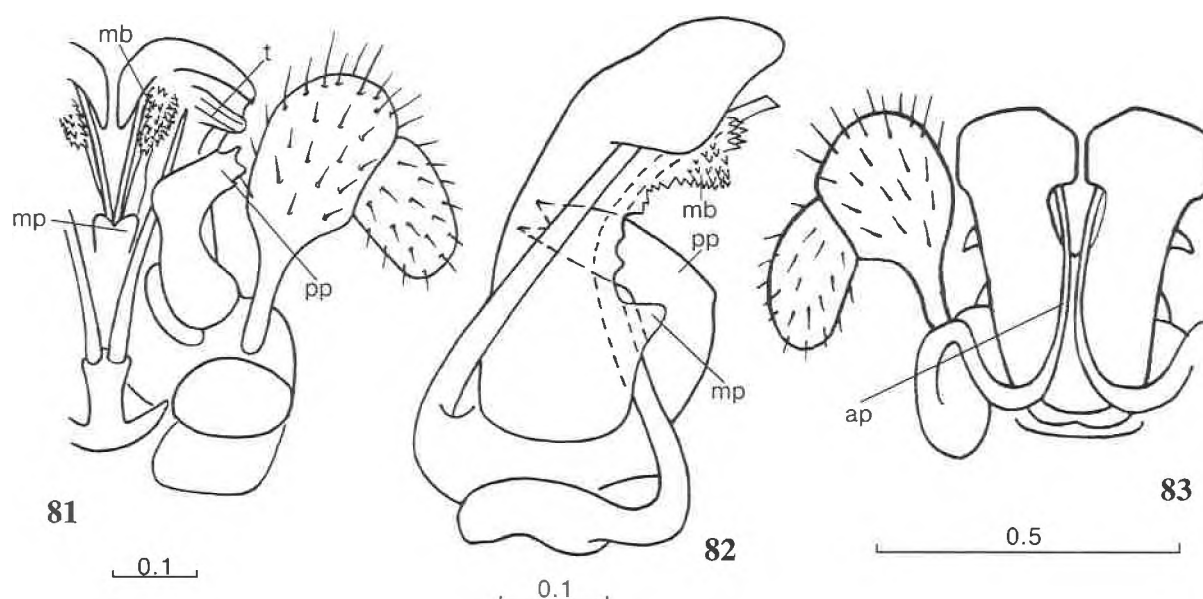
Рис. 78-80. *Diplomaragna sakhalinica* Mikh.: 78 — гоноподии (вид сзади); 79 — гоноподии (вид изнутри); 80 — гоноподии (вид спереди); b — выпячивание передней поверхности колпококситы; lp — боковой отросток кроющей бороздки колпококситы; mp — срединный отросток кроющей бороздки колпококситы; p — отросток ангиококситы. — Масштаб в мм (по [Михалева, 1995]).

Diplomaragna molodovae — Shear, 1990: 27, figs; Mikhajlova, 1993: 25; 1995: 80, figs; Mikhajlova & Basarukin, 1995: 94, map; Ganin, 1997: 133.

DESCRIPTION. Adult ♂ 14-15 mm long, 0.8-0.9 mm wide without and 1.2-1.3 mm with paraterga. Adult ♀ 14-16 mm long, 0.9-1.0 mm wide without and 1.3-1.5 mm with paraterga. Colour light beige with thin transverse brownish bands at hind edges of metazonites on fore part of body. Antennae brown, legs light marble-brown, eyes black.

Body with 32 segments. Head setose, vertigial suture

visible. Eyepatches triangular, each composed of 26-28 ocelli. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 4-27, reduced on segments 28-29, onward missing. Macrochaetae in a transverse row on segments 30-31, like an extended triangle on preceding segments. Anterolateral macrochaetae shorter than others, posterolateral ones longest, all pointed.



Figs 81-83. *Diplomaragna ganini* Mikh.: 81 — gonopods (caudal view); 82 — gonopods (mesal view); 83 — gonopods (front view); ap — anterior process of angiocoxite; mb — medial outgrowth of colpocoxite; mp — mesal process of colpocoxite sheath groove; pp — posterior process of angiocoxite; t — lateral folds of colpocoxite. — Scales in mm (81, 83 — after Mikhajlova [1997b]; 82 — after Mikhajlova [1993]).

Рис. 81-83. *Diplomaragna ganini* Mikh.: 81 — гоноподии (вид сзади); 82 — гоноподии (вид изнутри); 83 — гоноподии (вид спереди); ap — передний отросток ангиококситы; mb — срединный вырост колопококситы; mp — срединный отросток кроющей бороздки колопококситы; pp — задний отросток ангиококситы; t — боковые складки колопококситы. — Масштаб в мм (81, 83 — по [Михалева, 1997b]; 82 — по [Михалева, 1993]).

Legs long, claws normal. ♂ legs 10-11 each with coxal glands.

Anterior gonopods with a coxosternum and a 1-segmented, flagelliform, long telopodite, latter positioned freely on posterior surface of posterior gonopod colpocoxites inside a deep sheathing groove with open edges (Fig. 75). T-shaped coxal part of coxosternum with two chaetae on each side. Colpocoxital lateral process (lp) large, broad and blunt, mesal one (mp) blade-like, forming much of the edge of sheathing groove. Posterior gonopod colpocoxites scarcely fused medially, each with a front beak-shaped projection (b) indistinctly delimiting a distal hollow (Figs 76, 77). Angiocoxite with a short, stylet-shaped, mesal process (p). Posterior gonopod telopodites 2-segmented, setose.

Vulva oval, setose.

HABITATS. Litter of mixed and *Betula* forests.

DISTRIBUTION (Map 5). Originally described from the environs of Yuzhno-Sakhalinsk, Sakhalin, this species has since been reported also from near Novoaleksandrovsk, Aniva District.

Diplomaragna sakhalinica Mikhajlova, 1995
Figs 78-80, Map 5.

Diplomaragna sakhalinica Mikhajlova, 1995: 85, figs.

Diplomaragna sakhalinica — Mikhajlova & Basarukin, 1995: 94, map.

DESCRIPTION. Adult ♂ 13-14 mm long, 0.8-0.9 mm wide without and 1.3-1.4 mm with paraterga. Adult ♀ 15-15.5 mm long, 1.1-1.2 mm wide without and 1.5-1.6 mm with paraterga. Colour beige with thin and highly obscure transverse brownish bands at hind edge of metazonites of body fore part. Antennae brown, legs marble-brownish, eyes black.

Body with 32 segments. Head setose, vertigial suture visible. Ocelli 26-28, in a triangular eyepatch. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 6-27, reduced on segment 28, onward missing. Macrochaetae in a transverse row on segments 30-31, arranged in an extended triangle on preceding segments. Anterolateral macrochaetae slightly shorter than medial ones, posterolateral macrochaetae longest. Apex of all macrochaetae pointed. Axial suture well-developed.

Legs long, slender, claws normal. ♂ legs 10-11 each with coxal glands, coxae without processes.

Anterior gonopod telopodite 1-segmented, long, flagelliform, positioned inside a deep open-edged sheathing groove on posterior surface of posterior gonopod colpocoxite (Fig. 78); coxosternum with a T-shaped coxal part. Colpocoxite lateral sheath process (lp) dentiform and conical, mesal one (mp) like a broad swelling forming the edge of sheathing groove. Colpocoxites fused medially, each with a low front projection (b) indistinctly delimiting a distal hollow (Figs 79, 80). Angiocoxites with a small globule caudally and a flagelliform mesal process (p) somewhat more than half as short as colpocoxite. Posterior gonopod telopodite 2-segmented as usual, setose.

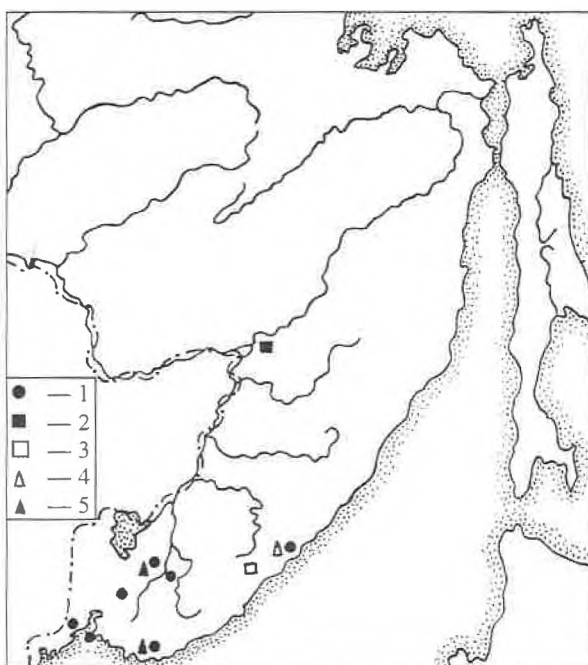
Vulva oval, with setae.

HABITATS. Forest litter.

DISTRIBUTION (Map 5). This species is known only from the original description from the southern part of Sakhalin Island (Korsakov and Aniva districts).

Diplomaragna ganini Mikhajlova, 1993
Figs 81-83, Map 6.

Diplomaragna ganini Mikhajlova, 1993: 23, figs.



Map 6. Distribution of *Diplomaragna terricolor* (1), *D. ganini* (2), *D. dalnegorica* (3), *D. zimovetnaya* (4), *D. anuchino* (5).

Карта 6. Распространение *Diplomaragna terricolor* (1), *D. ganini* (2), *D. dalnegorica* (3), *D. zimovetnaya* (4), *D. anuchino* (5).

Diplomaragna ganini — Ganin, 1995: 371; 1997b: 25; Mikhaljova, 1997: 129, figs.

DESCRIPTION. Adult ♂ 9-10 mm long, 0.7-0.8 mm wide without and 0.9-1.0 mm with paraterga. Adult ♀ 9-11 mm long, 0.9-1.0 mm wide and 1.1 mm with paraterga. Colour beige, yellowish or whitish, sometimes with transverse brownish bands dorsally on metazona. Legs light marble-brown, eyes black.

Body with 32 somites. Head densely setose, vertical suture rather shallow. Eyepatches triangular, each composed of 28-30 ocelli. Gnathochilarium without prominent, with several strong and long setae on outer sides of stipetes, lamellae linguales divided by a distinct and deep suture, each with three short parabaasal setae forming a

triangle and with further three longer setae in a longitudinal row. Antennae long and slender. Collum semi-circular, both collum and somite 2 narrower than head with genae. Body width gradually growing until somite 7, parallel-sided on somites 8-24, gradually tapering toward telson further on. Paraterga well-developed from somite 2 on, on somites 5-27 their caudolateral corners beak-shaped pointed. Macrochaetae in a transverse row on somites 30-31, arranged in an extended triangle on preceding somites. Anterolateral macrochaetae shorter than others, blunt; others longer, pointed. Surface finely alveolate.

Legs long, claws normal. Pregonopodal legs somewhat enlarged, otherwise unmodified. ♂ legs 10-11 normal, with coxal glands.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodite 1-segmented, flagelliform, positioned on posterior surface of posterior gonopod colpocoxites inside a shallow sheathing groove (Fig. 81). Apex of anterior gonopod telopodite pointed, visible as stretching outside the sheathing groove. Posterior gonopods with two pairs of angiocoxal processes (Figs 82, 83), anterior ones (ap) long, flagelliform, their distal portion positioned inside frontal folds of colpocoxites. Posterior angiocoxal processes (pp) large, curved forward, disto-apically with two larger and a few smaller teeth. Colpocoxites fused basally, with a medial notch and an oval apex. Subapically, colpocoxite medial outgrowths (mb) finely papillate-spiculate and with lateral transverse folds (t). Colpocoxital sheath groove with a small medial process (mp) but without lateral process. Posterior gonopod telopodites 2-segmented, distally setose, apex of femur with a relatively evident claw vestige.

Vulvae very small, bursal valves along ventral edge with long setae.

HABITATS. Litter of mixed forests with *Abies-Picea*. In the south of Khabarovsk Prov., the numbers range between 8.7 and 14.0 ind. per sq.m. [Ganin, 1997].

DISTRIBUTION (Map 6). The species is known only from Bolshoy Khekhtsyur Mt. Range, environs of Khabarovsk, its terra typica.

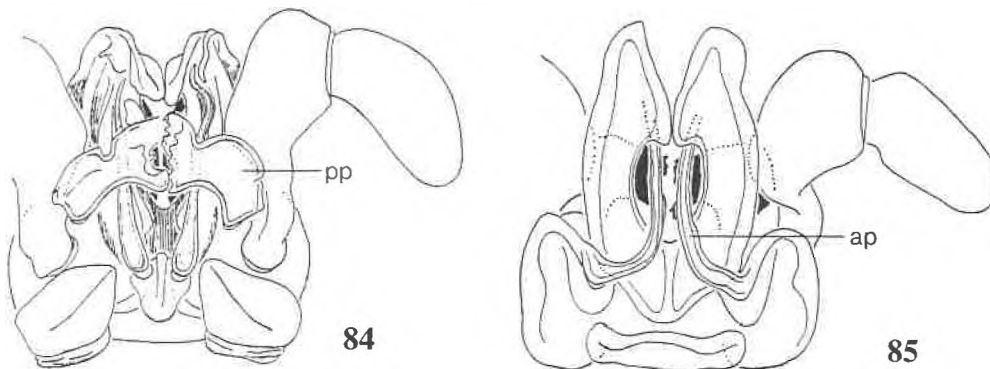
Diplomaragna terricolor (Attems, 1899)

Figs 84-85, Map 6.

Placodes terricolor Attems, 1899: 320; figs.

Diplomaragna terricolor — Attems, 1907: 123; Lokšina & Golovatch, 1979: 382; Golovatch, 1979b: 88; Kurcheva & Mikhaljova, 1980: 121; Mikhaljova, 1981c: 87; 1983b: 85; 1988b: 70; 1993: 29; 1997b: 130; Mikhaljova & Petukhova, 1983: 52; Mikhaljova & Bakurov, 1989: 40; Shear, 1990: 28; Ganin, 1997: 121.

DESCRIPTION. Adult ♂ 20-22 mm long, 1.5-1.6 mm wide without and 2.5-2.6 mm with paraterga.



Figs 84-85 *Diplomaragna terricolor* (Att.): 84 — gonopods (caudal view); 85 — gonopods (front view); ap — anterior process of angiocoxite; pp — posterior process of angiocoxite. — Scales absent (after Shear [1990]).

Рис. 84-85. *Diplomaragna terricolor* (Att.): 84 — гоноподии (вид сзади); 85 — гоноподии (вид спереди); ap — передний отросток ангиококситы; pp — задний отросток ангиококситы. — Масштаба нет (по [Shear, 1990]).

Adult ♀ 20-22 mm long, 1.5-1.6 mm wide without and 2.5-2.6 mm with paraterga. Colour light brown with head, antennae and distal parts of legs marble-brown. Eyes black.

Body with 32 segments. Head setose. vertical suture distinct. Eyepatches triangular, each composed of 26-30 ocelli. Gnathochilarium usual. Antennae long and slender. Collum oval with 3+3 macrochaetae. Paraterga beginning on segment 2, well-developed on segments 9-25, reduced on segment 28, onward missing.

Legs long and slender, claws normal. Pregonopodal legs somewhat enlarged, otherwise unmodified. ♂ legs 10-11 with coxal glands, coxae 10 enlarged, with a small process distal to gland.

Anterior gonopod telopodite 1-segmented, flagelliform, with a pointed apex, positioned inside an open-edged sheathing groove on posterior surface of posterior gonopod colpocoxite (Fig. 84); coxosternum with a T-shaped coxal part. Posterior gonopods with two pairs of angiocoxal processes, posterior ones (pp) very large, disto-apically with larger and smaller teeth. Anterior angiocoxal processes (ap) long, flagelliform, passing between colpocoxites in an incomplete fossa formed by median notch on each side (Fig. 85). Colpocoxite sheath groove without processes. Colpocoxites fused basally, with apex curved caudad. Posterior gonopod telopodites 2-segmented, setose.

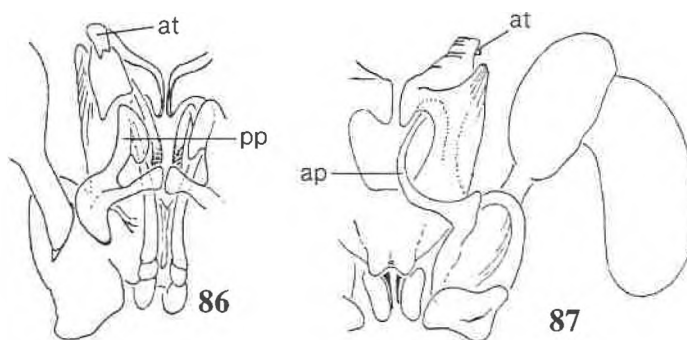
HABITATS. Litter, uppermost soil horizons and rotten wood in mixed and broadleaved forests. Immatures occur down to 20 mm deep [Mikhaljova, 1983b]. The numbers range between 0.5 and 2.5 ind. per sq. m [Kurcheva & Mikhaljova, 1980; Mikhaljova, 1988b].

DISTRIBUTION (Map 6). Originally described from Vladivostok, this species appears to be widespread throughout the southern part of the Maritime Province and reaches as far north as the Sikhote-Alin Biosphere Reserve.

Diplomaragna anuchino Shear, 1990

Figs 86-87, Map 6.

Diplomaragna anuchino Shear, 1990: 31; figs.



Figs 86-87. *Diplomaragna anuchino* Shear: 86 — gonopods (caudal view); 87 — gonopods (front view); ap — anterior process of angiocoxite; at — apex of colpocoxite; pp — posterior process of angiocoxite. — Scales absent (after Shear [1990]).

Рис. 86-87. *Diplomaragna anuchino* Shear: 86 — гоноподии (вид сзади); 87 — гоноподии (вид спереди); ap — передний отросток ангиококситы; at — вершина колпококситы; pp — задний отросток ангиококситы. — Масштаба нет (по [Shear, 1990]).

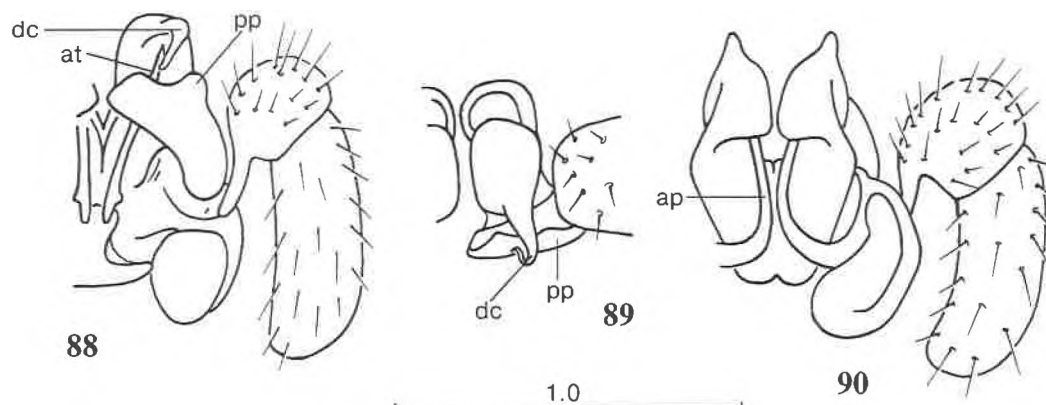
Diplomaragna anuchino — Mikhaljova, 1993: 18; 1997b: 127; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ 12-13 mm long. Width at 6th metazonite 1.48 mm. ♀ unknown. Colouration tan, very lightly mottled darker purplish brown on antennae and legs. Eyes black.

Body with 32 segments. Ocelli 29-30, in a triangular eyepatch. Paraterga beginning on segment 2, relatively low on somites 3-5, strongest on segments 9-17. Tergal macrochaetae acute, thin, about 0.35 long.

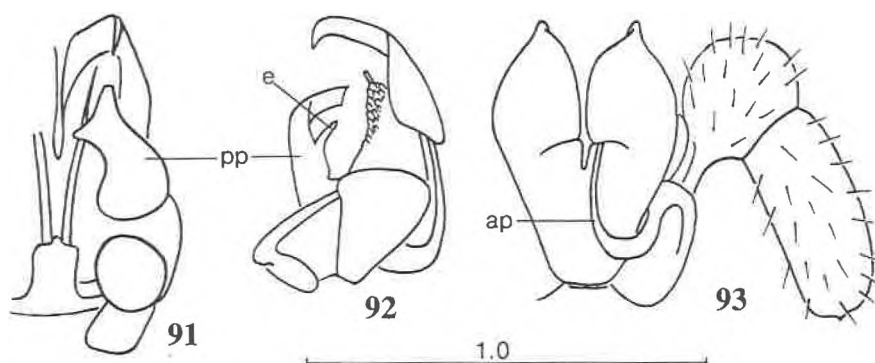
Legs long and slender. ♂ legs 3-7 enlarged, incrassate, pairs 5-7 much larger, femora swollen and curved. ♂ legs 10 and 11 with coxal glands.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodite 1-segmented, flagelliform, acute, positioned inside a deep sheathing groove on posterior surface of posterior gonopod colpocoxite (Fig. 86). Posterior gonopods with two pairs of angiocoxal processes. Posterior angiocoxal processes (pp) with two arms, mesal ones meeting in midline, lateral ones extending back against posterior surfaces of colpocoxites. Anterior angiocoxal processes (ap) very long, thin, curving mesally to pass



Figs 88-90. *Diplomaragna zimovcinaya* Mikh: 88 — gonopods (caudal view); 89 — gonopods (ventral view); 90 — gonopods (front view); ap — anterior process of angiocoxite; at — apex of telopodite; dc — distal part of colpocoxite; pp — posterior process of angiocoxite. — Scale in mm (after Mikhaljova [1997b]).

Рис. 88-90. *Diplomaragna zimovcinaya* Mikh: 88 — гоноподии (вид сзади); 89 — гоноподии (вид снизу); 90 — гоноподии (вид спереди); ap — передний отросток ангиококситы; at — вершина телоподита; dc — дистальная часть колпококситы; pp — задний отросток ангиококситы. — Масштаб в мм (по [Михалева, 1997b]).



Figs 91-93. *Diplomaragna dalnegorica* Mikh: 91 — gonopods (caudal view); 92 — gonopods (mesal view); 93 — gonopods (front view); ap — anterior process of angiocoxite; e — branch of posterior angiocoxal process; pp — posterior process of angiocoxite. — Scale in mm (after Mikhajlova [1997b]).

Рис. 91-93. *Diplomaragna dalnegorica* Микх: 91 — гоноподии (вид сзади); 92 — гоноподии (вид изнутри); 93 — гоноподии (вид спереди); ар — передний отросток ангиококситы; е — ветвь заднего отростка ангиококситы; pp — задний отросток ангиококситы. — Масштаб в мм (по [Михалёва, 1997b]).

through an opening formed by fusion of colpocoxites proximally, two mesal knobs distally that butt against one another (Fig. 87). Colpocoxites fused basally, deeply excavate on each side above fusion, then with blunt mesal processes that meet in midline. Above these, coxites angle at nearly 90° posteriorly, terminating in a small hook (at). Telopoditome 1 with a very thin stem, clavate over distal portion; segment 2 relatively small.

HABITATS. Litter of mixed forests.

DISTRIBUTION (Map 6). Originally described from the Anuchino District, Maritime Prov., this species has since been recorded also in the Lazovsky State Reserve.

Diplomaragna zimoveinaya Mikhajlova, 1997
Figs 88-90, Map 6.

Diplomaragna zimoveinaya Mikhajlova, 1997b: 124, figs. DESCRIPTION. Adult ♂ 12-12.5 mm long, 0.8-0.9 mm wide without and 1.3-1.4 mm with paraterga. ♀ unknown. Colour light beige. Antennae light brown, legs slightly brownish, eyes black.

Body with 32 segments. Head setose, vertigial suture

legs 2-7 somewhat enlarged, otherwise unmodified. ♂ legs 10-11 with coxal glands.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodite 1-segmented, flagelliform, positioned on posterior surface of posterior gonopod colpocoxites inside a shallow, open-edged, sheathing groove (Fig. 88). Apex of anterior gonopod telopodite (at) pointed, visible from outside. Posterior gonopods in posterior view with broad angiocoxal processes (pp) like thin, caudally convex plates with an undulate distal edge (Fig. 89). Colpocoxites fused basally, their distal part (dc) flagelliform, terminating in a hook. Colpocoxital sheath without evident processes: a very low, narrow, undulate swelling instead of a middle sheath process, and a tiny knob instead of a lateral sheath process. Angiocoxites strongly depressed on anterior face, anterior processes (ap) long, flagelliform, their distal portion positioned inside folds of colpocoxites (Fig. 90). Posterior gonopod telopodites 2-segmented, setose, femur long.

HABITATS. Coniferous and broadleaved forests.

DISTRIBUTION (Map 6). The species is known only from the original description from the Sikhote-Alin Biosphere Reserve, Maritime Province.

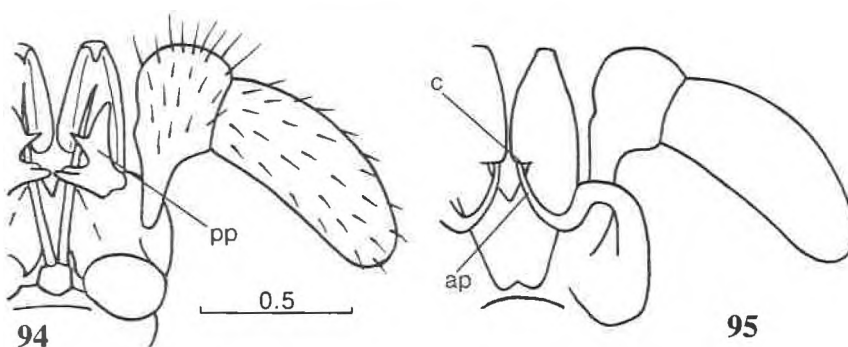
Diplomaragna dalnegorica Mikhajlova, 1993
Figs 91-93, Map 6.

Diplomaragna dalnegorica Mikhajlova, 1993: 21, figs.

Diplomaragna dalnegorica — Ganin, 1997: 126; Mikhajlova, 1997b: 129, figs.

DESCRIPTION. Adult ♂ 16-17 mm long, 0.7-0.8 mm wide without and 1.0-1.1 mm with paraterga. ♀ unknown. Colour beige, with transverse brown bands dorsally on metazona. Legs light marble-brown, increasingly brightly coloured toward telson. Antennae brown, eyes black.

Body with 32 somites.



Figs 94-95. *Diplomaragna kedrovaya* Mikh: 94 — gonopods (caudal view); 95 — gonopods (front view); ap — anterior process of angiocoxite; c — edge of colpocoxite fold; pp — posterior process of angiocoxite. — Scale in mm (original).

Рис. 94-95. *Diplomaragna kedrovaya* Микх: 94 — гоноподии (вид сзади); 95 — гоноподии (вид спереди); ар — передний отросток ангиококситы; с — край складки колпококситы; pp — задний отросток ангиококситы. — Масштаб в мм (оригинал).

Head densely setose, vertex marble-brown, vertigial suture hardly traceable. Eyepatches triangular, each composed of 28-30 ocelli. Gnathochilarium without promontum, with several strong and long setae on outer sides of stipites, lamellae linguales contiguous, each with three short parbasal setae. Antennae very long and slender. Collum semi-circular, narrower than head with genae. Body width gradually growing until somite 7, parallel-sided on somites 8-24, further on gradually tapering toward telson. Paraterga well-developed from somite 2 on, on somites 5-27 their caudolateral corners beak-shaped pointed. Macrochaetae in a transverse row on somites 30-31, arranged in an extended triangle on preceding somites. Anterolateral macrochaetae shorter than others, caudolateral ones longest, all blunt.

Legs long, claws normal. Pregonopodal legs a little enlarged, with ventral papillae near tip of tarsi. ♂ legs 10 and 11 with coxal glands.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodite 1-segmented, flagelliform, positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 91). A pointed apex of anterior gonopod telopodite visible as stretching outside the sheathing groove. Posterior angiocoxal processes (pp) large with a pointed, forward curved tip and with a long subapical branch (l) (Fig. 92). Anterior angiocoxal processes (ap) long, flagelliform, their distal portion positioned inside frontal folds of colpocoxites (Fig. 93). Colpocoxites fused basally, with apex pointed and unciform. Colpocoxite sheath groove without processes. Colpocoxital caudal surface finely papillate-spiculate. Posterior gonopod telopodites 2-segmented, setose, apex of femur with a claw vestige.

HABITATS. Litter of *Picea* forests.

DISTRIBUTION (Map 6). The species is known only from the original description from the Dalnegorsk Distr., Maritime Province.

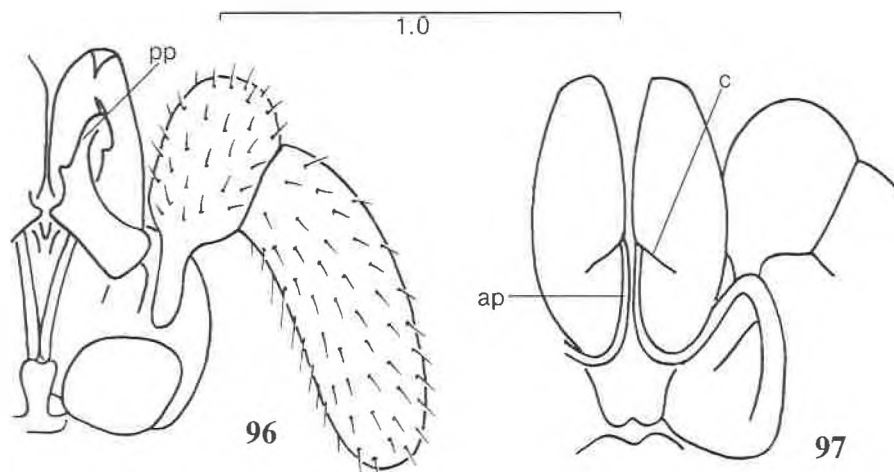
Diplomaragna kedrovaya Mikhajlova, 1993
Figs 94-95, Map 7.

Diplomaragna kedrovaya Mikhajlova, 1993: 24; figs.

Diplomaragna kedrovaya — Ganin, 1997: 121.

DESCRIPTION. Adult ♂ 16-17 mm long, 0.9-1.0 mm wide without and 1.4-1.5 mm with paraterga. ♀ unknown. Colouration beige, antennae brown, legs pale brown, marble-brownish dorsally, eyes black.

Body with 32 somites. Head setose, vertigial suture visible. Eyepatches triangular, each composed of 28-30 ocelli. Gnathochilarium usual. Antennae long and slender. Collum oval, both collum and somite 2 narrower than head with genae. Body growing in width toward somite 7, parallel-sided on somites 8-24, further on gradually

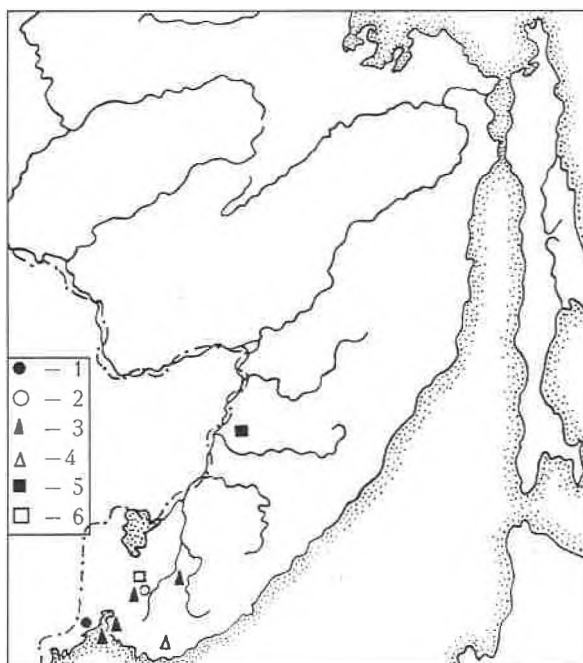


Figs 96-97. *Diplomaragna yakovlevka* Shear: 96 — gonopods (caudal view); 97 — gonopods (front view); ap — anterior process of angiocoxite; c — edge of colpocoxite fold; pp — posterior process of angiocoxite. — Scale in mm (after Mikhajlova [1997b]).

Рис. 96-97. *Diplomaragna yakovlevka* Shear: 96 — гоноподии (вид сзади); 97 — гоноподии (вид спереди); ap — передний отросток ангиококситы; c — край складки колпококситы; pp — задний отросток ангиококситы. — Масштаб в мм (по [Михалева, 1997b]).

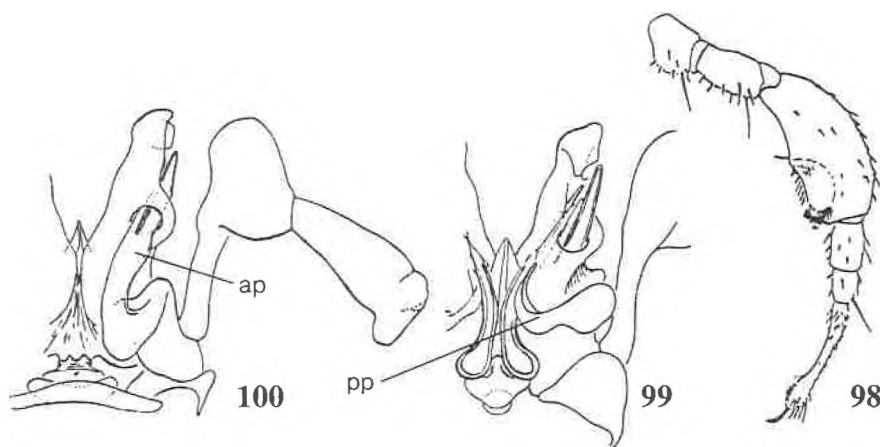
tapering toward telson. Somites 2-7 with increasingly well-developed lateral swellings instead of paraterga, from somite 8 on with already well-developed paraterga. Macrochaetae in a transverse row on last three somites, as an extended triangle on preceding somites. Posterolateral macrochaetae longest, pointed; anterolateral ones shortest, blunt; medial macrochaetae blunt.

Legs long, claws normal. ♂ legs 3-7 somewhat enlarged, apex of tarsus ventrally with a brush of strong sphacrotichs. ♂ legs 10-11 with coxal glands, usual.



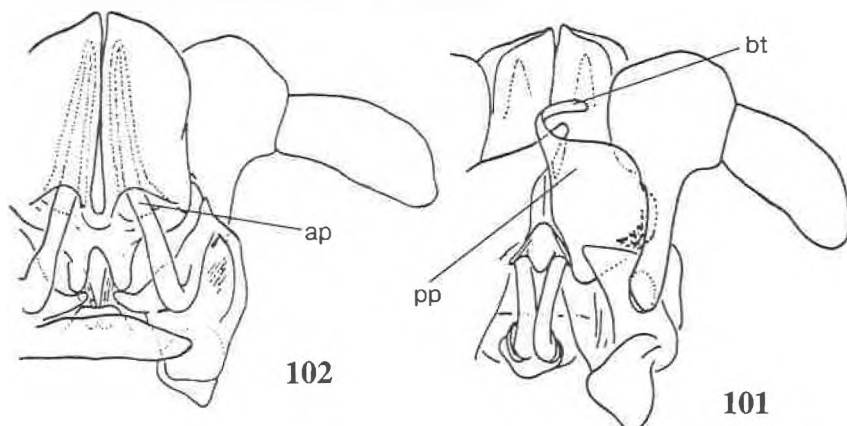
Map 7. Distribution of *Diplomaragna kedrovaya* (1), *D. picea* (2), *D. yakovlevka* (3), *D. lysaya* (4), *D. schawalleri* (5), *D. turova* (6).

Карта 7. Распространение *Diplomaragna kedrovaya* (1), *D. picea* (2), *D. yakovlevka* (3), *D. lysaya* (4), *D. schawalleri* (5), *D. turova* (6).



Figs 98-100. *Diplomaragna lysaya* Shear: 98 — ♂ leg 4; 99 — gonopods (caudal view); 100 — gonopods (front view); ap — anterior process of angiocoxite; pp — posterior process of angiocoxite. — Scale absent (after Shear [1990]).

Рис. 98-100. *Diplomaragna lysaya* Shear: 98 — 4-я нога у ♂; 99 — гоноподии (вид сзади); 100 — гоноподии (вид спереди); ap — передний отросток ангиококситы; pp — задний отросток ангиококситы. — Масштаба нет (по [Shear, 1990]).



Figs 101-102. *Diplomaragna picea* Shear: 101 — gonopods (caudal view); 102 — gonopods (front view); ap — anterior process of angiocoxite; bt — outgrowth of posterior angiocoxal process; pp — posterior process of angiocoxite. — Scale absent (after Shear [1990]).

Рис. 101-102. *Diplomaragna picea* Shear: 101 — гоноподии (вид сзади); 102 — гоноподии (вид спереди); ap — передний отросток ангиококситы; bt — вырост заднего отростка ангиококситы; pp — задний отросток ангиококситы. — Масштаба нет (по [Shear, 1990]).

Anterior gonopod with a T-shaped coxal part of coxosternum and 1-segmented, subflagelliform telopodites, latter positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 94), with apices invisible. Posterior gonopods with two pairs of angiocoxal processes, posterior ones (pp) large, with subapical teeth and medially contiguous, rounded outgrowths. Anterior angiocoxal processes (ap) flagelliform, their distal parts passing between colpocoxites into an incomplete fossa formed by a median notch on each side. Apices of anterior angiocoxal processes positioned inside frontal folds of colpocoxites (Fig. 95). Edges of folds (c) placed horizontally. Colpocoxites fused at base, distal parts directed caudad, pointed apically. Prefemur and femur of posterior gonopods setose, femur without claw apically.

HABITATS. Forest litter.

DISTRIBUTION (Map 7). The species is known only from the original description from the south of the Maritime Prov. ("Kedrovaya Pad" Reserve).

Diplomaragna yakovlevka Shear, 1990

Figs 96-97, Map 7.

Diplomaragna yakovlevka Shear, 1990: 29, figs.

Diplomaragna suputinca — Mikhajlova, 1993: 28, figs; Ganin, 1997: 123.

Diplomaragna yakovlevka — Mikhajlova, 1997b: 126, figs.

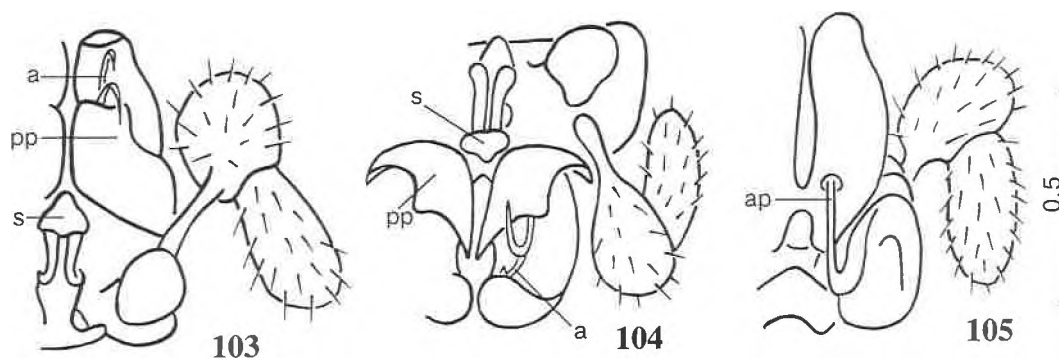
DESCRIPTION. Adult ♂ 12-15 mm long, 0.9-1.0 mm wide without and 1.2-1.4 mm with paraterga. Adult ♀ 14-15 mm long, 1.0-1.1 mm wide without and 1.3-1.4 mm with paraterga. Colour yellowish, antennae brown, legs brownish, pregonopodal legs dorsally with a pale marble-brown pattern, eyes black.

Body with 32 somites. Head setose, vertigial suture distinct. Eyepatches triangular, each composed of ca. 26 ocelli. Gnathochilarium typical, with several strong and long setae on outer sides of stipites; lamellae linguales contiguous, divided by a narrow, thin suture, each with shorter parabasal setae forming a triangle and with a few longer distal setae in a longitudinal row. Antennae long and slender. Collum oval, with 3+3 macrochaetae, both collum and somite 2 narrower than head with genae. Body width gradually growing until somite 7, parallel-sided on somites 8-24, onward gradually tapering. Paraterga well-developed from somite 2 on, on somites

5-27 their caudolateral corners beak-shaped pointed. Macrochaetae in a transverse row on somites 30-31, like an extended triangle on preceding somites. All macrochaetae pointed but not very sharply so. Anterolateral macrochaetae shortest, medial ones shorter than posterolateral ones. Axial suture well-developed. Surface finely alveolate.

Legs long, claws normal. Pregonopodal legs somewhat enlarged, otherwise unmodified. ♂ legs 10-11 normal, with coxal glands, coxa 10 enlarged.

Anterior gonopods with a T-shaped coxal part of coxosternum and 1-segmented flagelliform telopodites, latter positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 96). Anterior gonopod telopodite pointed, subapically finely serrate, apex visible as stretching outside the sheathing groove; latter without processes. Posterior gonopods with two pairs of angiocoxal processes, posterior ones (pp) large, with several outgrowths. Anterior angiocoxal processes (ap) like long, thick flagella, their distal portion positioned inside front folds of colpocoxites. Edges of folds (c)



Figs 103-105. *Diplomaragna turova* Mikh: 103 — gonopods (caudal view); 104 — gonopods (ventral view); 105 — gonopods (front view); a — apex of anterior angiocoxal process; ap — anterior process of angiocoxite; pp — posterior process of angiocoxite; s — colpocoxite sheath groove's mesal processes fused in midline. — Scale in mm (after Mikhajlova [1997b]).

Рис. 103-105. *Diplomaragna turova* Mikh: 103 — гоноподии (вид сзади); 104 — гоноподии (вид снизу); 105 — гоноподии (вид спереди); а — вершина переднего отростка ангиококситы; ap — передний отросток ангиококситы; pp — задний отросток ангиококситы; s — слитые вместе срединные отростки кроющей бороздки колпококситы. — Масштаб в мм (по [Михалева, 1997b]).

skew (Fig. 97). Colpocoxites fused basally, with a median foramen, caudally fringed, strongly curved caudo-apically, beak-shaped. Prefemur and femur of posterior gonopods sparsely setose, femur without claw vestige apically.

HABITATS. Litter and rotten wood in mixed and broadleaved forests. More often occurring in forests in valleys.

DISTRIBUTION (Map 7). This species has been described from the Maritime Prov. (Yakovlevka Distr., Ussuriyskii Reserve, and the environs of Vladivostok) and appears to be widespread over this territory.

Diplomaragna lysaya Shear, 1990

Figs 98-100, Map 7.

Diplomaragna lysaya Shear, 1990: 29, figs.

Diplomaragna lysaya — Mikhajlova, 1993: 25; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ about 12 mm long. Width at 6th metazonite, 1.74 mm. ♀ unknown. Colouration tan, very lightly mottled darker purplish brown on antennae and legs. Eyes black.

Body with 32 segments. Paraterga prominent, horizontal on somites 3-5, strongest on segments 9-26, slightly reduced on 27th and 28th, absent from somites 29-32.

♂ legs 3-7 enlarged, incrassate; leg pair 4 (Fig. 98) with femora 3-4 enlarged, a depressed glabrous area posterodistally, framed by an eyelash-like group of setae, tarsus with a mesally depressed, glabrous area; pairs 5-7 slightly larger than 4th, femora swollen and curved, lacking modifications present on 4th. ♂ coxae 10 and 11 with glands.

Anterior gonopods with a typical, T-shaped coxosternum and 1-segmented, flagelliform, acute telopodites sheathed by colpocoxites of posterior gonopods (Fig. 99). Posterior gonopods with two pairs of angiocoxal processes, posterior ones (pp) relatively small, laminate, curved in semi-circle. Anterior angiocoxal processes (ap) very large, passing through lateral foramina in colpocoxites (Fig. 100). Colpocoxites of posterior gonopods fused basally, diverging distally, slightly and smoothly curved posteriorly. Telopoditomere 1 with a very thin stem and a clavate distal portion; segment 2 elongate, with some indication of segmentation distally.

DISTRIBUTION (Map 7). This species has been described as based on a single male holotype deriving from

the Lazovskii State Reserve, SE Maritime Prov. No other data concerning this species are available.

Diplomaragna picea Shear, 1990

Figs 101-102, Map 7.

Diplomaragna picea Shear, 1990: 31, figs.

Diplomaragna picea — Mikhajlova, 1993: 25; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ 9-10 mm long, width at 6th metazonite, 1.2. ♀ unknown. Colouration light cream-tan, antennae white. Ocelli about 25, difficult to count because of complete lack of pigment.

Body with 32 segments. Paraterga beginning on segment 2, prominent, horizontal on somites 3-5, strongest, squarish, horizontal on segments 3-23, slightly reduced on somites 25-27, absent from somites 28-32.

Legs long and slender. ♂ legs 3-7 enlarged, somewhat incrassate; ♂ coxae 10 and 11 with glands.

Coxosternum of anterior gonopods very broad, telopodites 1-segmented, simple, acute, strongly curved, positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 101). Latter with basal mesal and lateral swellings, tightly clasping anterior gonopods. In posterior view, colpocoxites very deeply cupped; posterior angiocoxal processes (pp) large, broad, blade-like, with a distal outgrowth (bt) curving far back into colpocoxites. Anterior angiocoxal processes (ap) long, slender, sheathed on anterior surface of colpocoxite (Fig. 102). Colpocoxites of posterior gonopods fused basally, undivided, relatively broad, sharply curved posteriorly over distal 1/3 extent. Both posterior gonopod telopoditomers substantially reduced, proximal segment with a distinct stem.

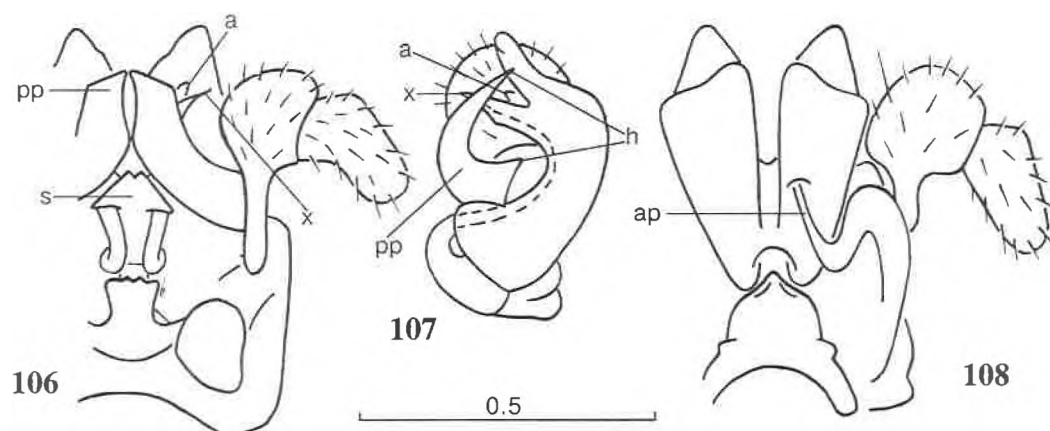
DISTRIBUTION (Map 7). This species has been described as based on a single male holotype deriving from the Ussuriyskii Reserve, Maritime Prov. No other data concerning this species are available.

Diplomaragna turova Mikhajlova, 1997

Figs 103-105, Map 7.

Diplomaragna turova Mikhajlova, 1997b: 125, figs.

DESCRIPTION. Adult ♂ 11.5 mm long, 0.7 mm wide without and 1.2 mm with paraterga. Body, antennae and legs light beige, eyes black.



Figs 106-108. *Diplomaragna schawalleri* Mikh.: 106 — gonopods (caudal view); 107 — gonopods (mesal view); 108 — gonopods (front view); a — apex of anterior angiocoxal process; ap — anterior process of angiocoxite; h — outgrowths of posterior angiocoxal process; pp — posterior process of angiocoxite; s — colpocoxite sheath groove's mesal processes fused in midline; x — apex of anterior gonopod telopodite. — Scale in mm (after Mikhajlova [1997b]).

Рис. 106-108. *Diplomaragna schawalleri* Mikh.: 106 — гоноподии (вид сзади); 107 — гоноподии (вид изнутри); 108 — гоноподии (вид спереди); а — вершина переднего отростка ангиококситы; ар — передний отросток ангиококситы; h — выросты заднего отростка ангиококситы; pp — задний отросток ангиококситы; s — слитые вместе срединные отростки кроющей бороздки колпококситы; x — вершина телоподита передних гоноподий. — Масштаб в мм (по [Михалева, 1997b]).

Body with 32 segments. Head setose, vertigial suture hardly visible. Eyepatches triangular, each composed of 30 ocelli. Antennae long and slender. Collum semi-circular with 3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 4-27, reduced on segments 28-29, onward missing. Macrochaetae in a transverse row on segments 30-31, like an extended triangle on preceding segments. Anterolateral macrochaetae shortest, medial ones longest. All macrochaetae cylindrical and pointed, yet not very sharply so.

Legs long and slender, claws normal. ♂ legs 3-7 somewhat enlarged, otherwise unmodified. ♂ legs 10 and 11 with coxal glands.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodite 1-segmented, flagelliform, positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 103). A pointed apex of telopodite visible as stretching outside the sheathing groove. Mesal sheath processes fused in midline (s), tightly clasping anterior gonopods. Posterior angiocoxal processes (pp) large, like a broad, caudally subrectangularly bent plate with an undulate, emarginate, distal margin (Fig. 104). Anterior angiocoxal processes (ap) long, slender, flagelliform (Fig. 105), piercing the colpocoxites so that their apices (a) stretching out on caudal surface of colpocoxite. Colpocoxites of posterior gonopods fused basally, with an oval apex curved caudally. Telopodites 2-segmented, setose, prefemur with a thin stem, femur small.

HABITATS. Wet fallen leaves near stream.

DISTRIBUTION (Map 7). This species has been described as based on a single male holotype deriving from the Ussuriyskii Reserve, Maritime Prov. No other data concerning this species are available.

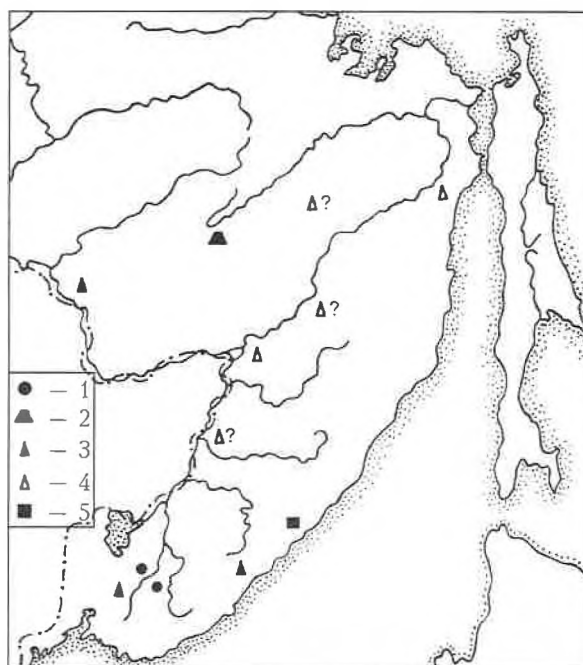
Diplomaragna schawalleri Mikhajlova, 1993
Figs 106-108, Map 7.

Diplomaragna schawalleri Mikhajlova, 1993: 26, figs.

Diplomaragna schawalleri — Ganin, 1997: 105; Mikhajlova, 1997b: 129, figs.

DESCRIPTION. Adult ♂ 11 mm long, 0.7 mm wide without and 0.9 mm with paraterga. Adult ♀ 11-12 mm long, 0.8 mm wide without and 1.0 mm with paraterga. Colour yellowish-whitish, with indistinct brownish spots dorsally. Eyes black.

Body with 32 somites. Head densely setose, vertigial suture distinct. Eyepatches triangular, each composed of 20-25 ocelli. Gnathochilarium typical, with several strong



Map 8. Distribution of *Diplomaragna reducta* (1), *D. bureyinskaya* (2), *D. mikhajlovae* (3), *D. cristifer* (4), *D. kuruma* (5).

Карта 8. Распространение *Diplomaragna reducta* (1), *D. bureyinskaya* (2), *D. mikhajlovae* (3), *D. cristifer* (4), *D. kuruma* (5).

Figs 109-110. *Diplomaragna reducta* Shear: 109 — gonopods (caudal view); 110 — gonopods (front view); ap — anterior process of angiocoxite; pp — posterior process of angiocoxite. — Scale absent (after Shear [1990]).

Рис. 109-110. *Diplomaragna reducta* Shear: 109 — гоноподии (вид сзади); 110 — гоноподии (вид спереди); ар — передний отросток ангиококситы; пр — задний отросток ангиококситы. — Масштаба нет (по [Shear, 1990]).

and long setae on outer sides of stipites, lamellae linguales contiguous, each with shorter parabasal setae forming a triangle and with longer distal setae in a longitudinal row. Antennae long and slender. Collum oval with 3+3 macrochaetae and brownish spots on each side, both collum and somite 2 narrower than head with genae. Body width gradually growing until somite 7, parallel-sided on somites 8-23, onward gradually tapering. Paraterga well-developed from somite 2 on, on somites 5-27 their caudolateral corners beak-shaped pointed. Macrochaetae in a transverse row on somites 30-31, like an extended triangle on preceding somites. Anterolateral macrochaetae a bit shorter than both others, all macrochaetae blunt apically. Surface finely alveolate.

Legs long, with neither ventral brushes nor pads, claws normal. ♂ legs 3-7 somewhat enlarged, otherwise unmodified, claw 7 with a long parabasal seta; ♂ legs 10-11 normal, with coxal glands.

Anterior gonopods with a T-shaped coxal part of coxosternum and 1-segmented flagelliform telopodites, latter positioned on posterior surface of posterior gonopod colpocoxites inside a deep sheathing groove (Fig. 106). Apex of anterior gonopod telopodite (x) pointed, visible as stretching outside the sheathing groove. Mesal sheath groove processes fused in midline (s), tightly clasping anterior gonopods. Posterior gonopods with two pairs of angiocoxal processes, posterior ones (pp) large, like a caudad curved plate with an apical and a midway pointed, horn-shaped, outgrowth (h) (Fig. 107), both well separated. Anterior angiocoxal processes (ap) long, flagelliform (Fig. 108), their distal parts piercing colpocoxites so that apices (a) visible on caudal surface of colpocoxites. Colpocoxites of posterior gonopods fused basally, strongly curved caudad, gradate as it were. Prefemur and femur of posterior gonopods sparsely setose, femur with a relatively evident ventral hump at midway, without claw vestige apically.

HABITATS. Broadleaved *Quercus* forest with *Populus* and *Betula*.

DISTRIBUTION (Map 7). Described from the Khabarovsk Prov. (12 km of NE Bikin), this species seems to be confined to its terra typica.

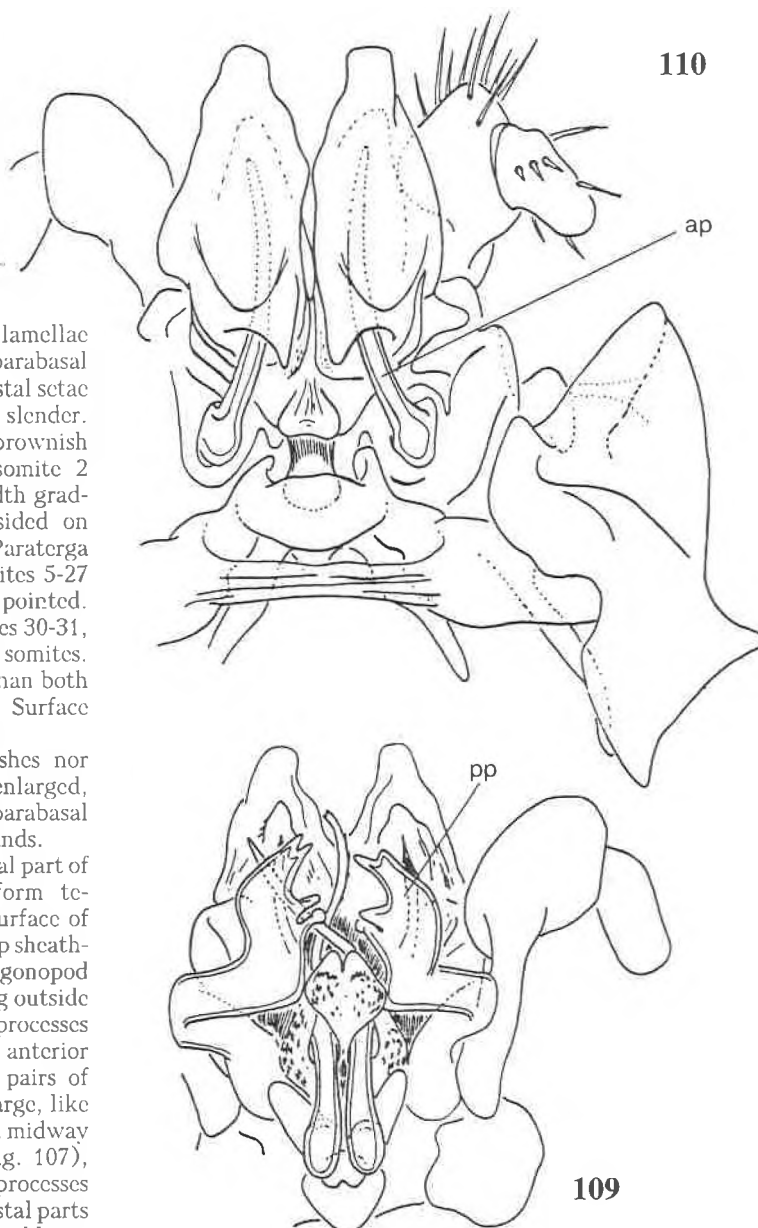
Diplomaragna reducta Shear, 1990

Figs 109-110, Map 8.

Diplomaragna reducta Shear, 1990: 35, figs.

Diplomaragna reducta — Mikhajlova, 1993: 25; 1997b: 127; Ganin, 1997: 127.

DESCRIPTION. Length of adult ♂ about 10 mm, width at 6th metazonite, 1.2 mm. ♀ unknown. Coloura-

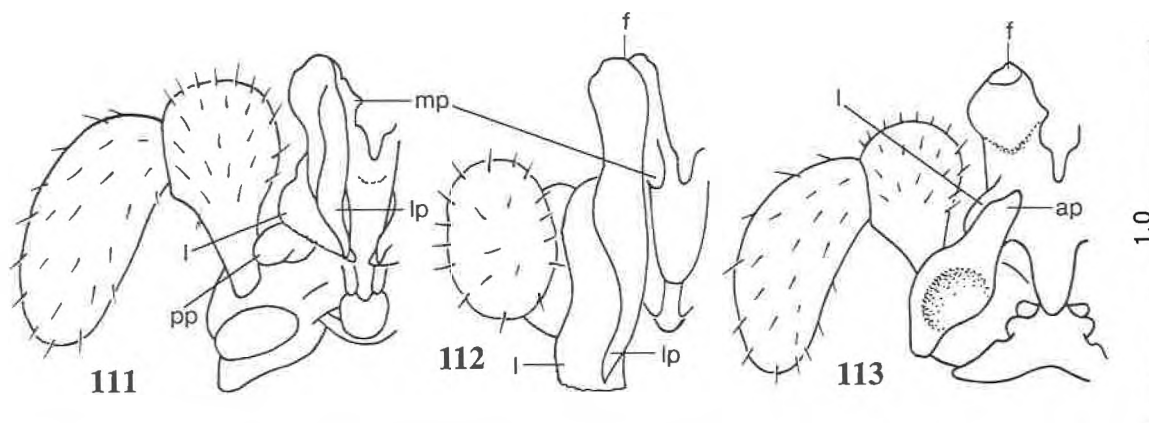


tion light cream-tan, antennae white, eyes black.

Body with 32 segments. Paraterga beginning on collum, prominent, horizontal on somites 3-5, strongest, squarish, horizontal on segments 9-23, slightly reduced on somites 24-26, absent from segments 27-30. Posterolateral macrochaetae longest. Apices of all macrochaetae blunt.

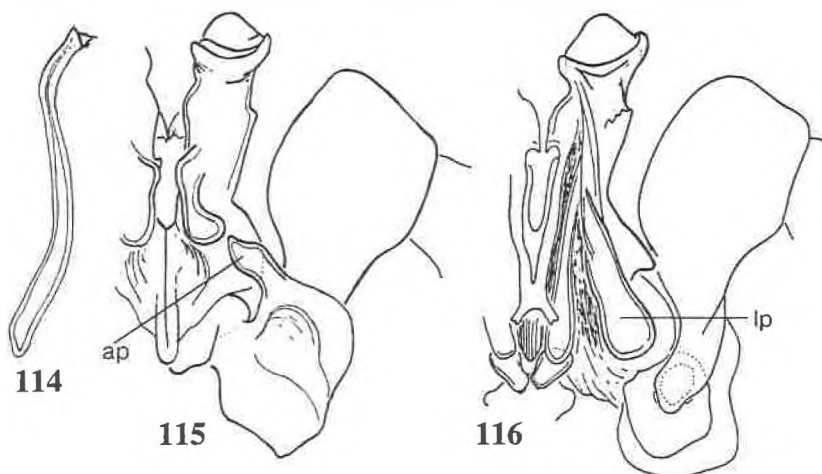
♂ legs 3-7 enlarged, coxae 10 and 11 with glands; ♂ coxa 10 with a small posteroventral knob.

Coxosternum of anterior gonopods very broad, telopodites 1-segmented, flagelliform, simple, acute, positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 109). Latter with basal mesal and lateral swellings, tightly clasping anterior gonopods. Posterior angiocoxal processes (pp) large, curving first mesally, then ventrally, with outgrowths placed closely to each other. Anterior angiocoxal processes (ap) long, slender, sheathed on anterior surface of colpocoxite (Fig. 110). Colpocoxites of posterior gonop-



Figs 111-113. *Diplomaragna bureyinskaya* Mikh.: 111 — gonopods (caudal view); 112 — gonopods (ventral view); 113 — gonopods (front view); ap — anterior angiocoxal process; f — fovea of colpocoxite sheath groove; l — lobe of lateral process of colpocoxite sheath groove; lp — lateral process of colpocoxite sheath groove; mp — mesal process of colpocoxite sheath groove; pp — posterior angiocoxal process. — Scale in mm (after Mikhajlova [1997b]).

Рис. 111-113. *Diplomaragna bureyinskaya* Mikh.: 111 — гоноподии (вид сзади); 112 — гоноподии (вид снизу); 113 — гоноподии (вид спереди); ap — передний отросток ангиококситы; f — лунка кроющей бороздки колопококситы; l — лопасть бокового отростка кроющей бороздки колопококситы; lp — боковой отросток кроющей бороздки колопококситы; mp — срединный отросток кроющей бороздки колопококситы; pp — задний отросток ангиококситы. — Масштаб в мм (по [Михалева, 1997b]).



Figs 114-116. *Diplomaragna mikhaljovae* Shear: 114 — telopodite of anterior gonopods; 115 — gonopods (front view); 116 — gonopods (caudal view); ap — anterior process of angiocoxite; lp — lateral process of colpocoxite sheath groove. — Scale absent (after Shear [1990]).

Рис. 114-116. *Diplomaragna mikhaljovae* Shear: 114 — телоподит передних гоноподий; 115 — гоноподии (вид спереди); ap — передний отросток ангиококситы; lp — боковой отросток кроющей бороздки колопококситы. — Масштаба нет (по [Shear, 1990]).

ods fused basally, undivided, relatively broad, sharply curved posteriorly over distal 1/3 extent. Both posterior gonopod telopoditomers substantially reduced, setose, proximal segment with a distinct stem.

HABITATS. Coniferous-broadleaved forests.

DISTRIBUTION (Map 8). Originally described from the Chuguyevka and Yakovlevka districts, Maritime Prov., this species has since been recorded also in the Anuchino Distr. of the same Province.

Diplomaragna bureyinskaya Mikhajlova, 1997
Figs 111-113, Map 8.

Diplomaragna bureyinskaya Mikhajlova, 1997b: 126, figs.

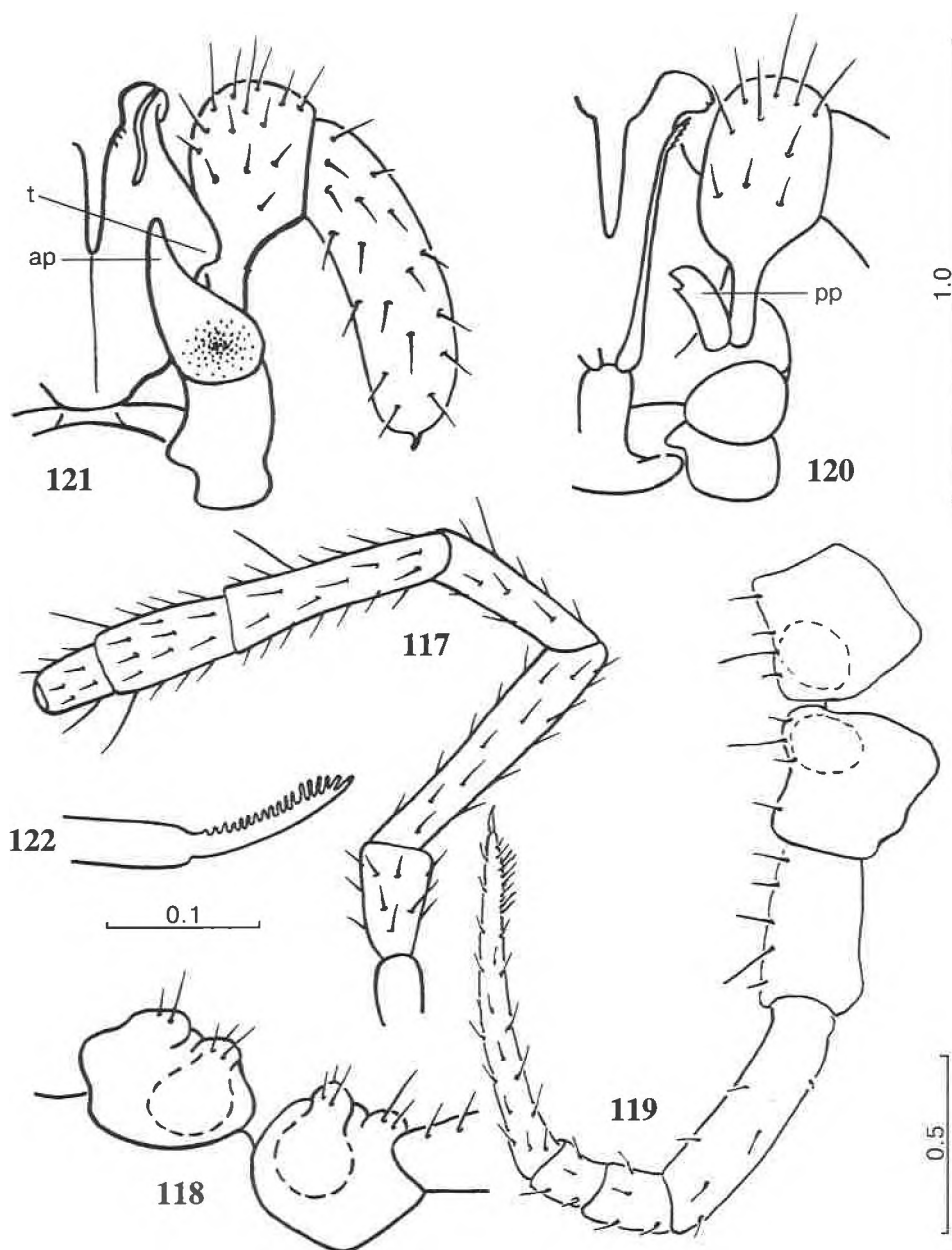
DESCRIPTION. Adult ♂ 18-19 mm long, 1.3-1.5 mm wide without and 1.8-2.0 mm with paraterga. Adult ♀ 19-20 mm long, 1.6-1.7 mm wide without and 2.1-2.2 mm with paraterga. Colour light brown. Antennae brown, distal parts of legs marble-brown, eyes black.

Body with 32 segments. Head setose, vertigial suture visible. Antennae long and slender. Collum semi-circular with 3+3 macrochaetae. Segment 2 narrower than both

head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 4-27, reduced on segments 28-29, onward missing.

Legs long, claws normal. ♂ legs 3-7 greatly enlarged; ♂ legs 10-11 with coxal glands.

Anterior gonopods with a T-shaped coxal part of coxosternum and 1-segmented flagelliform telopodites, latter positioned on posterior surface of posterior gonopod colpocoxites inside a deep sheathing groove with distad converging edges completely concealing the tips of telopodites (Fig. 111). Angiocoxites in posterior view with a globule. Posterior angiocoxal process (pp) small. Colpocoxites of posterior gonopods fused basally, their distal parts strongly curved forward, with an apical fovea (f) terminating the sheathing groove. Latter with a large, lateral, elongate outgrowth (lp) supplied with a broad lobe (l) embracing entire colpocoxite transversely. Middle process (mp) of sheathing groove like a small outgrowth (Fig. 112). Posterior gonopods in anterior view (Fig. 113) with angiocoxites strongly depressed, latter with distomesal angles drawn out into dentiform processes (ap). Posterior gonopod telopodites 2-segmented, setose, both segments large.



Figs 117-122. *Diplomaragna cristofer* Mikh.: 117 — antenna; 118 — ♂ coxae 10; 119 — ♂ leg 11; 120 — gonopods (caudal view); 121 — gonopods (front view); 122 — apex of anterior gonopod telopodite; ap — anterior process of angiocoxite; pp — posterior process of angiocoxite; t — external edge of colpocoxite. — Scales in mm (117-119, 122 — after Mikhaljova [1993], 120-121 — after Mikhaljova [1997b]).

Рис. 117-122. *Diplomaragna cristofer* Mikh.: 117 — антенна; 118 — коксы 10-й пары ног у ♂; 119 — 11-я пара ног у ♂; 120 — гоноподии (вид сзади); 121 — гоноподии (вид спереди); 122 — вершина телоподита передних гоноподий; ap — передний отросток ангиококситы; pp — задний отросток ангиококситы; t — наружный край колпококситы. — Масштаб в мм (117-119, 122 — по [Михалева, 1993], 120-121 — по [Михалева, 1997b]).

HABITATS. *Larix* forests with *Picea* and *Pinus pumila* at 900-1,400 m a.s.l.

DISTRIBUTION(Map 8). Originally described from the Verkhne-Bureyinsk Distr., Khabarovsk Prov., this species has since never been rediscovered.

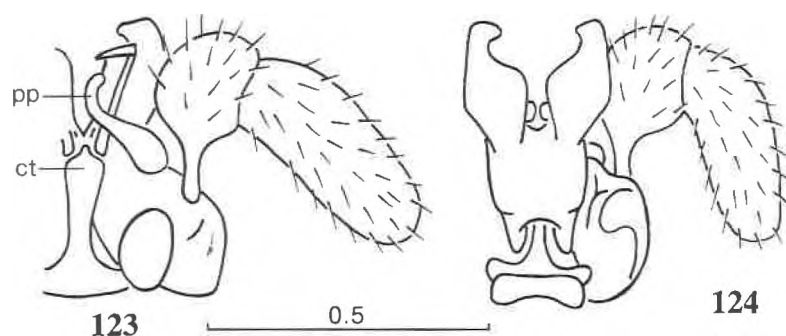
Diplomaragna mikhaljovae Shear, 1990
Figs 114-116, Map 8.

Diplomaragna mikhaljovae Shear, 1990: 20, figs.

Diplomaragna mikhaljovae — Mikhaljova, 1993: 25; Gannin, 1997: 10.

DESCRIPTION. Length of ♂ body, about 20-22 mm, width at 6th metazonite, 2.86 mm. Length of ♀ body, about 22 mm, width at 6th metazonite, 2.7 mm. Colouration light brown, mottled darker purplish-brown on antennae and legs, eyes black.

Body with 32 segments. Ocelli 25-27 in a triangular



Figs 123-124. *Diplomaragna kuruma* Mikh.: 123 — gonopods (caudal view); 124 — gonopods (front view); ct — coxal part of coxosternum; pp — posterior process of angiocoxite. — Scale in mm (after Mikhajlova [1997b]).

Рис 123-124. *Diplomaragna kuruma* Mikh.: 123 — гоноподии (вид сзади); 124 — гоноподии (вид спереди); ct — коксальная часть кокостерна; pp — задний отросток ангиококситы. — Масштаб в мм (по [Михалёва, 1997b]).

eyepatch. Paraterga beginning on collum, strongest on segments 9-22, at first planar, then becoming angled dorsad, thinner, longer; abruptly smaller on segment 27, absent from segments 28-31. Metatergal macrochaetae acute, thin.

♂ legs 3-7 enlarged, incrassate, pairs 5-7 much larger, femora swollen and curved. ♂ coxae 10 and 11 with glands.

Anterior gonopods with a T-shaped coxal part of coxosternum and 2-segmented flagelliform telopodites, latter positioned on posterior surface of posterior gonopod colpocoxites inside a sheathing groove (Fig. 116). Tip of telopodite slightly swollen (Fig. 114). Lateral sheathing groove processes (lp) very large, broad. Posterior gonopods in anterior view (Fig. 115) with angiocoxites strongly depressed on anterior face; distomesal angles drawn out into rather blunt, angular processes (ap) fitting into grooves on colpocoxites. Colpocoxites of posterior gonopods fused at base, their tips with a deep groove setting off a cap-like apex. Posterior gonopod telopodites 2-segmented, setose, large.

HABITATS. Litter of mixed and broadleaved forests. In the Amurskaya Area (Khangin State Reserve), the numbers range between 7.0 and 18.0 ind. per sq.m. [Ganin, 1997].

DISTRIBUTION (Map 8). Originally described from the southern part of the Maritime Prov. (Ussuriyskii Reserve) and from the Amurskaya Area (Khangin State Reserve), this species has since been recorded also in the Dalnegorsk Distr., Maritime Prov.

Diplomaragna cristofer Mikhajlova, 1993
Figs 117-122, Map 8.

Diplomaragna cristofer Mikhajlova, 1993: 19, figs.

Diplomaragna cristofer — Ganin, 1997: 10; Mikhajlova, 1997b: 126, figs.

DESCRIPTION. Adult ♂ 15-16 mm long, 1.7-1.8 mm wide without and 1.9-2.0 mm with paraterga. Adult ♀ 15.5-16 mm long, 1.7-1.8 mm wide without and 1.9-2.0 mm with paraterga. Colouration brown-yellow, with transverse brown bands on dorsal and lateral sides of metazona. Legs marble brownish dorsally. Eyes black, antennae brown.

Body with 32 somites. Head densely setose, vertigial suture well-developed and wide. Eyepatches subtriangular, each composed of 28-30 ocelli. Gnathochilarium with

several strong setae on outer sides of stipites, lamellae linguales contiguous. Antennae (Fig. 117) very long and slender. Collum oval with 3+3 macrochaetae and faint marble spots on each side. Both collum and somite 2 narrower than head with genae. Body growing in width toward somite 7, parallel-sided on somites 8-24, onward gradually tapering. Paraterga well-developed from somite 2 on, on somites 5-27 their caudolateral corners beak-shaped pointed. Macrochaetae in a transverse row on somites 30-31, like an extended triangle on preceding somites. Anterolateral macrochaetae shorter than others, all pointed. Somital surface microreticulate.

Legs long, claws normal, tarsus distally with a ventral brush of short strong setae. ♂ legs 3-7 enlarged, apex of tarsus ventrally with a brush of strong short setae. ♂ legs 10-11 (Figs 118, 119) with coxal glands and ventral brushes near tarsal apices.

Anterior gonopod coxosternum with a T-shaped coxal part; telopodites 1-segmented, subflagelliform, positioned on posterior surface of posterior gonopod colpocoxites inside a deep sheathing groove (Fig. 120). Latter splitting longitudinally the distal end of colpocoxite into two tightly adjacent parts so that unciform apices of colpocoxites look bifid (Fig. 121). Cristate apices of anterior gonopod telopodites (Fig. 122) visible as stretching outside the sheathing groove of posterior gonopod colpocoxite. Posterior gonopods with angiocoxites depressed centrally on anterior face; distomesal angles drawn out into digitiform processes (ap). Colpocoxites fused along basal 2/3 height, external edges drawn into a triangular plate (t). Colpocoxital surface finely papillate-spiculate. Posterior angiocoxal processes (pp) small, shaving-shaped with an incision at distal edge. Colpocoxital sheathing groove without processes. Prefemur and femur of posterior gonopods setose, with somewhat longer setae at tip of prefemur. Femur with a claw apically.

HABITATS. Mountainous *Picea* and mixed forests. In the eastern part of the Khabarovsk Prov., the numbers amount to 21.0 ind. per sq.m. [Ganin, 1997].

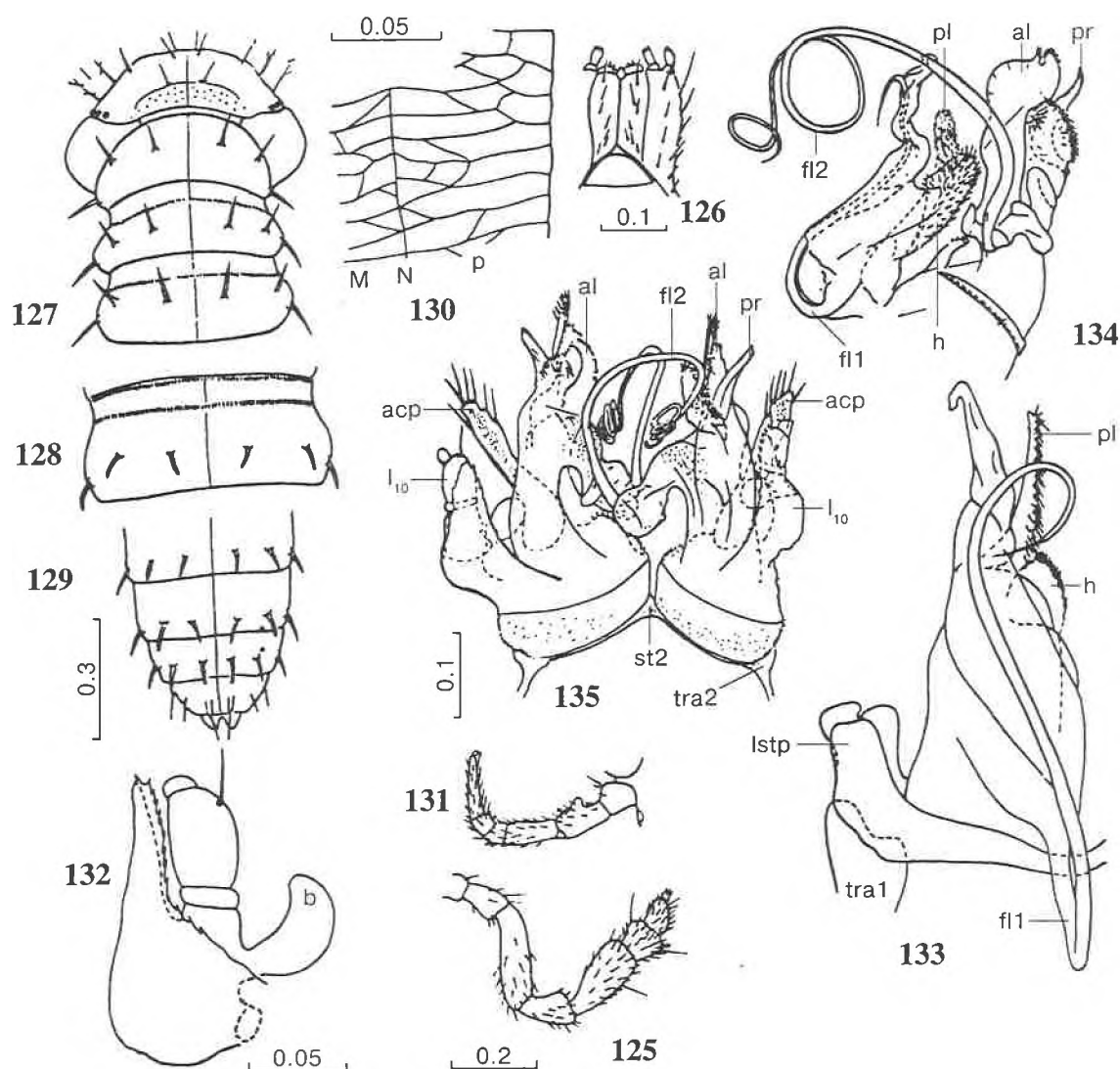
DISTRIBUTION (Map 8). Reliably known only from the S Khabarovsk Prov. (near Khabarovsk and the environs of Sofiysk, Ulchskii Distr.), whence originally described. Ganin's [1997] records in the Bikin and Nanaisk districts require confirmation.

Diplomaragna kuruma Mikhajlova, 1997
Figs 123-124, Map 8.

Diplomaragna kuruma Mikhajlova, 1997b: 124, figs.

DESCRIPTION. Adult ♂ 9 mm long, 0.4 mm wide without and 0.9 mm with paraterga. Adult ♀ 9-9.5 mm long, 0.4 mm wide without and 0.9 mm with paraterga. Colour light beige. Antennae and legs light beige, eyes black.

Body with 32 segments. Head setose, vertigial suture hardly visible. Eyepatches triangular, each composed of 30 ocelli. Antennae long and slender. Collum oval with



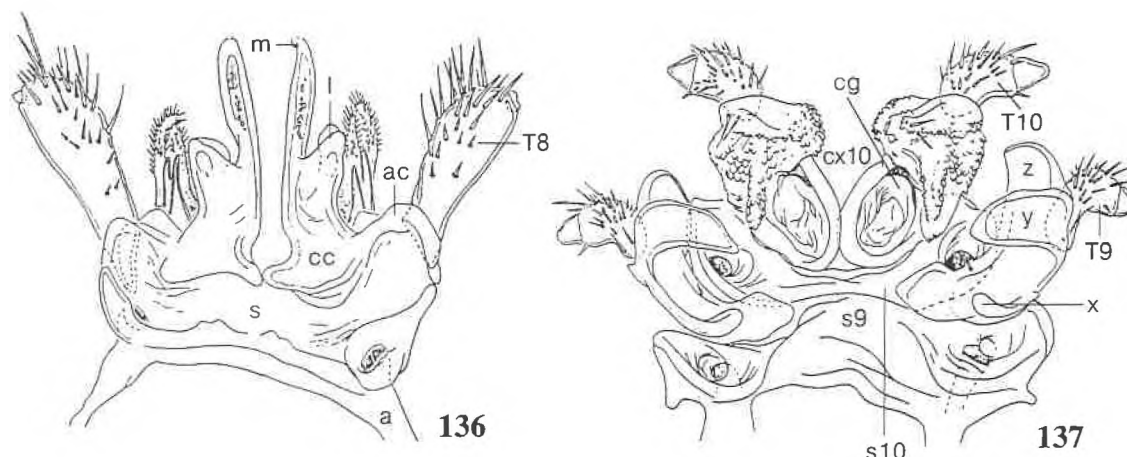
Figs 125-135. *Hoffmanniema exiguum* Gol.: 125 — antenna; 126 — ♂ gnathochilarium; 127 — fore part of body; 128 — mid-body segment; 129 — back part of body; 130 — part of lateral surface of pleurotergal arch; 131 — ♂ leg 12; 132 — ♂ leg 10; 133 — anterior gonopods; 134 — anterior and posterior gonopods (lateral view, posterior gonopods without telopodite); 135 — posterior gonopods and ♂ leg 10; M — metazonite; N — transverse suture dividing pro- and metazona; P — prozonite; acp — posterior gonopod telopodite; al — fore hyaline membrane; b — outgrowth of ♂ coxae 10; fl1 — flagellum of anterior gonopods; fl2 — flagellum of posterior gonopods; h — internal outgrowth of anterior gonopod telopodite; lstp — lateral sternal outgrowth of anterior gonopods; pr — external digitiform process of posterior gonopods; l₁₀ — ♂ leg pair 10; pl — telopodite of anterior gonopods; st2 — sternite of posterior gonopods; tra1 — tracheal apodeme of anterior gonopods; tra2 — tracheal apodeme of posterior gonopods. — Scales in mm (after Golovatch [1978b]).

Рис. 125-135. *Hoffmanniema exiguum* Gol.: 125 — антенна; 126 — гнатохиларий ♂; 127 — передний конец тела; 128 — срединный туловищный сегмент; 129 — задний конец тела; 130 — участок боковой поверхности плеуро-тергальной дуги; 131 — 12-я пара ног у ♂; 132 — 10-я пара ног у ♂; 133 — передние гоноподии; 134 — передние и задние гоноподии (вид сбоку, задние гоноподии без телоподита); 135 — задние гоноподии и 10-я пара ног у ♂; М — метазонит; N — поперечный шов между про- и метазонитом; P — прозонит; асп — телоподит задних гоноподий; ал — передняя гиалиновая перепонка; b — выступ 10-й коксы ♂; fl1 — жгутик передних гоноподий; fl2 — жгутик задних гоноподий; h — внутренний вырост телоподита передних гоноподий; pl — телоподит передних гоноподий; lstp — боковые стернальные выросты передних гоноподий; l₁₀ — 10-я пара ног у ♂; пр — наружный пальцевидный отросток задних гоноподий; st2 — стернит задних гоноподий; tra1 — трахейный карман передних гоноподий; tra2 — трахейный карман задних гоноподий. — Масштаб в мм (по [Головач, 1978b]).

3+3 macrochaetae. Segment 2 narrower than both head with genae and segment 3. Paraterga beginning on segment 2, well-developed on segments 4-28, reduced on segment 29, onward missing. Macrochaetae in a transverse row on segments 30-31, like an extended triangle on preceding segments. Anterolateral macrochaetae short-

est, clavate, posterolateral ones longest. Medial and posterolateral macrochaetae cylindrical, pointed but not very sharply so.

Legs long and slender, claws normal. ♂ legs 3-7 somewhat enlarged, otherwise unmodified. ♂ legs 10 and 11 normal, with coxal glands.



Figs 136-137. *Golovatchia magda* Shear: 136 — anterior gonopods (front view); 137 — posterior gonopods and ♂ leg-pair 10 (front view); S9 — sternite of posterior gonopods; S10 — sternite of ♂ leg-pair 10; T8 — anterior gonopod telopodite; T9 — posterior gonopod telopodite; T10 — ♂ telopodite 10; a — tracheal apodeme of anterior gonopods; ac — angiocoxite of anterior gonopods; cc — colpocoxite; cg — coxal glands of ♂ leg-pair 10; cx10 — ♂ coxa 10; l — lateral outgrowth of colpocoxite; m — mesal outgrowth of colpocoxite; s — sternite of anterior gonopods; x — anterior coxal branch of posterior gonopods; y — mesal coxal branch of posterior gonopods; z — posterior coxal branch of posterior gonopods. — Magnification 200x (after Shear (1992)).

Рис. 136-137. *Golovatchia magda* Shear: 136 — передние гоноподии (вид спереди); 137 — задние гоноподии и 10-я пара ног у ♂ (вид спереди); S9 — стернит задних гоноподий; S10 — стернит 10-й пары ног у ♂; T8 — телоподит передних гоноподий; T9 — телоподит задних гоноподий; T10 — 10-й телоподит у ♂; а — трахейный карман передних гоноподий; ac — ангиококсит передних гоноподий; cc — колпококсит; cg — коксальные железы 10-й пары ног у ♂; cx10 — коксы 10 у ♂; l — боковой вырост колпококсита; m — срединный вырост колпококсита; s — стернит передних гоноподий; x — передняя коксальная ветвь задних гоноподий; y — срединная коксальная ветвь задних гоноподий; z — задняя коксальная ветвь задних гоноподий. — Увеличение 200x (по [Shear, 1992]).

Anterior gonopod coxosternum with a very long T-shaped coxal part (ct); telopodite 1-segmented flagelliform, positioned on posterior surface of posterior gonopod colpocoxite inside a sheathing groove (Fig. 123). Distal part of telopodites visible as stretching outside the sheathing groove; apex pointed. Posterior angiocoxal processes (pp) knag-shaped with a rounded tip. Colpocoxites fused basally, with an oval apex, distally curved caudad. Colpocoxite sheath groove without evident outgrowths; tiny flattened knobs fused in the middle in place of mesal sheathing groove processes. Anterior angiocoxal processes absent (Fig. 124). Posterior gonopod telopodites 2-segmented, setose, prefemur with a thin stem, femur elongate.

HABITATS. Litter of *Quercus* forests.

DISTRIBUTION (Map 8). This species is known only from the Sikhote-Alin Biosphere Reserve, Maritime Prov., its terra typica.

Family Hoffmaneumatidae Golovatch, 1978

Currently known only from the south of the Russian Far East, likely to occur also in the adjacent parts of North Korea and Northeast China. Represented by a single genus and species.

The main distinguishing characters are as follows: body very small (maximum 10.0 mm long), with 28 segments, gnathochilarium without promentum, surface of somites finely reticulate, metazonites without lateral keels but with small dorsolateral bulges, legs without tarsal papillae. ♂ legpair 10 strongly reduced, only ♂ legpair 11 with coxal glands, gonopods highly complex, both anterior and posterior ones with a pair a long flagella.

Genus *Hoffmaneuma* Golovatch, 1978

Monobasic, currently known only from the central and southern parts of the Maritime Province.

The main distinguishing characters as in the family. In addition, ocellaria somewhat reduced.

Hoffmaneuma exiguum Golovatch, 1978

Figs 125-135, Map 4.

Hoffmaneuma exiguum Golovatch, 1978b: 1010, figs.

Hoffmaneuma exiguum — Loksina & Golovatch, 1979: 383; Kurcheva & Mikhailova, 1980: 121; Mikhailova, 1981c: 87; 1983b: 83; 1988b: 70; 1993: 29; 1998: 7; Mikhailova & Petukhova, 1983: 52; Mikhailova & Bakurov, 1989: 40; Shear, 1992: 68; Ganin, 1997: 121.

DESCRIPTION. Body ca. 6 mm long in ♂ and ♀, width up to 0.5 mm, with 28 segments. Colouration from brown to dark brown, marbled, with two obscure, paler, marbled stripes dorsally. Legs brown.

Head with a few pairs of long setae on vertex and clypeus. Ocellaria of adults as six black ocelli in a single uneven row on each side of head. Antennae relatively long, clavate (Fig. 125). Gnathochilarium without promentum, each lamella lingualis with three longer apical and four shorter basal setae, stipetes with long and strong setae in distal part (Fig. 126). Collum ovoid, somites 2-24 with poorly developed dorsolateral bulges (Figs 127-129). Metazonites (M) densely microreticulate (Fig. 130). Macrochaetae of anterior body segments longer and sharper than those of posterior somites.

Legs relatively long, devoid of tarsal papillae; ♂ legs 3 and 4 a little enlarged; ♂ leg 10 (Fig. 131) somewhat reduced, sternum wide, ribbon-shaped, broadened later-

ally, coxa with a lobe-shaped outgrowth (b), telopodite 3-segmented, middle telopoditomer longest; ♂ leg 11 with coxal glands; ♂ leg 12 (Fig. 132) with a mesal uncus on prefemur.

Anterior gonopods (Fig. 133) with a pair of long flagella (fl1) starting anterobasally from coxite and sheathed by a mesal groove running along a complex coxite making about three complete spiral turns from base to apex. Telopodite (pl) fimbriate at edge and with an inner, totally fimbriate outgrowth (h) (Fig. 134). Posterior gonopods (Fig. 135) with a pair of very long, spiralling flagella (fl2), a large, anterior, hyaline membrane with a finely fimbriate apex (al), a posteromesal membrane strongly fimbriate apically, and an outer digitiform process pointed at apex (pr). A rod-like, 1-segmented telopodite (acp) ending up by a small group of setae.

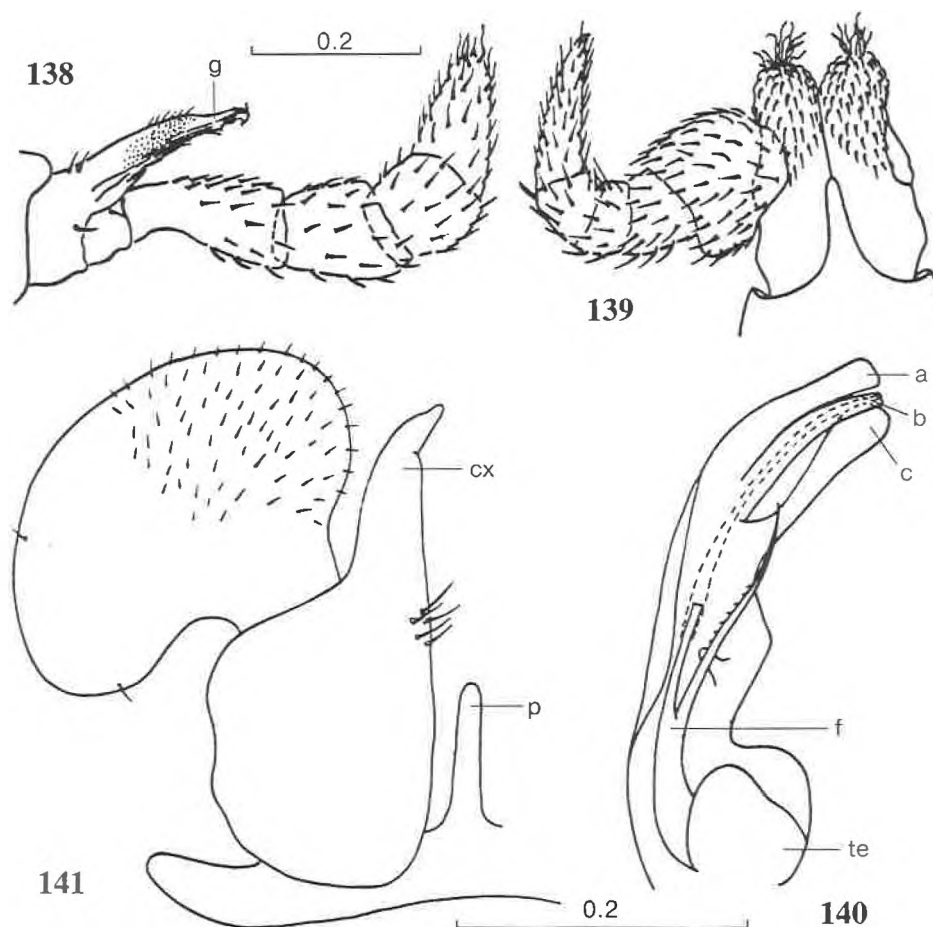
HABITATS. It dwells in the litter and uppermost soil horizons in montane mixed and valley broadleaved forests. Both adults and juveniles prefer dwelling in forest litter [Mikhaljova, 1983b], the numbers range from 0.3 to 7.5 ind. per sq. m depending on forest type [Kurcheva & Mikhaljova, 1980; Mikhaljova, 1981c, 1988b; Mikhaljova & Bakurov, 1989].

DISTRIBUTION (Map 4). Originally described from the Ussuriyskii Reserve and Chuguyevka Distr., this species appears to be widespread in the central and southern parts of the Maritime Province.

Family Golovatchiidae Shear, 1992

Currently known only from the south of the Russian Far East, likely to occur also in the adjacent parts of Northeast China. Represented by a single genus and species.

The main distinguishing characters are as follows: body with 30 segments; gnathochilarium without prominent; enlarged, curved but otherwise unmodified anterior ♂ legs; telopodite of anterior gonopods 2-



Figs 138-141. *Underwoodia kartschevae* Gol.: 138 — ♂ leg 2; 139 — ♂ leg 3; 140 — anterior gonopods (caudal view); 141 — posterior gonopods (caudal view); a — mesal branch of colpocoxite; b — lateral branch of colpocoxite; c — posterior branch of colpocoxite; cx — coxite of posterior gonopods; f — flagellocoxite; g — gonapophysis; p — mesal process of sternite; te — anterior gonopod telopodite. Scales in mm (138-139 — after Golovatch [1980a], 140-141 — after Mikhaljova & Basarukin [1995]).

Рис. 138-141. *Underwoodia kartschevae* Gol.: 138 — 2-я пара ног у ♂; 139 — 3-я пара ног у ♂; 140 — передние гоноподии (вид сзади); 141 — задние гоноподии (вид сзади); а — срединная ветвь колпококситы; б — боковая ветвь колпококситы; с — задняя ветвь колпококситы; cx — коксит задних гоноподий; f — флагеллококсит; g — гонапофиз; p — срединный отросток стернита задних гоноподий; te — телоподит передних гоноподий. Масштаб в мм (138-139 — по [Головач, 1980а], 140-141 — по [Михалова, Басарукин, 1995]).

segmented, terminal segment strongly reduced, knob-like; posterior gonopods well-separated, placed on a wide sternum and consisting of strongly curved coxites each carrying a 3-segmented, non-hypertrophied telopodite; ♂ leg 10 functioning as auxiliary gonopods, well-sclerotized, enlarged mainly due to a gland-bearing coxite but with telopodite also reduced only to three segments; ♂ leg 11 without coxal glands.

Genus *Golovatchia* Shear, 1992

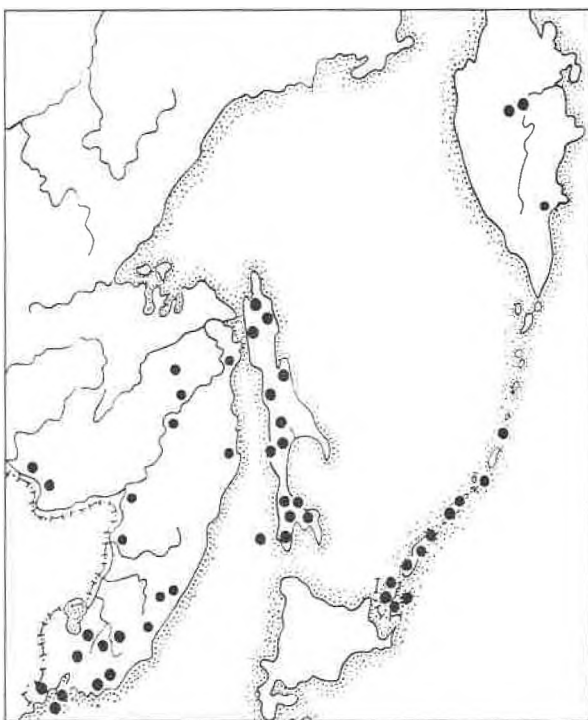
Monobasic, currently known only from the Verkhnebureinskii District of the Khabarovsk Province.

The main distinguishing characters as in the family.

Golovatchia magda Shear, 1992

Figs 136, 137, Map 4.

Golovatchia magda Shear, 1992: 66, figs.



Map 9 Distribution of *Underwoodia kurtischevae* (●).
Карта 9. Распространение *Underwoodia kurtischevae* (●)

Golovatchia magda — Mikhajlova, 1993: 29; Ganin, 1997: 133.

DESCRIPTION. Body ca. 15 (♂) and 16.5 mm (♀) long, width 1.2 (♂) and 1.4 mm (♀), with 30 segments. Colouration pale brown, anterior somites marbled.

Head glabrous, rounded. Ocellaria of adults with ca. 30 black ocelli a subtriangular patch on each side of head. Antennae relatively short, clavate. Mentum undivided. Metaterga with dorsolateral bulges devoid of pronounced shoulders, with 3+3 short, somewhat clavate macrochaetae. ♂ legpairs 3-7 enlarged, prefemora curved inward, not otherwise modified. Auxiliary gonopods (♂ legpair 10) with a usual sternum (S10); coxae (cx10) enlarged, medially contiguous, each lobed, with a large coxal gland (cg); telopodite (T10) 3-segmented, much like T9. ♂ legpair 11 without coxal glands.

Sternum (S) of anterior gonopods (Fig. 136) broad, unmodified, with pronounced tracheal openings and short, rod-like apodemes (a). Coxae enlarged, medially contiguous, with biramous colpocoxites (cc) of which lateral branch (l) curved strongly posteriorly and laterally flattened, and mesal branch (m) suberect, more rod-like, slightly curved at tip. Angiocoxites (ac) with several branches of which two (anterior) acuminate, smooth and three posterior strongly fimbriate. Telopodites (T8) relatively large, basal segment setose and clavate, terminal one bare and very small. Posterior gonopods (Fig. 137) with a broad sternum (S9). Coxites widely separated from one another, strongly depressed, with margins drawn out into three flattened branches (x, y, z); a single small seta at posterior rim. Anterior most branches (x) embracing lateral branch (l) of anterior gonopod colpocoxite, and posterior most branches (y) fitting lateral to coxa 10. Telopodites (T9) 3-segmented, only middle segment setose, much like T10.

HABITAT. *Larix* taiga.

DISTRIBUTION (Map 4). Hitherto found solely at Mogdy River (sic!), Verkhnebureinskii Distr., Khabarovsk Province.

Family Caseyidae Verhoeff, 1909

This basically Nearctic family encompasses seven genera, of which only one has a species in East Asia. Though hitherto recorded solely in the Russian Far East, this species is likely to occur also in the adjacent parts of Japan, Korea, and China.

The main distinguishing characters as follows: body with 30 segments; gnathochilarium with a promentum; metazonites subcylindrical, with neither paraterga nor bulges, nor tubercles; metatergal setae long, pointed, arranged in a single transverse row; pleurosternal regions of metazona often striated; ♂ mandibular stipes mostly with a ventral lobe; ♂ tarsal papillae absent; ♂ coxa 2 with a more or less well-developed gonapophysis; ♂ coxa 3 hypertrophied; ♂ legs 10 with coxal glands; anterior gonopods mostly 2- to 4-branched, placed on a sternal plate with or without lateral process; posterior gonopod sternite narrow, coxite with a distomesal colpocoxite, telopodite 1-segmented, hypertrophied.

Genus *Underwoodia* Cook & Collins, 1895

Encompassing three species, of which two are widespread over the northern and central parts of North America, and the third has formally been recorded only in the Far East of Russia.

The main distinguishing characters as in the family but also body small (6-11 mm long), pleurosternal striations wanting; mandibular stipes devoid of a lobe; gonapophysis on ♂ coxa 2 relatively short; anterior gonopod sternite without lateral process, colpocoxites triramous, flagellocoxite (f in Fig. 140) split into two subequal branches, of which caudal longer and barbed.

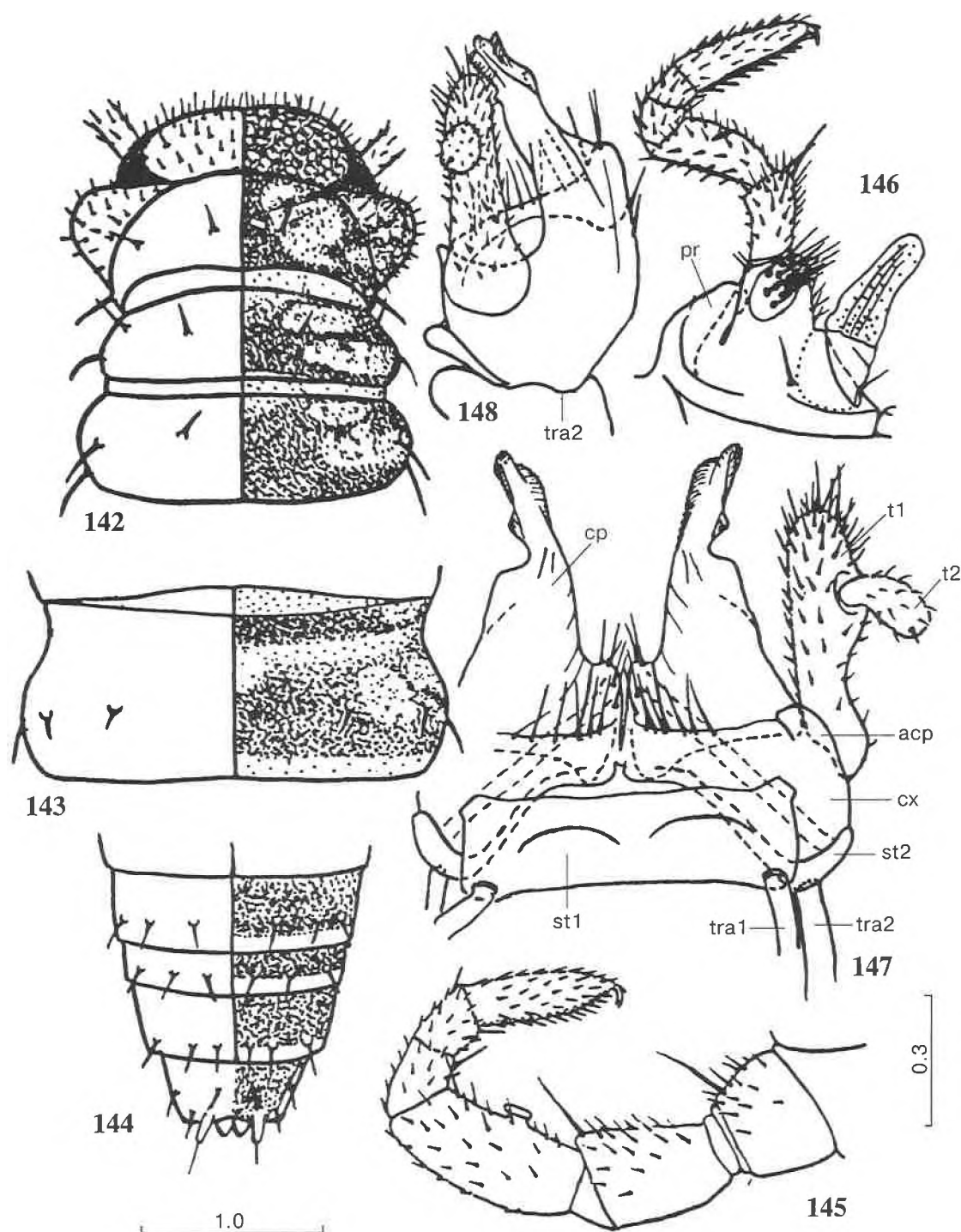
Underwoodia kurtischevae Golovatch, 1980 Figs 138-141, Map 9.

Underwoodia kurtischevae Golovatch, 1980a: 200, figs.

Underwoodia kurtischevae — Kurcheva & Mikhajlova, 1980: 121; Mikhajlova, 1981c: 87; 1983b: 83; 1988b: 70; 1990: 137; 1993: 17, map; Mikhajlova & Petukhova, 1983: 52; Ursova, 1983: 305; Ganin, 1989a: 145; 1994: 60; 1997: 10; Mikhajlova & Bakurov, 1989: 40; Gromyko, 1990: 66; Shelley, 1993: 175, figs, map; Mikhajlova & Basarukin, 1995: 92, figs, map.

DESCRIPTION. Body length 7-8 (♂) to 7-11 mm (♀), width 1.5-2.0 (♂) to 1.6-2.5 mm (♀). Colouration pale red-brown, more intense and marbled on anterior body part. Body with 30 segments, subcylindrical, metazona with neither paraterga nor lateral bulges, nor tubercles. Ocelli black, 15 in a subtriangular eyepatch on each side of head. Antennae relatively long, slender. Legs short; ♂ leg 2 (Fig. 138) with terminally unciform gonapophyses (g); ♂ leg 3 (Fig. 139) somewhat hypertrophied, inner coxal lobes setose and with apical bundles of hairs; ♂ leg 10 with glands on enlarged coxae, latter with a caudomesal process each.

Anterior gonopods (Fig. 140) relatively large. Sternite broad, without processes. Each colpocoxite divided into three suberect branches: medial (a) with a small



Figs 142-148. *Megalotyla brevichaeta* Gol. et Mikh: 142 — fore part of body; 143 — mid-body segment; 144 — back part of body; 145 — ♂ leg 6; 146 — ♂ leg 10 (front view); 147 — gonopods (front view); 148 — posterior gonopods (lateral view); acp — anterior outgrowth; cp — colpocoxite; cx — syncoxite; pr — external process of coxae 10; st1 — anterior gonopod sternite; st2 — sternite of posterior gonopods; t1 and t2 — segments of telopodite; tra1 — tracheal apodeme of anterior gonopods; tra2 — tracheal apodeme of posterior gonopods. — Scales in mm (after Golovatch & Mikhailova [1978]).

Рис. 142-148. *Megalotyla brevichaeta* Gol. et Mikh: 142 — передний конец тела; 143 — срединный туловищный сегмент; 144 — задний конец тела; 145 — 6-я пара ног у ♂; 146 — 10-я пара ног у ♂ (вид спереди); 147 — гоноподии (вид спереди); 148 — задние гоноподии (вид сбоку); асп — передний вырост; ср — коллококсит; сх — синкоксит; пр — наружный отросток таза 10-й пары ног; st1 — стернит передних гоноподий; st2 — стернит задних гоноподий; t1 и t2 — сегменты телоподита; tra1 — трахейный карман передних гоноподий; tra2 — трахейный карман задних гоноподий. — Масштаб в мм (по [Головач, Михалева, 1978]).

subterminal lobule, lateral (b), and caudal (c), latter well-separated from b, with an even mesal edge and a rounded apex. Flagellocoxites (f) swollen near base, biramous, caudal branch longer and barbed, front branch shorter and simple. Telopodites (te) short and stout. Sternite of posterior gonopods (Fig. 141) narrow, with a median process (p) of varying length. Coxites (cx) pointed at apex, setose on inner side. Telopodites 1-segmented, greatly swollen, setose.

HABITATS. This species dwells in the litter and uppermost soil horizons in coniferous, mixed and broad-leaved forests both on mountain slopes and in river valleys. It tends to prefer living in forest litter [Mikhajlova, 1983b], but seldom it occurs even on seashores in sand under debris cast ashore. The average numbers range from 0.5 to 37.0 ind. per sq. m in forests of the Maritime and Khabarovsk provinces depending on forest type [Kurcheva & Mikhajlova, 1980; Mikhajlova, 1981c, 1988b; Mikhajlova & Bakurov, 1989; Ganin, 1997].

DISTRIBUTION (Map 9). This species is among the most widespread in the entire Far East of Russia, this probably being accounted for by parthenogenesis characteristic also of both of its Nearctic congeners. It seems more than likely that *Underwoodia* will finally become formally recorded also in the adjacent parts of China, Korea, and Japan.

Family Megalotylidae Golovatch, 1978

Currently known only from the south of the Far East of Russia, likely to occur also in the adjacent parts of Northeast China. Represented by a single genus.

The main distinguishing characters are as follows: body with 30 segments; gnathochilarium without promentum; metazona with dorsolateral bulges instead of paraterga; ♂ tarsal papillae present, claw with a short auxiliary spine near base; ♂ leg 10 with hypertrophied coxae, telopodite reduced; both ♂ leg 10 and 11 with coxal glands; anterior gonopods reduced to a large, square, sternal plate with tracheal apodemes but without traces of appendages; posterior gonopods with a 2-segmented telopodite, hypertrophied coxae and large colpocoxites.

Genus *Megalotyla* Golovatch, 1978

Monobasic, currently known only from the south of the Russian Far East.

The main distinguishing characters are as in the family.

Megalotyla brevichaeta Golovatch & Mikhajlova, 1978

Figs 142-148, Map 4.

Megalotyla brevichaeta Golovatch & Mikhajlova, 1978: 67, figs.

Megalotyla brevichaeta — Lokšina & Golovatch, 1979: 383; Kurcheva & Mikhajlova, 1980: 121; Mikhajlova, 1981c: 87; 1983b: 84; 1988b: 70; 1993: 29; Mikhajlova & Petukhova, 1983: 52; Ganin, 1997: 121.

DESCRIPTION. Body 25-28 mm long, 2.3-2.4 mm wide (♂, ♀). Body and legs brown mottled with marble yellowish spots of varying size (Figs 142, 143). Body with 30 segments. Ocelli black, 29-30 in a subtriangular eyepatch on each side of head. Head densely pubescent,

antennae long and slender. Collum ovoid, somites 2-25 with poorly developed dorsolateral bulges (Figs 142, 143), somites 26-30 subcylindrical (Fig. 144). Metatergal macrochaetae short. Legs long. ♂ tarsal papillae absent only from pairs 1 and 2 as well as from near claw from pair 10 on. Claw long with a short dorsal spine. ♂ legs 3-6 with a small mushroom-like protuberance on inner side of femur (Fig. 145). ♂ legs 10 and 11 with coxal glands, a hypertrophied ♂ coxa 10 with a rounded outgrowth (pr) near base and a distofrontal setose pad (Fig. 146).

Anterior gonopods (Fig. 147) reduced to a large, square, sternal plate (st1) with tracheal apodemes (tra1) but without traces of appendages. Posterior gonopods (Fig. 148) with medially fused coxae (syncoxite), each coxa (cx) with a small front process (acp), a 2-segmented, setose telopodite (t1 & t2), and a large caudal outgrowth (colpocoxite, cp). Syncoxite placed on a plate-like sternum (st2), latter thicker and sclerotized at periphery and membranous centrally; tracheal apodemes (tra2) well-developed. Coxae with long setae, telopoditomere 2 (t2) with a claw vestige apically.

HABITATS. It dwells in the litter and uppermost soil horizons in coniferous and mixed forests on mountain slopes and in broadleaved forests of river valleys. This species tends to prefer living in forest litter, it often occurs in rotten wood as well [Mikhajlova, 1983b]. The average numbers range from 0.5 to 2.5 ind. per sq. m depending on forest type [Kurcheva & Mikhajlova, 1980; Mikhajlova, 1981c].

DISTRIBUTION (Map 4). Originally described from the Chuguyevka and Shkotovo districts as well as from the environs of Vladivostok, this species has hitherto been reported from various places of the Maritime Province, likely to occur also in the adjacent parts of China and Korea.

Order Polydesmida Leach, 1815

The largest millipede order in terms of species numbers, especially prolific in tropical areas. Distributed all over the globe except for Antarctica. About 30 families, of which only three occur in the Russian Far East.

The main distinguishing characters of the group are as follows: ocelli absent; number of body segments fixed, usually 20 or 19, including telson; all somital sclerites coalesced into a complete ring with metazonite usually provided with lateral keels/wings/bulges (= paraterga), latter sometimes with peritremata (= calluses); only ♂ leg 8 modified into gonopods, latter always retaining primary segmentation between coxite and telopodite; certain ♂ legs sometimes with sphaerotrichs, or sphaerotrichomes (= setae on knobs), ventrally.

KEY TO FAMILIES AND GENERA OF POLYDESMIDA:

- 1(4) Metazona with dorsolateral paraterga serrate at lateral edges. Dorsal surface of metazona with more or less flat, polygonal bosses arranged in three transverse rows (Figs 166, 167). Gonopods tightly fused basally Family Polydesmidae
- 2(3) Paraterga broad and high (Fig. 149). Body relatively large (over 15 mm long). Gonopod telopodites in situ not to almost not crossing each other Genus *Epanerchodus*
- 3(2) Paraterga narrow, set somewhat lower (Figs 176, 187). Body relatively small (< 15 mm long). Gono-

- pod telopodites in situ evidently crossing each other
..... Genus *Uniramidesmus*
- 4(1) Metazona without dorsolateral wings, instead with dorsolateral bulges/keels or peritremata non-serrate at margin (Fig. 210). Dorsal surface of metazona without polygonal sculpture, smooth or barely tuberculate. Gonopods free from each other basally 5
- 5(6) Adults poorly pigmented: whitish, yellowish or yellowish with a brown dorsal pattern. Gonopods simple, without conspicuous solenomerite branch (Fig. 211). Body relatively large (adults over 25 mm long) ... Family Xystodesmidae (Genus *Levizonus*)
- 6(5) Adults strongly pigmented: brown to dark brown with various tinges. Gonopods usually complex, with an evident solenomerite branch (Fig. 232). Medium-sized (adults 15-19 mm long)
..... Family Paradoxosomatidae
- 7(10) Peritremata of midbody somites not delimited from below by a sulcus (Fig. 230) 8
- 8(9) Gonopods not ring-like coiled, twisted, very complex. Adult body brown to dark brown, 25-30 mm long Genus *Sichotanus*
- 9(8) Gonopods ring-like coiled. Body brown to light brown, 18-19 mm long Genus *Haplogonosoma*
- 10(7) Peritremata of midbody somites evidently demarcated by a sulcus not only dorsally but also ventrally (Fig. 236) 11
- 11(12) Caudal corners of peritremata projecting strongly beak-like, starting from somite 15 on. Gonopods 4-branched, tips directed mesad (Fig. 235)
..... Genus *Oxidus*
- 12(11) Caudal corners of peritremata poorly projecting beak-like, starting from somite 17 on. Gonopods different, simpler, tips directed laterad (Fig. 238)
..... Genus *Cawjeekelia*

Family Polydesmidae Leach, 1815

About 25 genera, pattern basically Holarctic with only marginal representation in the Oriental realm. The Far East of Russia supports two genera.

The main distinguishing characters of the group are as follows: metazona mostly with evident paraterga and polygonal macrosculpture; paraterga devoid of lateral peritremata; ♂ legs usually with sphaerotrichs beneath; gonopod aperture subcordate, gonocoxae subglobose, medially fused and deeply excavate for accommodation of telopodites; cannula (= inner coxal horn) present; seminal groove typically with a loop, a subterminal accessory seminal chamber and a terminal hairy pulvillus.

Genus *Epanerchodus* Attems, 1901

This prolific East Asian genus comprises about 70 species in Japan, China (down to Sechuan and Guangzhou in the south), Korea, and the Russian Far East. In Russia, only four species have hitherto been encountered.

The distinguishing characters of *Epanerchodus* are as follows: body relatively large (ca. 2 cm long); metaterga flat, paraterga wide and set about as high as dorsum; sphaerotrichs on ventral side of certain ♂ legs present; gonopods relatively stout, complex, femorite hollow posteriorly, with a characteristically fringed/serrate clivus, only very seldom with a vestigial endomerite but always with 2-3 strong distofemoral processes [cf. Golo-

vatch, 1991]; seminal groove with a characteristic loop, ending up at near bottom of caudal excavation on a hairy pulvillus supplied with a preterminal accessory seminal chamber.

KEY TO SPECIES AND MORPHS OF *EPANERCHODUS*:

- 1(8) Body colouration uniform beige or pink, without pattern. Body up to 22 mm long 2
- 2(5) Tibia and postfemur of ♂ with an outgrowth
..... *E. polymorphus*
- 3(4) Larger: body length 18-22 mm. Postfemoral and tibial outgrowths in ♂ extending to leg 28. Distal part of gonopod telopodite with a dentiform process (dp) and a group of bacilli (Fig. 151)
..... *E. polymorphus* forma *digitata*
- 4(3) Smaller: body length 15.5-18 mm. Postfemoral and tibial outgrowths in ♂ extending to leg 25. Distal part of gonopod telopodite with neither processes nor bacilli (Fig. 152)
..... *E. polymorphus* forma *simplificata*
- 5(2) Tibia and postfemur of ♂ legs without outgrowths 6
- 6(7) Caudolateral corners of paratergites elongate, beginning from segment 5 or 6. Body length 15 mm. Gonopods as in Figs 156, 157 *E. cuspidatus*
- 7(6) Caudolateral corners of paratergites short, beginning from segments 7-9. Body length 16-18 mm. Gonopods as in Figs 153-155 *E. kunashiricus*
- 8(1) Body darker, reddish-brown, paraterga can be bright pink. Body length up to 35 mm. *E. bifidus*

Epanerchodus polymorphus Mikhajlova et Golovatch, 1981

Figs 149-152, Map 10.

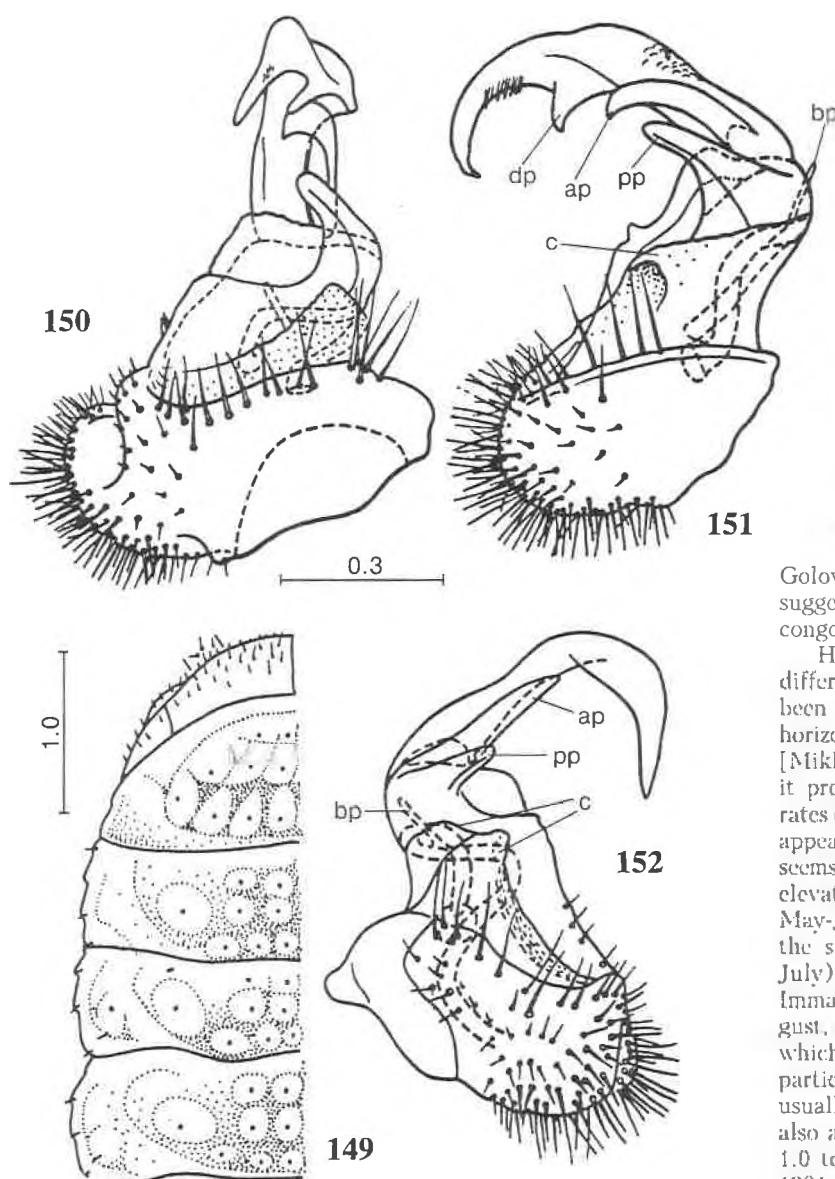
Epanerchodus polymorphus Mikhajlova & Golovatch, 1981: 1184, figs.

Epanerchodus polymorphus — Mikhajlova, 1983b: 85; 1988b: 70; 1993: 30; 1997a: 145; Mikhajlova & Petukhova, 1983: 53; Mikhajlova & Bakurov, 1989: 40; Ganin, 1997: 121.

DESCRIPTION. Adult ♂ 18-22 mm in length, 2.6-3.0 mm in width (forma *digitata*) and 15.5-18 mm in length, 2.5-2.6 mm in width (forma *simplificata*). Adult ♀ 16.5-21.5 mm in length, 2.5-2.9 mm in width. Colouration pinkish-beige, legs whitish-yellow, antennae brown.

Head moderately densely setose, with two pairs of longer vertigial setae. Genae rectangular in dorsal view. Antennae slender, clavate. Antennomere 7 with two small knobs, one bare and the other with short pubescence. Length ratios of antennomeres 2-7 as 2.4:4.1:2.6:3.0:2.9:1, width ratios as 1:1.1:1.0:1.1:1.4:1.1. Collum in width subequal to or a bit broader than head. Body parallel-sided on somites 7-17, further on gradually tapering toward telson. Metatergal polygonal sculpture as three transverse rows of bosses, 2nd and 3rd rows being developed more strongly than 1st one (Fig. 149). Tergal setae short, apically blunt. Paraterga well-developed, their caudolateral corners beak-shaped pointed on segments 5(8)-18, apically blunt (forma *digitata*) or acute (forma *simplificata*). Epiproct long, rounded at tip, setose.

Legs moderately long and slender, more densely setose ventrally, can be somewhat incrassate in ♂ as compared to ♀. Starting from ♂ legpair 3, tarsus, postfemur and, partly, femur with sphaerotrichs on ventral surface. Tibia and



Figs 149-152. *Epanerchodus polymorphus* Mikh. et Gol. 149 — fore part of body; 150 — forma *digitata*, gonopods (ventral view); 151 — forma *simplifcata*, gonopods (lateral view); ap — additional process; bp — bacilliform process; c — clivus; dp — dentiform process; pp — postfemoral process. — Scales in mm (after Mikhajlova & Golovatch [1981]).

Рис. 149-152. *Epanerchodus polymorphus* Mikh. et Gol. 149 — передний конец тела; 150 — морфа *digitata*, гоноподии (вид снизу); 151 — морфа *simplifcata*, гоноподии (вид сбоку); ap — добавочный отросток; bp — палочковидный отросток; c — клиvus; dp — зубовидный отросток; pp — постфеморальный отросток. — Масштаб в мм (по [Михалова, Головач, 1981]).

Golovatch, 1981]. The same traits can be suggested at least for a few other Japanese congeners.

HABITATS. Litter, rotten wood of different forest types. This species has been registered in the uppermost soil horizons [Mikhajlova, 1983b] and in caves [Mikhajlova, 1993, 1997a]. Apparently, it prefers humid biotopes as, at higher rates of air humidity, e.g. during rains, it appears on the surface in great numbers. It seems to be restricted by 700-750 m a.s.l. elevations. Mass mating takes place in May-June, egg-laying obviously all over the summer (in the lab from May to July). Embryogeny lasts about a month. Immatures start appearing in July-August, molting occurs in special chambers which the larva constructs using soil particles and its own faeces. Hibernation usually as penultimate instars, sometimes also as adults. The numbers range from 1.0 to 9.5 ind. per sq. m [Mikhajlova, 1981c, 1988b; Mikhajlova & Bakurov, 1989; Kurcheva & Mikhajlova, 1980].

DISTRIBUTION (Map 10). Originally described from the southern part of the Maritime Prov. (Partizansk, Chuguyevka and Anuchino districts as well as Usuriyskii, Lazovskii and "Kedrovaya Pad" reserves), this species is highly abundant and common there.

Epanerchodus kunashiricus Mikhajlova, 1988
Figs 153-155, Map 10.

Epanerchodus kunashiricus Mikhajlova, 1988a: 620, figs. *Epanerchodus kunashiricus* — Mikhajlova, 1993: 30; Mikhajlova & Basarukin, 1995: 94, map; Ganin, 1997: 133.

DESCRIPTION. Adult ♂ 16-18 mm long, 2.0-2.5 mm wide. Adult ♀ 16-17 mm long, 2.0-2.5 mm wide. Colouration beige, antennae brown.

Head clothed with very short pubescence, with two pairs of longer vertigial setae. Genae rectangular in dorsal view. Antennae clavate, in situ reaching the anterior part of somite 4. Length ratios of antennomeres 2-7 as 2.0: 4.2:3.1:3.3:3.1:1.0, width ratios as 1:1.1:1.0:1.1:1.4:1.0;

postfemur of ♂ legpairs 9(10)-28 (forma *digitata*) or 13(15)-25 (forma *simplifcata*) with a ventral process. ♀ legs unmodified, epigynal ridge behind ♀ coxae 2 low, transverse, rounded, often shallowly sinuate.

Gonopods (Figs 150, 151, 152) with a heavily setose prefemoral portion. Femur well-developed, with an outer bacilliform horn (bp) (=endomerite). Clivus (c) low, with excavations. Seminal groove making a characteristic loop and ending up at bottom of a broad femoral cavity. Postfemoral process (pp) large, digitiform. Gonopod telopodites falcate, in situ holding parallel to each other. Distally, telopodite either with a dentiform process (dp) and a group of batons (forma *digitata*) or without process and batons (forma *simplifcata*). Basally, telopodite with a curved (forma *digitata*) or erect (forma *simplifcata*) additional branch (ap).

REMARKS. This species is particular in displaying morphism, i.e. two distinct male morphs (forma *digitata* and forma *simplifcata*) and a quite continuous variation range of females, all invariably coexisting [Mikhajlova &

5th with some short sensory bacilli. Collum in width equal to head. Body parallel-sided on somites 6-17. Metatergal polygonal sculpture as in preceding species. Paraterga well-developed, their caudolateral cornes beak-shaped pointed on segments 6-18. Epiproct rounded at tip, sparsely setose.

Legs moderately long and slender, more densely setose ventrally; ♂ tibia and tarsus with small sphaerotrichs on ventral surface. Epigynal ridge behind ♀ coxae 2 transverse, low, rounded.

Gonopods (Figs 153-155) with a setose prefemoral portion. Femur with a outer bacilliform process. Clivus (c) low. Seminal groove making a characteristic loop and ending up at bottom of a broad femoral cavity. Postfemoral process (pp) strong, apically pointed or blunt, basally with a high to very low, rough knob. Telopodites falcate, apically with two branches (b), of which one longer than the other. Telopodites in situ holding parallel to each other.

HABITATS. Litter of mixed and broadleaved forests, in sand under debris on sea coast, under stones near water of lake banks.

DISTRIBUTION (Map 10). Originally described from near Mendeleyevo and Golovnino, Kunashir Island, Kuriles, this species appears to be widespread throughout the Kunashir Island.

Epanerchodus cuspidatus Mikhailova, 1996

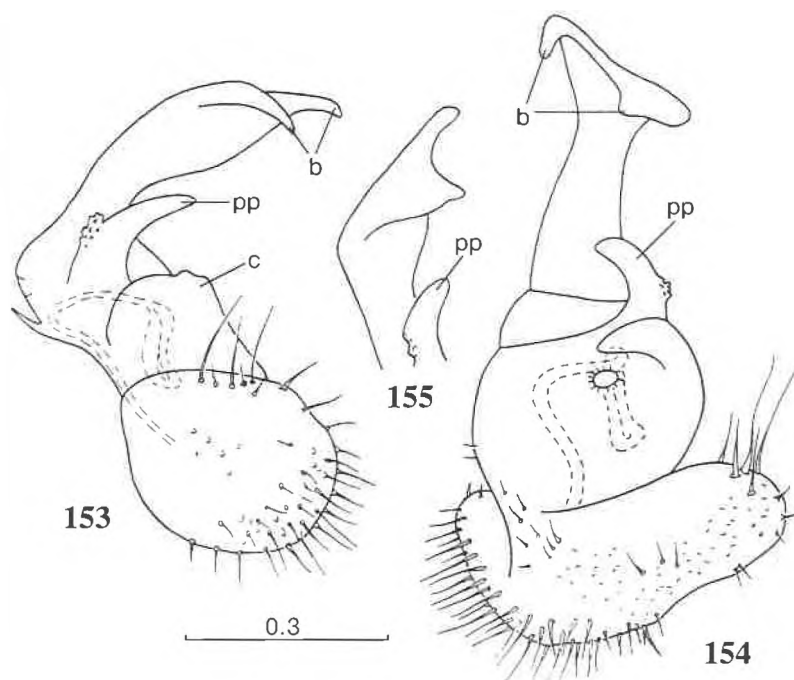
Figs 156-157, Map 10.

Epanerchodus cuspidatus Mikhailova, 1996a: 3, figs.

DESCRIPTION. Adult ♂ ca. 15 mm long, 2.0 mm wide. Adult ♀ 15.5 mm long, 2.0 mm wide. Colour pinkish-beige, legs light, antennae brown.

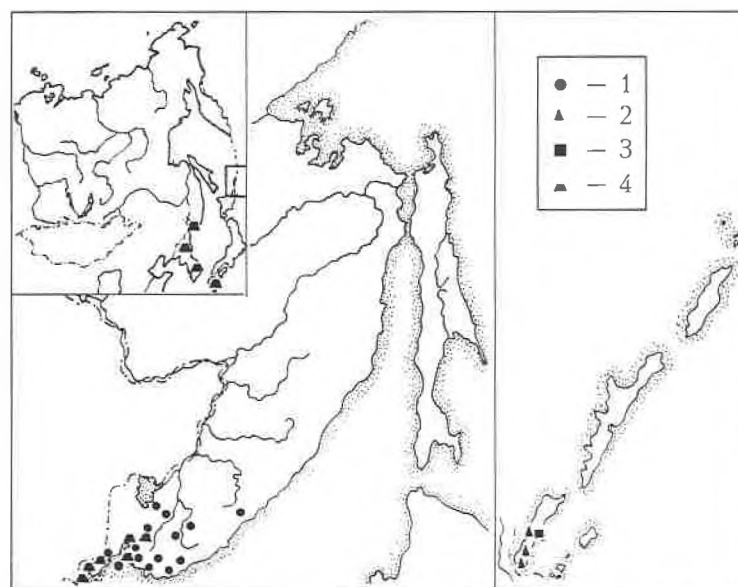
Head large, subglobular, densely covered with minute pubescence. Genae rectangular in dorsal view. Antennae long, clavate. Length ratios of antennomeres 2-7 as 1.5:2.7:2.2:2.1:1.9:1. width ratios as 0.9:1.1:1.1:1.2:1.4:1.0, respectively; 7th with some sensory bacilli. Collum elliptical, somewhat narrower than head; posterior corners slightly angular; a row of setae along anterior margin, further two rows centrally. Segments 3 and 4 somewhat shorter and narrower than others.

Succeeding segments gradually increasing in width toward segment 10, parallel-sided between 10th and 17th and gradually tapering toward telson further on. Metatergal polygonal sculpture usual, tergal setae short, blunt apically. Paraterga well-developed, their outer margin



Figs 153-155. *Epanerchodus kunashiricus* Mikh.: 153 — gonopods (lateral view); 154 — gonopods (ventral view); 155 — telopodite and postfemoral process; b — telopodite branches; c — clivus; pp — postfemoral process. — Scale in mm (after Mikhailova [1988a]).

Рис. 153-155. *Epanerchodus kunashiricus* Микх.: 153 — гоноподии (вид сбоку); 154 — гоноподии (вид снизу); 155 — телоподит и постфеморальный отросток; b — ветви телоподита; c — кливус; pp — постфеморальный отросток. — Масштаб в мм (по [Михалева, 1988a]).

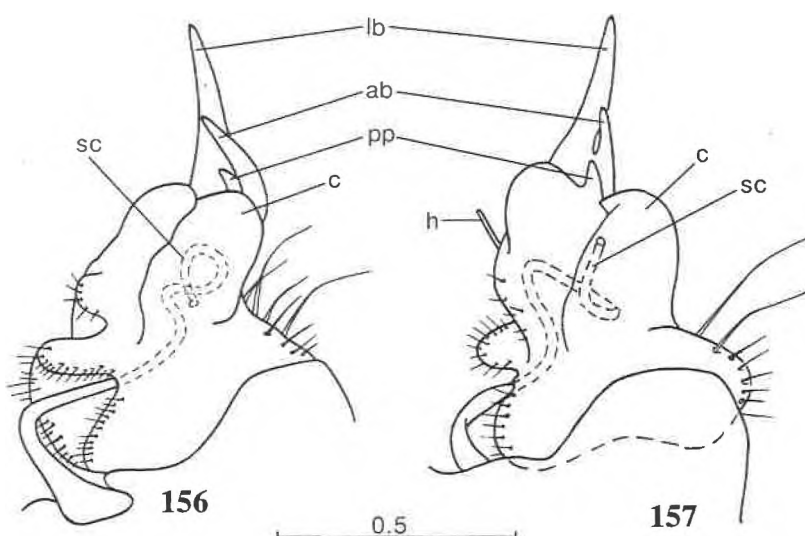


Map 10. Distribution of *Epanerchodus polymorphus* (1), *E. kunashiricus* (2), *E. cuspidatus* (3), *E. bifidus* (4).

Карта 10. Распространение *Epanerchodus polymorphus* (1), *E. kunashiricus* (2), *E. cuspidatus* (3), *E. bifidus* (4).

moderately convex, with three minute incisions. Caudolateral corners of paraterga beak-shaped pointed on segments 5-18. Epiproct medium-sized, conical, rounded at tip, setose.

Legs moderately long and slender, ventrally more



Figs 156-157. *Epanerchodus cuspidatus* Mikh.: 156 — gonopods (lateral view); 157 — gonopods (ventral view); ab — additional short branch of tibiotarsus; c — clivus; h — external horn of femur; lb — long branch of tibiotarsus; pp — postfemoral process; sc — seminal canal. — Scale in mm (after Mikhajlova [1996a]).

Рис. 156-157. *Epanerchodus cuspidatus* Mikh.: 156 — гоноподии (вид сбоку); 157 — гоноподии (вид снизу); ab — дополнительная короткая ветвь тибитарсуса; c — кливус; h — наружный рог фемора; lb — длинная ветвь тибитарсуса; pp — постфеморальный отросток; sc — семенной канал. — Масштаб в мм (по [Михалова, 1996а]).

densely setose; ♂ tibia and tarsus with small sphaerotrichs on ventral surface. Legs 1 and 2 as usual somewhat reduced in size.

Gonopods (Figs 156, 157) in situ holding parallel to main axis, with an as usual heavily setose prefemoral portion. Clivus (c) broad, with a flattened margin. Seminal groove (sc) making a characteristic loop and ending up at bottom of a rather narrow femoral cavity. Femoral outer horn (h) (=endomerite in the sense of Golovatch [1991]) bacilliform. Postfemoral process (pp) very small. Tibiotarsus with a long, somewhat curved branch (lb) and an additional shorter branch (ab). Both branches pointed apically.

DISTRIBUTION (Map 10). Originally described from near Yuzhno-Kurilsk, Kunashir Island, Kuriles. This species has since never been rediscovered. No other data concerning *E. cuspidatus* are available.

Epanerchodus bifidus Takakuwa, 1954

Figs 158-165, Map 10.

Epanerchodus bifidus — Golovatch & Mikhajlova, 1979: 837; Mikhajlova & Petukhova, 1983: 52; Mikhajlova, 1988b: 70; 1997a: 145; 1998: 4; Ganin, 1997: 121.

DESCRIPTION. Adult ♂ and ♀ 20-24 mm long, ca. 4.0 mm wide. Colour reddish-brown, either uniform or not, when lateral edges of paraterga bright pink, forming a characteristic pattern of spots and stripes.

Anterior portion of head covered with minute pubescence, vertex glabrous (Fig. 158). Antennae slender (Fig. 159). Collum much broader than head, transversely elliptical; lateral ends angulate, with a weak notch on each side; a row of fine setae present along anterior margin. Somite 2 broader than collum, keels somewhat bent forward. Succeeding segments slightly elevated on dorsum, bare, with very weak sculpture of usual pattern from segment 4 on. Paraterga particularly well-developed, horizontal,

usually as wide as long; posterior corner increasingly pointed from segment 4 on; anterior margin convex and smooth, lateral margin with 3-4 weak incisions, each bearing a minute seta (Fig. 160). Telson with an ovoid epiproct (Fig. 161).

Legs slender but ♂ prefemur somewhat swollen dorsally. ♂ tarsus and tibia of anterior legs only with sphaerotrichs (Fig. 162).

Femur of gonopods (Figs 163-165) well-developed, setose. Clivus (c) broad, with a lamelliform margin, outer horn unequally bifurcate. Tibiotarsus with long and short branches. Postfemoral process (pp) long.

HABITATS. Litter of coniferous-broadleaved forests. This species has also been registered in caves [Murakami & Paik, 1968; Mikhajlova, 1997a]. In the S Maritime Province, the numbers average 0.2 ind. per sq. m [Mikhajlova, 1988b].

DISTRIBUTION (Map 10). This species is widespread in Korea, Japan and the southern Maritime Province. The northern border of its geographical

range seems to coincide with that of *Abies holophylla* Max. (Ussuriyskii Reserve).

The identity of this species versus the Korean *E. koreanus* Verhoeff, 1937 requires confirmation [cf. Mikhajlova & Kim, 1993].

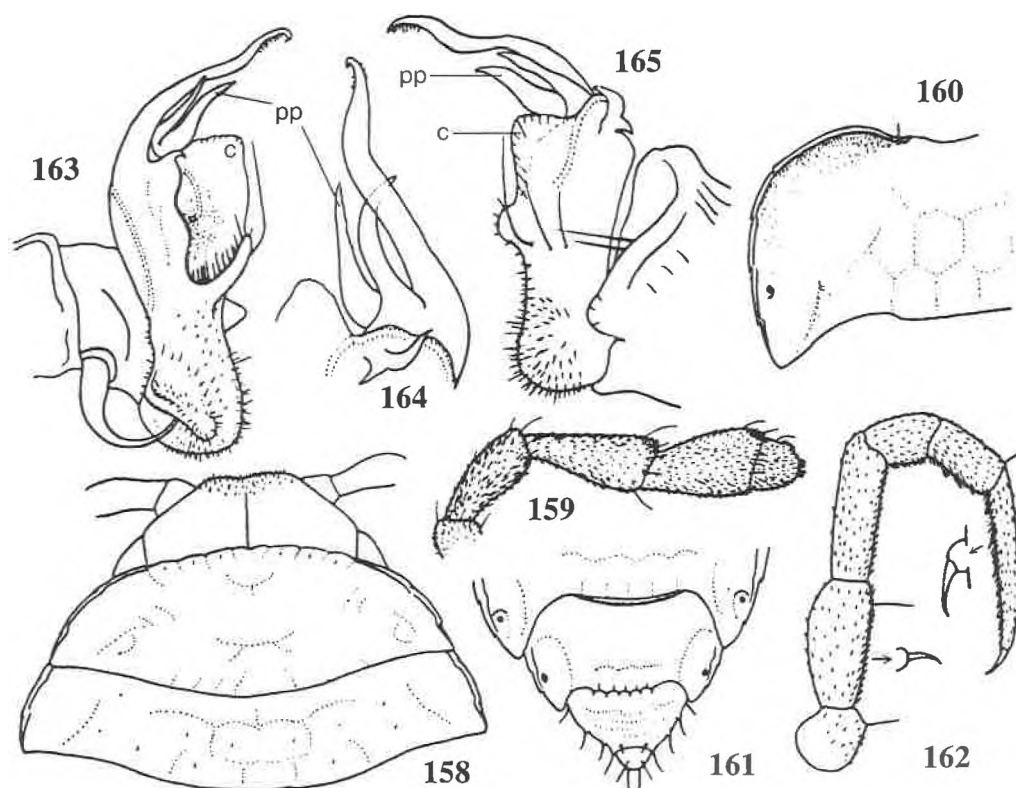
Genus *Uniramidesmus* Golovatch, 1979

This genus currently comprises eight species in Siberia (1) and the Far East of Russia (7).

The distinguishing characters of this genus are as follows: body small (usually ca. 1 cm long); metaterga rather convex, paraterga small and set below dorsum; sphaerotrichs absent; gonopods slender, strongly falcate to coiled caudally, relatively simple, not excavate, in situ crossing each other; accessory seminal chamber invariably absent, seminal groove without loop, opening subterminally to terminally on a more or less strongly reduced pulvillus.

KEY TO SPECIES OF *UNIRAMIDESMUS*:

- 1(10) Gonopods falcate, femorite with a posterior process 2
- 2(3) Gonopod telopodite with two lateral, long branches (lp) and an inner dentiform process (d) (Figs 168, 169). Paraterga broad, straight laterally (Fig. 167) *U. dentatus*
- 3(2) Gonopod telopodite different, paraterga narrow, rounded laterally 4
- 4(5) Posterior outgrowth of gonopod femorite (b) rounded (Fig. 173); solenomerite with a tiny denticle (h) subapically, without processes (Fig. 174) *U. alveolatus*
- 5(4) Posterior outgrowth of gonopod femorite different; solenomerite with various processes but without tiny denticle subapically 6



Figs 158-165. *Epanerchodus bifidus* Tak.: 158 — fore part of body; 159 — distal part of antenna; 160 — mid-body segment; 161 — ♂ leg 7; 162 — back part of body; 163 — gonopods (mesal view); 164 — tibiotarsal part of gonopods; 165 — gonopods (lateral view); c — clivus; pp — postfemoral process. — Scale absent (after Murakami & Paik [1968]).

Рис. 158-165. *Epanerchodus bifidus* Tak.: 158 — передний конец тела; 159 — дистальный конец антенны; 160 — срединный туловищный сегмент; 161 — 7-я пара ног у ♂; 162 — задний конец тела; 163 — гоноподии (вид изнутри); 164 — тибготарзальная часть гоноподий; 165 — гоноподии (вид сбоку); c — кливус; pp — постфеморальный отросток. — Масштаба нет (по [Murakami & Paik, 1968]).

- 6(7) Posterior outgrowth of gonopod femorite high cariniform; solenomerite with a small dentiform process (o) proximad of orifice of seminal groove (Figs 177, 178) *U. deterius*
 7(6) Posterior outgrowth of gonopod femorite low, different; solenomerite different distally 8
 8(9) Solenomerite with a ventro-apical unciform process (p) (Figs 182, 183) *U. cornutus*
 9(8) Solenomerite ventrally with 1-2 small blade-like outgrowths (x) (Figs 184, 185) *U. septimus*
 10(1) Gonopods ring-shaped, femorite without process 11
 11(12) A deep sulcus (c) present between gonopod femorite and postfemoral portion (Figs 193-195) ...
 *U. constrictus*
 12(11) No deep sulcus between gonopod femorite and postfemoral portion (Figs 188, 189, 191)
 *U. aberrans*

Uniramidesmus dentatus Mikhajlova, 1979
 Figs 166-169, Map 11.

Uniramidesmus dentatus Mikhajlova in: Golovatch & Mikhajlova, 1979: 834, figs.

Uniramidesmus dentatus — Lokšina & Golovatch, 1979: 384; Kurcheva & Mikhajlova, 1980: 121; Mikhajlova, 1981c: 87; 1983b: 85; 1988b: 70; 1993: 32; Mikhajlova & Petukhova,

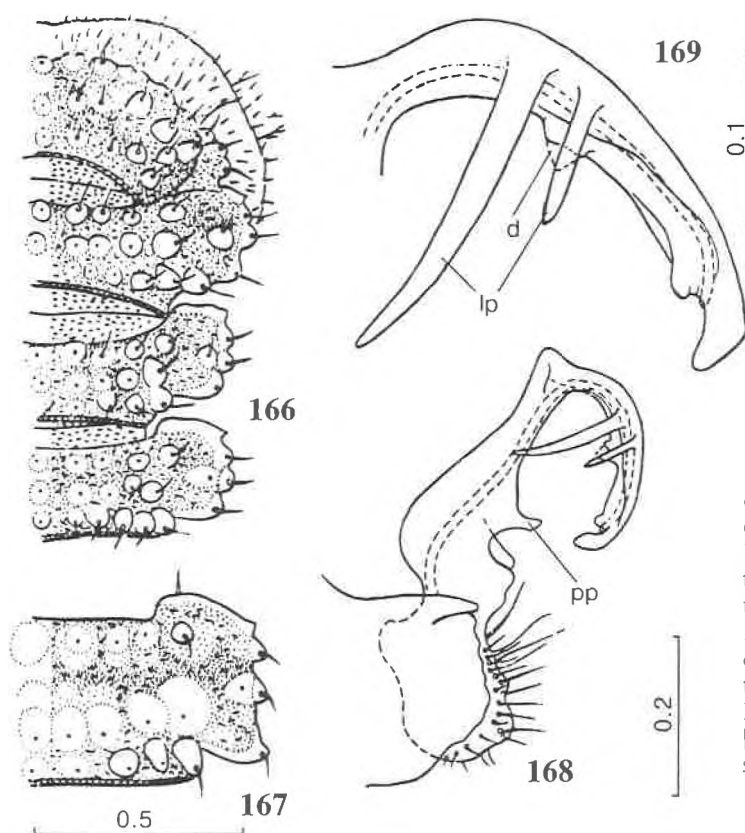
1983: 53; Mikhajlova & Bakurov, 1989: 40; Ganin, 1997: 114, 121, 124, 126, 140.

?*Uniramidesmus dentatus* — Ganin, 1997: 12, 13, 23, 109, 112.

DESCRIPTION. Adult ♂ and ♀ 8-9 mm long, 1.1-1.3 mm wide. Colouration pinkish. Head (Fig. 166) covered with dense minute pubescence. Antennae short, clavate. Distodorsal parts of antennomeres 5-7 each with a group of short baton-shaped sensilla. Length ratios of antennomeres 2-7 as 1.5:2.2:1.5:1.5:2.6:1. Collum semicircular, somewhat narrower than head with genae. Body growing in width toward somite 5 or 6, onward parallel-sided until somite 17, further on tapering caudally. Metatergal polygonal sculpture as three transverse rows of bosses with setigerous knobs, 3rd row developed more strongly than both preceding ones, with lateral boss. knob of 3rd row well-developed. Paraterga well-developed, broad, straight laterally, caudolateral corners pointed (Fig. 167). Epiproct long, cylindrical, blunt at tip.

♂ legs somewhat incrassate compared to ♀ ones. Each ♂ coxa 2 with a small projection terminating vasa deferentia. Epigynal ridge behind ♀ coxae 2 low, setose apically.

Gonopods (Figs 168, 169) strongly falcate, crossing in situ. Prefemoral part setose, femorite with a posterior process (pp); entire telopodite = solenomerite with two lateral, long branches (lp) and an inner dentiform process (d), as well as with a subterminal orifice of seminal groove opening on a small, bare pulvillus.



Figs 166-169 *Uniramidesmus dentatus* Mikh: 166 — fore part of body; 167 — metazonite 11; 168 — gonopods (lateral view); 169 — distal part of gonopod telopodite; d — inner dentiform process; lp — lateral spines of gonopod telopodite; pp — posterior process of gonopod femorite. — Scales in mm (after Golovatch & Mikhailjova [1979])

Рис. 166-169. *Uniramidesmus dentatus* Mikh: 166 — передний конец тела; 167 — метазонит 11; 168 — гоноподии (вид сбоку); 169 — дистальная часть телоподита гоноподий; d — внутренний зубовидный отросток; lp — боковые шипы телоподита гоноподий; pp — задний отросток фемуры гоноподий. — Масштаб в мм (по [Головач, Михалева, 1979]).

DISTRIBUTION (Map 11). Originally described from the southern and central parts of the Maritime Prov. (Ussuriyskii Reserve, Khasan, Dalnegorsk and Chuguyevka districts), this species has been recorded also in the Sikhote-Alin Biosphere Reserve, Maritime Prov., as well as in the Nanaisky and Bikin districts, S Khabarovsk Province. However, the records of this species in the Zeya and Khingan reserves, Amurskaya Area, by Ganin [1997] require confirmation; hence the necessary qualifications.

Uniramidesmus alveolatus Mikhailjova, 1979

Figs 170-174, Map 11.

Uniramidesmus alveolatus Mikhailjova in: Golovatch & Mikhailjova, 1979: 831, figs.

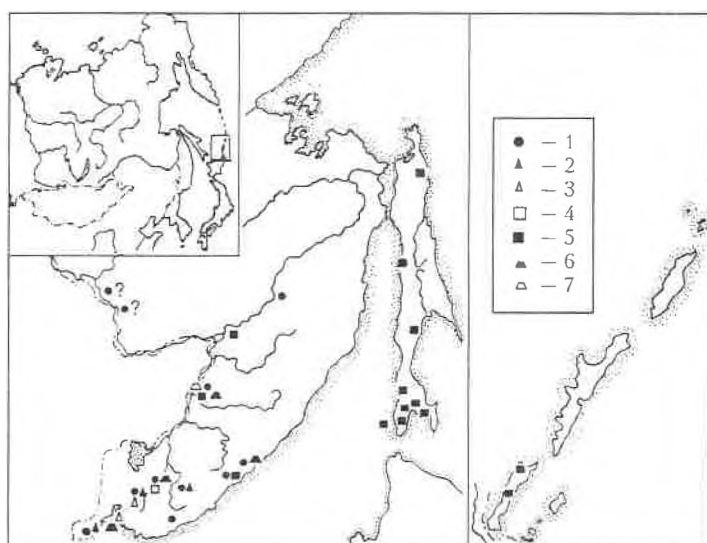
Uniramidesmus alveolatus — Loksina & Golovatch, 1979: 384, Mikhailjova, 1983b: 85; 1988b: 70; 1993: 32; Mikhailjova & Petukhova, 1983: 53; Ganin, 1997: 121.

DESCRIPTION. Adult ♂ and ♀ 8-9 mm long, 0.8-1.0 mm wide. Colouration dark pinkish. Head covered with dense minute pubescence. Antennae short, clavate. Distodorsal parts of antennomeres 5-7 each with a group of short baton-shaped sensilla. Length ratios of antennomeres 2-7 as 1.1:1.8:1.2:1.2:2.1:1. Culum semicircular, somewhat narrower than head with genae. Body growing in width toward somite 5 or 6, onward parallel-sided until somite 18, further on tapering caudally. Metatergal polygonal sculpture of somites 1-4 as three transverse rows of high setigerous knobs (Fig. 170). Starting from somite 5, knobs getting gradually reduced, turning into usual three rows of flat bosses, with rows 1 and 3 developed better (Fig. 171). Lateral boss of 3rd row well-developed. Paraterga small, mostly moderately rounded laterally, caudolateral corners pointed. Paraterga 2 and 3 straight laterally. Somital

microsculpture microreticulate throughout.

♂ legs somewhat incrassate compared to ♀ ones. Each ♂ coxa 2 with a small projection terminating vasa deferentia. Epigynal ridge behind ♀ coxae 2 small, bare.

Gonopods (Figs 173, 174) strongly falcate, crossing in situ. Prefemoral part setose, femorite with a rounded



Map 11. Distribution of *Uniramidesmus dentatus* (1), *U. alveolatus* (2), *U. deterus* (3), *U. cornutus* (4), *U. septimus* (5), *U. aberrans* (6), *U. constrictus* (7).

Карта 11. Распространение *Uniramidesmus dentatus* (1), *U. alveolatus* (2), *U. deterus* (3), *U. cornutus* (4), *U. septimus* (5), *U. aberrans* (6), *U. constrictus* (7).

HABITATS. Litter of mountainous and valley forests of different types. This species has also been recorded in the uppermost soil strata (0-10 cm) [Mikhailjova, 1983b]. In the S Maritime Province, the numbers range from 0.5 to 11.0 ind. per sq. m [Kurcheva & Mikhailjova, 1980; Mikhailjova & Bakurov, 1989; Mikhailjova, 1981c, 1988b].

posterior outgrowth (b); entire telopodite = solenomeric with a tiny denticle (h) subapically and a posterior outgrowth, fold at ca. $\frac{3}{4}$ extent of telopodite; subterminal orifice of seminal groove opening on a small, micropilose pulvillus; tip of gonopod subunciform.

HABITATS. Litter and the uppermost soil horizons of coniferous-broadleaved forests [Mikhailjova, 1983b]. In the S Maritime Province, the numbers average 0.8 ind. per sq. m [Mikhailjova, 1988b].

DISTRIBUTION (Map 11). Originally described from the southern and central parts of the Maritime Province (Ussuriyskii Reserve, Khasan and Chuguyevka districts), this species has since never been rediscovered.

Uniramidesmus deterrentus Golovatch, 1979
Figs 175-178, Map 11.

Uniramidesmus deterrentus Golovatch in: Golovatch & Mikhailjova, 1979: 831, figs.

Uniramidesmus deterrentus — Lokšina & Golovatch, 1979: 384; Mikhailjova, 1983b: 85; 1988b: 70; 1993: 33; Mikhailjova & Petukhova, 1983: 53; Ganin, 1997: 121.

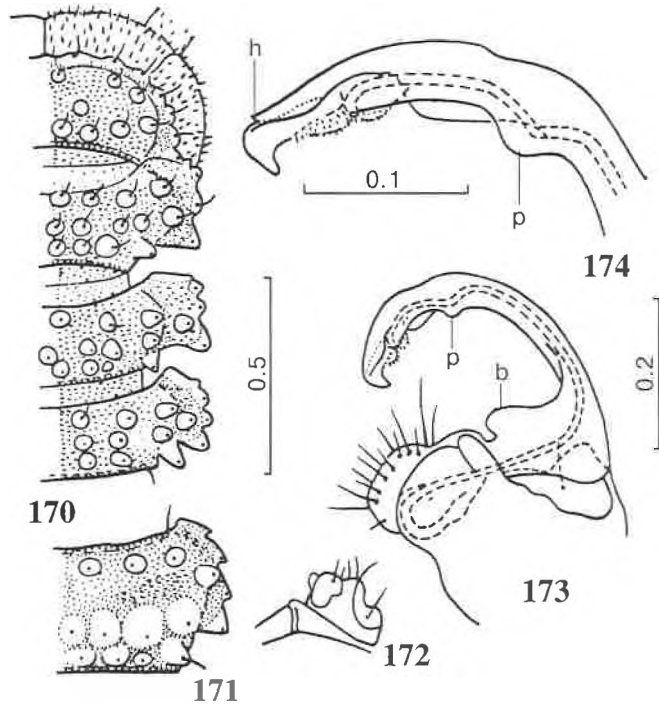
DESCRIPTION. Adult ♂ and ♀ 9-11 mm long, 1.0-1.2 mm wide. Colouration pinkish. Head (Fig. 175) covered with dense minute pubescence. Antennae short, clavate. Distodorsal parts of antennomeres 5-7 each with a group of short baton-shaped sensilla. Length ratios of antennomeres 2-7 as 1.1:1.8:1.4:1.4:2.4:1. Collum semicircular, somewhat narrower than head with genae. Body growing in width toward somite 5 or 6, onward parallel-sided until somite 18, further on tapering caudally. Metatergal polygonal sculpture relatively strongly obliterated, yet traceable as three transverse rows of setigerous knobs on bosses (Fig. 176). Lateral boss of 3rd row inconspicuous. Paraterga very small, rounded laterally, caudolateral corners blunt but collum with pointed caudolateral corners. Epiproct long, cylindrical, blunt at tip.

♂ legs somewhat incrassate compared to ♀ ones. Each ♂ coxa with a projection terminating vasa deferentia. Epigynal ridge behind ♀ coxae 2 small, bare.

Gonopods (Figs 177, 178) strongly falcate, crossing in situ. Prefemoral part setose, femurite with a large cariniform outgrowth (b); entire telopodite = solenomeric with a small dentiform process (o) proximad of a subterminal orifice of seminal groove opening on a small, micropilose pulvillus; tip of gonopod unciform.

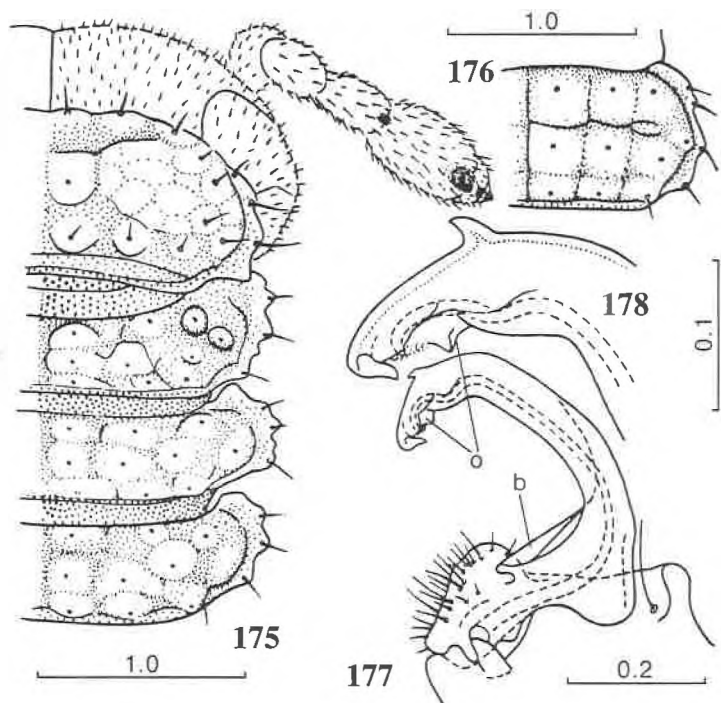
Figs 175-178. *Uniramidesmus deterrentus* Gol.: 175 — fore part of body; 176 — metazonite 11; 177 — gonopods (lateral view); 178 — distal part of gonopod telopodite; b — outgrowth of gonopod femur; o — dentiform process of gonopod telopodite. — Scales in mm (after Golovatch & Mikhailjova [1979]).

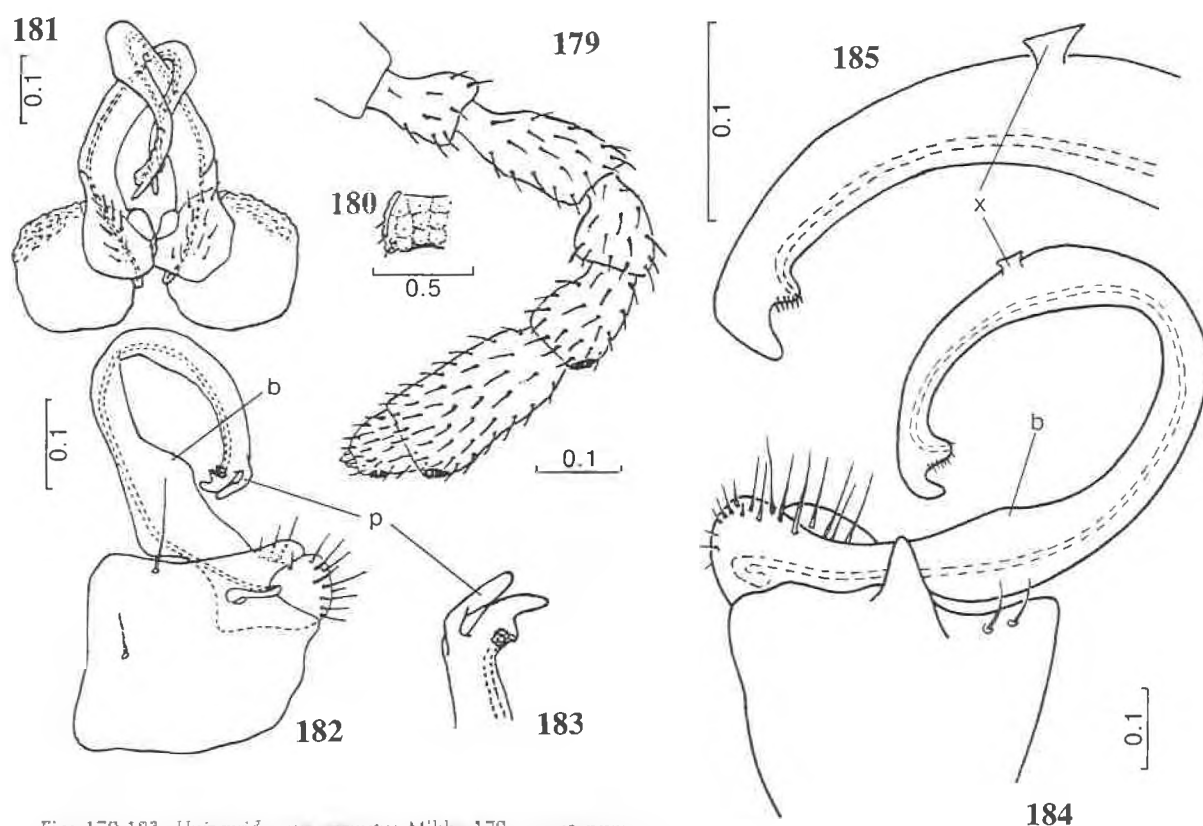
Рис. 175-178. *Uniramidesmus deterrentus* Gol.: 175 — передний конец тела; 176 — метазонит 11; 177 — гоноподии (вид сбоку); 178 — дистальная часть телоподита гоноподий; b — вырост фемуры гоноподий; o — зубовидный отросток телоподита гоноподий. — Масштаб в мм (по [Головач, Михалева, 1979]).



Figs 170-174. *Uniramidesmus alveolatus* Mikh.: 170 — fore part of body; 171 — metazonite 11; 172 — ♂ coxa 2; 173 — gonopods (lateral view); 174 — distal part of gonopod telopodite; b — outgrowth of gonopod femurite; h — tooth of gonopod telopodite; p — posterior projection of gonopod telopodite. — Scales in mm (after Golovatch & Mikhailjova [1979]).

Рис. 170-174. *Uniramidesmus alveolatus* Mikh.: 170 — передний конец тела; 171 — метазонит 11; 172 — кокса 2-й пары ног у ♂; 173 — гоноподии (вид сбоку); 174 — дистальная часть телоподита гоноподий; b — вырост фемуры гоноподий; h — зубчик на телоподите гоноподий; p — задний выступ телоподита гоноподий. — Масштаб в мм (по [Головач, Михалева, 1979]).





Figs 179-183. *Uniramidesmus cornutus* Mikh. 179 — antenna; 180 — metazonite 11; 181 — gonopods (caudal view); 182 — gonopods (mesal view); 183 — distal part of gonopod telopodite; b — outgrowth of gonopod femorite; p — process of gonopod telopodite. — Scales in mm (after Mikhajlova [1984a]).

Рис. 179-183. *Uniramidesmus cornutus* Mikh: 179 — антенна; 180 — метазонит 11; 181 — гоноподии (вид сзади); 182 — гоноподии (вид изнутри); 183 — дистальная часть телоподита гоноподий; b — вырост фемуры гоноподий; p — отросток телоподита гоноподий. — Масштаб в мм (по [Михалева, 1984a]).

Figs 184-185. *Uniramidesmus septimus* Mikh. 184 — gonopods (lateral view); 185 — distal part of gonopod; b — outgrowth of gonopod femorite; x — projection of gonopod telopodite. — Scales in mm (after Mikhajlova [1990]).

Рис. 184-185. *Uniramidesmus septimus* Mikh: 184 — гоноподии (вид сбоку); 185 — дистальная часть гоноподий; b — вырост фемуры гоноподий; x — выступ телоподита гоноподий. — Масштаб в мм (по [Михалева, 1990]).

HABITATS. Litter of mixed coniferous-broadleaved and broadleaved forests, both mountainous and in valleys [Mikhajlova, 1983b]. This species has also been recorded in rotten wood. In the S Maritime Province, the numbers average 0.3 ind. per sq. m [Mikhajlova, 1988b].

DISTRIBUTION (Map 11). Originally described from the southern part of the Maritime Province (Usuriyskii Reserve and the environs of Vladivostok), this species has since never been rediscovered.

Uniramidesmus cornutus Mikhajlova, 1984
Figs 179-183, Map 11.

Uniramidesmus cornutus Mikhajlova, 1984a: 456, figs.

Uniramidesmus cornutus — Mikhajlova & Bakurov, 1989: 40; Mikhajlova, 1993: 32; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ and ♀ 8-10 mm long, 0.8-0.9 mm wide. Colouration brown-pink. Head covered with dense minute pubescence. Antennae short, clavate (Fig. 179). Distal part of antennomeres 5-7 dorsally with groups of short batons. Length ratios of antennomeres 2-7 as 1.5:2.3:1.5:1.7:2.7:1. Collum ovoid, narrower than head with genae. Metatergal polygonal sculpture as three transverse rows small setigerous knobs on bosses (Fig. 180). Lateral bosses of 3rd row inconspicuous. Paraterga

narrow, arcuate laterally, caudolateral corners blunt. Somital microsculpture microreticulate throughout.

♂ legs similar to ♀ ones. Each ♂ coxa 2 with a projection of vasa deferentia. Epigynal ridge behind ♀ coxae 2 bisinuate.

Gonopods (Figs 181-183) falcate, crossing in situ. Prefemur setose, femorite with a posterior tuberculiform projection (b); telopodite = solenomerite apically with a ventral unciform outgrowth (p); orifice of seminal groove subterminal on a small, micropilose pulvillus.

HABITATS. Litter and the uppermost soil horizons of mixed forests. The greatest locomotor activity is in the second half of May and the first half of June. In the S Maritime Province, the numbers range from 1.0 to 16.0 ind. per sq. m [Mikhajlova & Bakurov, 1989].

DISTRIBUTION (Map 11). Originally described from the Anuchino Distr., Maritime Province, this species has since never been rediscovered.

Uniramidesmus septimus Mikhajlova, 1990
Figs 184-185, Map 11.

Uniramidesmus septimus Mikhajlova, 1990: 137, figs.

Uniramidesmus septimus — Mikhajlova, 1993: 33; Mikhajlova & Basarukin, 1995: 94, map; Ganin, 1997: 105.

DESCRIPTION. Adult ♂ and ♀ 8.5-10 mm long, 0.8-1.0 mm wide. Colour pinkish, brighter in anterior body end. Head covered with dense minute pubescence. Antennae short, clavate. Distal part of antennomeres 5-7 dorsally with a group of short batons. Length ratios of antennomeres 2-7 as 1.4:2.15:1.5:1.5:2.4:1. Collum semi-circular, somewhat narrower than head with genae. Metatergal polygonal sculpture as three transverse rows of small setigerous knobs on bosses, last row much narrower than both preceding ones. Lateral bosses of 3rd row rather conspicuous. Paraterga narrow, arcuate laterally, caudolateral corners blunt. Somital microsculpture microreticulate throughout.

♂ legs somewhat enlarged compared to ♀ ones. Epigynal ridge behind ♀ coxae 2 like two low transverse-oval crests, front one single-humped, serving as anterior edge of sternite, while caudal one bisinuate.

Gonopods (Figs 184, 185) falcate, crossing in situ. Prefemur setose, femorite with a very low, posterior, triangular projection (b); telopodite = solenomerite ventrally with 1-2 small, blade-like outgrowths (x); orifice of seminal groove subterminal on a high, micropilose pulvillus.

HABITATS. Litter of coniferous, mixed and broad-leaved forests. The numbers reach up to 280 ind. per sq.m. in the Khekhtsyrs Reserve, environs of Khabarovsk [Ganin, 1997].

DISTRIBUTION (Map 11). Originally described from Sakhalin Island (Aniva and Korsakov districts) and Kunashir Island, Kuriles, this species has also been recorded in the southern part of the Khabarovsk Province (Bikin Distr. and Khekhtsyrs Reserve).

Uniramidesmus aberrans Mikhaljova, 1979
Figs 186-191, Map 11.

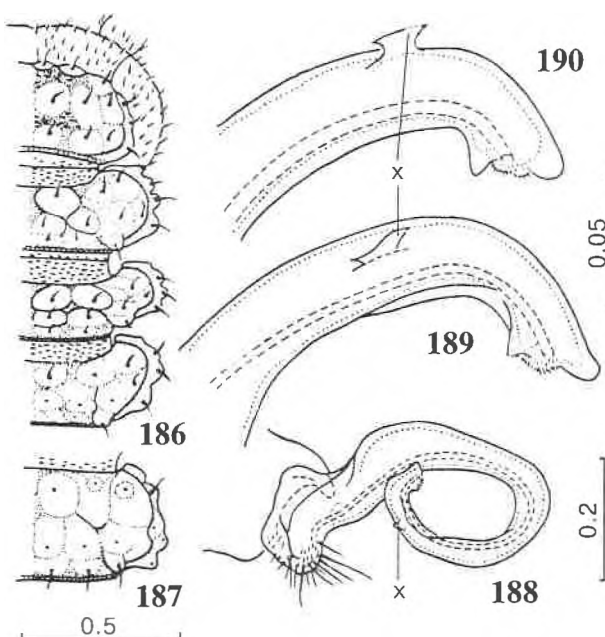
Uniramidesmus aberrans Mikhaljova in: Golovatch & Mikhaljova, 1979: 834, figs.

Uniramidesmus aberrans — Lokšina & Golovatch, 1979: 384; Mikhaljova & Petukhova, 1983: 53; Mikhaljova & Bakurov, 1989: 40; Mikhaljova, 1993: 32; 1998: 3, fig.; Ganin, 1997: 121.

DESCRIPTION. Adult ♂ and ♀ 7-9 mm long, 1.0-1.1 mm wide. Colouration dark pink. Head covered with dense minute pubescence (Fig. 186). Antennae short, clavate. Distodorsal parts of antennomeres 5-7 each with a group of short baton-shaped sensilla. Length ratios of antennomeres 2-7 as 1.8:2.5:1.8:1.9:3.0:1. Collum ovoid, somewhat narrower than head with genae. Body growing in width toward somite 5, onward parallel-sided until somite 17, further on tapering caudally. Metatergal polygonal sculpture composed of three rows of setigerous knobs on bosses. Lateral boss/knob of 3rd row inconspicuous. Paraterga small, rounded laterally, caudolateral corners blunt (Fig. 187).

♂ legs somewhat incrassate as compared to ♀ ones. Each ♂ coxa 2 with a ventral projection terminating vasa deferentia. Epigynal ridge behind ♀ coxae 2 small, with two paramedian setae apically.

Gonopods (Figs 188-191) ring-shaped, coiled caudally, crossing in situ. Prefemur setose, femorite without projections; telopodite = solenomerite very simple, only subterminally with 1-2 tiny, blade-like outgrowths (x), with (Fig. 191) or without (Figs 189, 190) very broad sulcus (s); orifice of seminal groove terminal on a micropilose pulvillus.



Figs 186-190. *Uniramidesmus aberrans* Mikh.: 186 — fore part of body; 187 — metazonite 11; 188 — gonopods (lateral view); 189, 190 — distal part of gonopod telopodite; x — projection of gonopod telopodite. — Scales in mm (after Golovatch & Mikhaljova [1979]).

Рис. 186-190. *Uniramidesmus aberrans* Mikh.: 186 — передний конец тела; 187 — метазонит 11; 188 — гоноподии (вид сбоку); 189, 190 — дистальная часть телоподита гоноподий; x — выступ телоподита гоноподий. — Масштаб в мм (по [Головач, Михалева, 1979]).

REMARKS. It seems noteworthy that the population from near Boitsovo, Bikin Distr., Khabarovsk Prov., contains a distinct male morph in which the subapical part of the solenomerite bears a very broad sulcus and two small, blade-like, ventral outgrowths (Fig. 191). In contrast, in the typical *aberrans* there is only a single blade-like outgrowth and no such a sulcus (Figs 189, 190) [Mikhaljova, 1998].

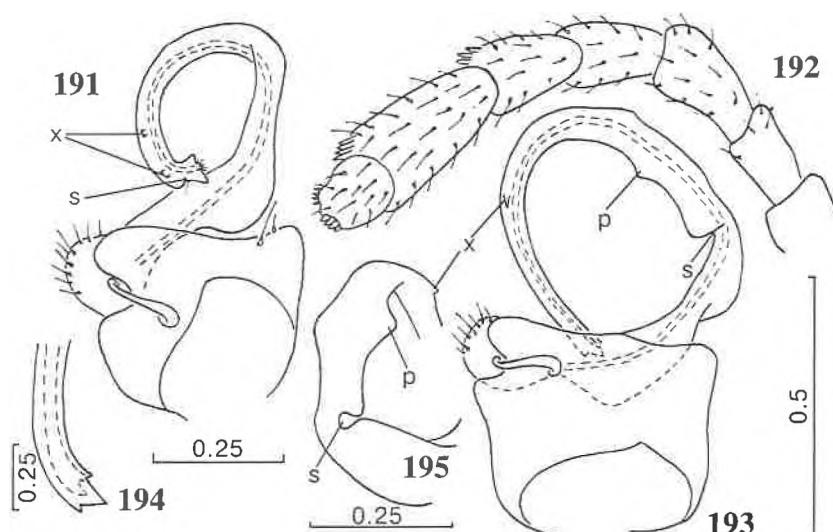
HABITATS. Litter of mixed and broadleaved forests. In the S Maritime Province, the numbers range from 1.0 to 4.0 ind. per sq. m [Mikhaljova, 1988b]. The highest locomotor activity is in the second half of May and the first half of June [Mikhaljova & Bakurov, 1989].

DISTRIBUTION (Map 11). Originally described from the environs of Vladivostok, this species has since been recorded also in the Anuchino and Ternei districts of Maritime Province as well as in the Bikin District of Khabarovsk Province.

Uniramidesmus constrictus Mikhaljova, 1998
Figs 192-195, Map 11.

Uniramidesmus constrictus Mikhaljova, 1998: 3, figs.

DESCRIPTION. Adult ♂ and ♀ 7-8 mm long, 0.5-0.6 mm wide. Body, antennae and legs uniform beige. Head covered with dense short pubescence. Antennae short, clavate. Distal parts of antennomeres 5 and 6 dorsally with a group by small bacilli; distal part of antennomere 7 dorsally with a very small knob surmounted by bacilli (Fig. 192). Bases of antennae very poorly separated. Length ratios of antennomeres 2-7 as 1.2:1.8:1.5:1.4:2.1:1.



Figs 191-195. *Uniramidesmus aberrans* Mikh. (191) and *U. constrictus* Mikh. (192-195): 191 & 193 — gonopods (mesal view); 192 — antenna; 194 — distal part of gonopod telopodite; 195 — medial part of gonopod telopodite; p — prominence of postfemoral part; s — sulcus; x — external outgrowth of telopodite. Scales in mm (after Mikhajlova [1998]).

Рис. 191-195. *Uniramidesmus aberrans* Mikh. (191) и *U. constrictus* Mikh. (192-195): 191, 193 — гоноподии (вид изнутри); 192 — антенна; 194 — дистальная часть телоподита гоноподия; 195 — медиальная часть телоподита гоноподия; p — выступ постфеморальной части; s — сульфус; x — наружный вырост телоподита. Масштаб в мм (по [Михалова, 1998]).

Body substrongylosomoid. Collum ovoid, somewhat narrower than head. Segment 2 somewhat narrower than head. Body growing in width toward segment 5 or 6, onward parallel-sided until segment 18, further on tapering caudally. Metatergal polygonal sculpture as three transverse rows of low bosses with setae, all rows equally well-developed. Lateral boss of caudal row indistinguishable. Polygonal sculpture best developed on segments 1-4 and 17-19, being strongly obliterated in between. Tergal setae short, thin, apically pointed, a little longer on segments 1-4 and 17-19. Paraterga very small, laterally poorly rounded except for paraterga 2-4 with arcuate lateral edges; caudolateral corners obtuse. Legs and body rings finely alveolate, metazonital fields smooth. Epiproct long, cylindrical, apically blunt.

Legs relatively long, claws normal. Each ♂ coxa 2 with a ventral projection terminating vasa deferentia. ♀ sternum 3 with a very low eminence but without epigynal ridge.

Gonopods (Figs 193-195) ring-shaped, coiled caudad. Prefemoral portion usual, setose distally; telopodites in situ crossing each other; subterminal orifice of seminal groove opening on a very small and bare pulvillus (Fig. 194). Femurite set off from postfemoral portion by a deep sulcus (c) (Fig. 195). Angle between basal and apical parts of telopodite obtuse. Distal part of telopodite with a small external outgrowth (x).

HABITATS. Litter of broadleaved forest.

DISTRIBUTION (Map 11). Described very recently, only known from the environs of Bikin, S Khabarovsk Province.

Family Xystodesmidae Cook, 1895

This group is mainly distributed in the Nearctic (about 50 genera) and Southeast and East Asia (about 10 genera). Only one genus occurs in the southern Far East of Russia.

The main distinguishing characters are as follows: peritremata (= lateral calluses) on paraterga present; metatergal polygonal sculpture from absent to inconspicuous, dorsum glabrous; gonopod aperture transverse-oval, gonocoxites subcylindrical, not fused mesally, cannula present; gonopod telopodite without conspicuous, separate, solenomerite branch.

Genus *Levizonus* Attems, 1898

Hitherto known from Far East of Russia (5 species), Korea (1 species), and Japan (2 species), although the presence of this genus also in China is quite obvious.

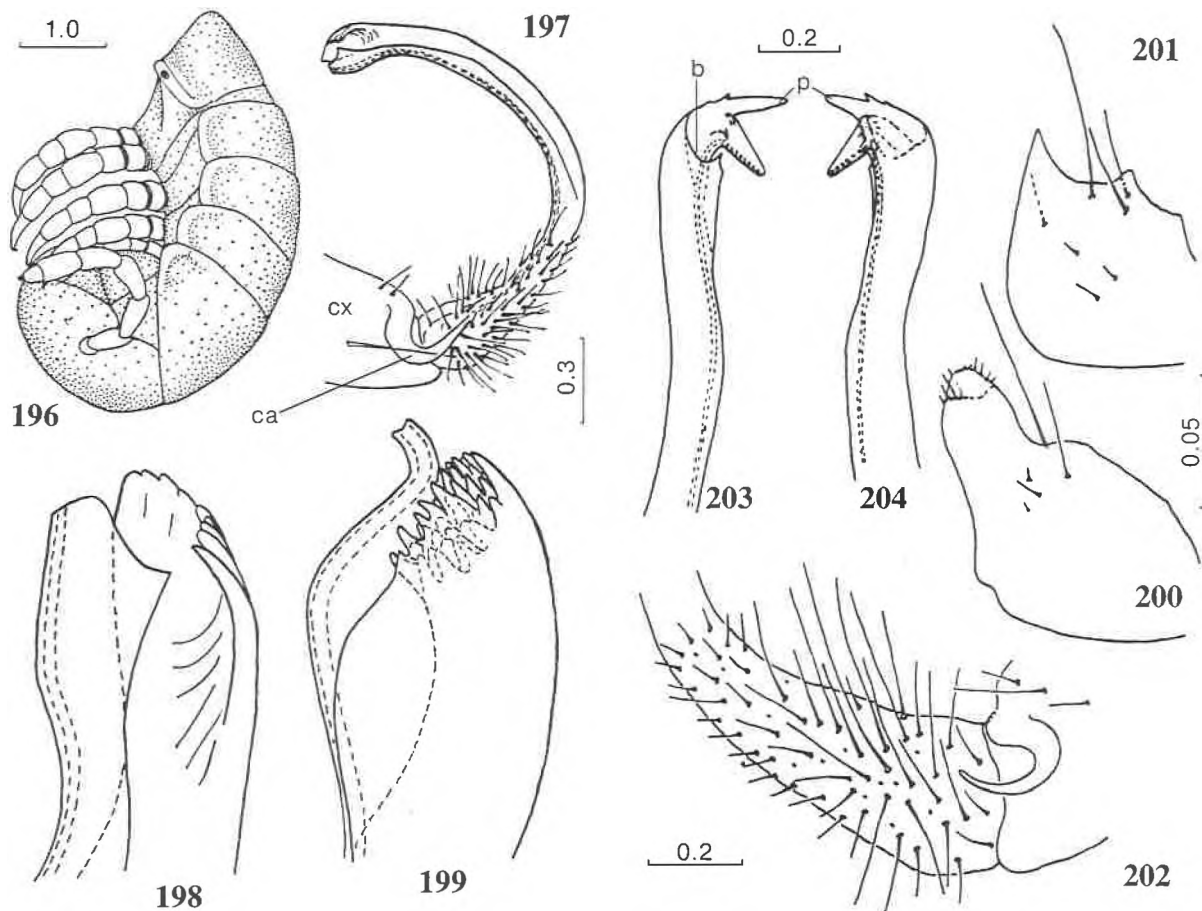
The main distinguishing characters are as follows: body stout; metazonites without transverse sulcus but with peritremata (low lateral outgrowths/calluses) rounded at front and, usually, caudal margins; gonopods arcuate to coiled ring-like; telopodite slender, uniramous, with a modified apex: seminal groove opening terminally on a tiny solenomerite.

KEY TO SPECIES OF *LEVIZONUS*:

- 1(8) Metazonital surface smooth, without bosses 2
- 2(3) Apex of gonopod telopodite like two plates placed perpendicular to each other; one of the plates serrate at outer margin, the other a rudimentary solenomerite (Figs 197-199) *L. malewitschi*
- 3(2) Apex of gonopod telopodite different 4
- 4(5) External dentiform process of gonopod telopodite (z) with a large horn (p) basally (Figs 203, 204) *L. distinctus*
- 5(4) External dentiform process of gonopod telopodite without horn basally 6
- 6(7) Interior edge of telopodite apex (b) always smooth, with neither spines nor outgrowths. External dentiform process of telopodite (z) straight (Figs 207-209) *L. laqueatus*
- 7(6) Interior edge of telopodite apex (b) smooth or with one to numerous small outgrowths. External dentiform process of telopodite (z) curved (Figs 211-217) *L. thaumasius*
- 8(1) Metazonital surface with bosses (Fig. 218) *L. variabilis*

Levizonus malewitschi Lokšina & Golovatch, 1977
Figs 196-199, Map 12.

Levizonus malewitschi Lokšina & Golovatch, 1977: 75, figs.
Levizonus malewitschi — Lokšina & Golovatch, 1979: 385;
Kurcheva & Mikhajlova, 1980: 120; Mikhajlova, 1981a: 66,
map; 1983b: 81; 1990: 136; 1993: 33; Mikhajlova & Petukhova,
1983: 53; Ganin, 1997: 124.



Figs 196-199. *Levizonus malewitschi* Lok et Gol.: 196 — fore part of body; 197 — gonopods; 198, 199 — distal part of gonopod telopodite; ca — cannula; cx — coxite. — Scales in mm (after Lokšina & Golovatch [1977]).

Рис 196-199. *Levizonus malewitschi* Lok et Gol.: 196 — передний конец тела; 197 — гоноподии; 198, 199 — дистальная часть телоподита гоноподий; ca — рог коксита гоноподий; cx — коксит. — Масштаб в мм (по [Локшина, Головач, 1977]).

DESCRIPTION. Adult ♂ 23-28 mm long, 3.6-4.0 mm wide. Adult ♀ 23-30 mm long, 3.0-3.8 mm wide. Colouration shining whitish. Head sparsely setose along external margin only, with 2+2 vertical setae. Antennae slender, in situ reaching the posterior edge of segment 2. Collum ovoid, not broader than head and somite 2 (Fig. 196). Peritremata rounded at front and caudal margins, non-angulate. Only posterior edge of metazonite 18 with a small dentiform outgrowth.

Each ♂ coxa 2 mesally with a large, setose, unciform process terminating vasa deferentia. Each ♀ coxa 2 with a spiniform process.

Gonopod coxite (cx) (Fig. 197) massive, with three setae, a long, straight, basal process, and a cannula (ca). Telopodite coiled ring-like, prefemur setose as usual. Apex of telopodite (Figs 198, 199) split into two plates: a serrate exterior and a rudimentary solenomerite interior devoid of a dentiform outgrowth.

HABITATS. Litter and the uppermost soil strata (down to 20 cm deep) [Mikhaljova, 1983b] of different types of mountainous and valley forests. In the S Maritime Province, the numbers range from 3.5 to 62 ind.

Figs 200-204. *Levizonus distinctus* Mikh.: 200 — ♂ coxa 2; 201 — ♀ coxa 2; 202 — coxite and prefemoral part of gonopod telopodite; 203 — distal part of gonopod telopodite (mesal view); 204 — distal part of gonopod telopodite (lateral view); b — interior edge of apex of gonopod telopodite; p — horn of gonopod telopodite; z — dentiform process of gonopod telopodite. — Scales in mm (after Mikhaljova [1990]).

Рис 200-204. *Levizonus distinctus* Mikh.: 200 — 2-я кокса у ♂; 201 — 2-я кокса у ♀; 202 — коксит и префеморальная часть телоподита гоноподий; 203 — дистальная часть телоподита гоноподий (вид изнутри); 204 — дистальная часть телоподита гоноподий (вид сбоку); b — внутренний край вершины телоподита гоноподий; p — рог телоподита гоноподий; z — зубовидный отросток телоподита гоноподий. — Масштаб в мм (по [Михалева, 1990]).

per sq. m [Kurcheva & Mikhaljova, 1980]. This species is characterized by an extended period of reproduction, with dominance of juveniles over adults.

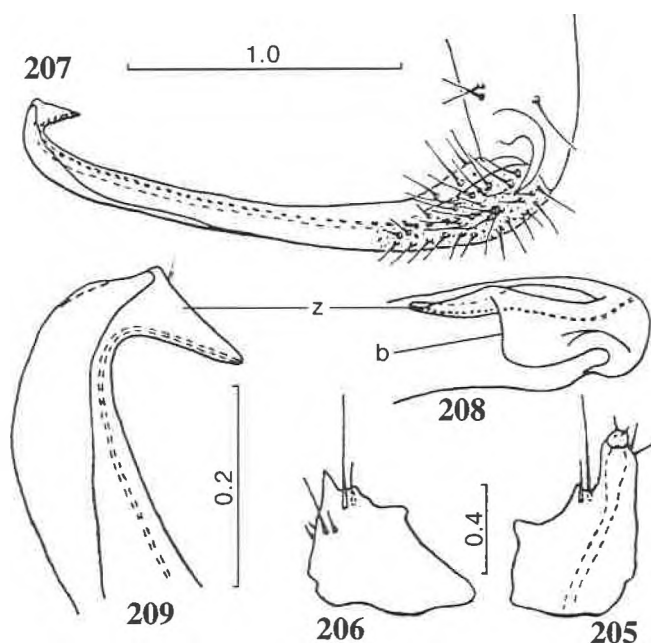
DISTRIBUTION (Map 12). Originally described from Kavalerovo Distr., Maritime Prov., this species appears to be widespread in the Province's central and eastern parts.

Levizonus distinctus Mikhaljova, 1990
Figs 200-204, Map 12.

Levizonus distinctus Mikhaljova, 1990: 135, figs.

Levizonus distinctus — Mikhaljova, 1993: 33; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ 20-23 mm long, 1.8-2.0 mm wide. Adult ♀ 22-24 mm long, 2.8-2.9 mm wide. Colouration yellow or yellow-white. A very vague tergal pattern



Figs 205-209. *Levizonus laqueatus* Mikh.: 205 — ♂ соха 2; 206 — ♀ сохы 2; 207 — gonopods (mesal view); 208 — distal part of gonopod telopodite (ventral view); 209 — distal part of gonopod telopodite (mesal view); b — interior edge of gonopod telopodite apex; z — dentiform process of gonopod telopodite. — Scales in mm (after Mikhajlova [1981a]).

Рис 205-209. *Levizonus laqueatus* Mikh.: 205 — 2-я соха у ♂; 206 — соха 2-й пары ног у ♀; 207 — гоноподии (вид изнутри); 208 — дистальная часть телоподита гоноподий (вид снизу); 209 — дистальная часть телоподита гоноподий (вид изнутри); b — внутренний край вершины телоподита гоноподий; z — зубовидный отросток телоподита гоноподий. — Масштаб в мм (по [Михалева, 1981а]).

traceable as transverse pale yellow and/or white bands and lateral spots. Head with 2+2 vertigial setae. Antennae slender, medium-sized. Collum ovoid, considerably broader than head and somewhat narrower than segment 2. Peritremata small, rounded laterally, caudolateral corners absent. Peritremata 19 rather strongly reduced.

♂ coxa 2 with a large process curved forward (Fig. 200). ♀ coxa 2 with a pointed process (Fig. 201).

Gonopod coxite (Fig. 202) with strong three setae and a cannula. Telopodites in situ holding parallel to each other, with a densely setose prefemur. Distal part of

telopodite (Figs 203, 204) with a dentiform process = solenomerite (z) curved inside, carrying a large horn (p) bearing spinules of different sizes and terminating seminal groove. Inner edge of telopodite apex (b) concave, with a pointed outgrowth.

HABITATS. Litter and the uppermost soil strata of different types of mountainous and valley forests.

DISTRIBUTION (Map 12). This species is only known from the Sikhote-Alin Biosphere Reserve, Maritime Prov., its terra typica.

Levizonus laqueatus Mikhajlova, 1981 Figs 205-209, Map 12.

Levizonus laqueatus Mikhajlova, 1981a: 63, figs.

Levizonus laqueatus — Mikhajlova, 1983b: 87; 1993: 33; Mikhajlova & Petukhova, 1983: 53; Ganin, 1997: 126.

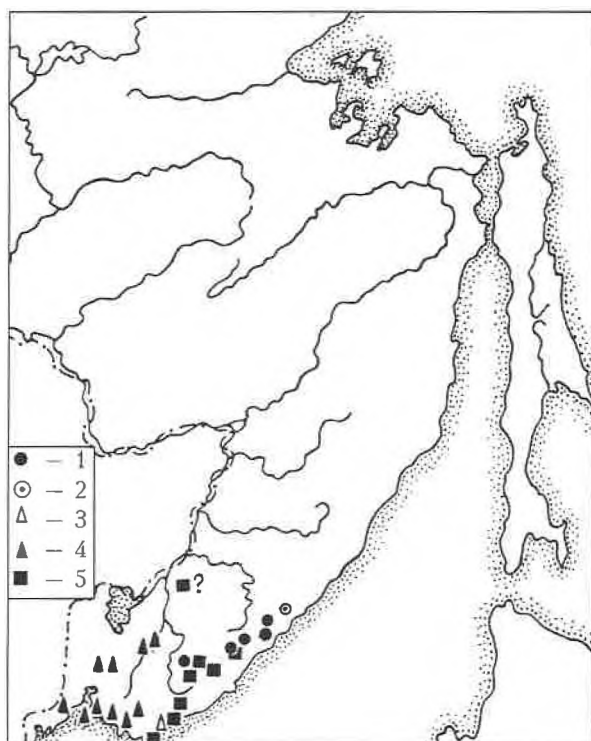
DESCRIPTION. Adult ♂ 25-27 mm long, 3.1-3.2 mm wide. Adult ♀ 27-29 mm long, 4.0-4.2 mm wide. Colour of ventral and lateral parts of body yellow-white with a brown tergal pattern. ♂ and aged adults brighter, juveniles pallid. Head with 2+2 vertigial setae. Antennae long and slender. Collum ovoid, considerably broader than head but not broader than segment 2. Peritremata poorly-developed, rounded laterally. Peritremata 19 somewhat reduced. Starting from somite 12 or 13, peritremata with a rounded, though never clear-cut, caudal corner.

♂ coxa 2 with a large, setigerous process curved forward (Fig. 205). ♀ coxa 2 with a small, pointed, setigerous process (Fig. 206).

Gonopod coxite (Figs 207) with three strong setae and a cannula. Prefemur densely setose as usual. Distal part of telopodite (Figs 208, 209) with and external, straight, dentiform process = solenomerite (z) curved inside and terminating seminal groove. Inner edge of telopodite apex (b) smooth, with neither outgrowths nor excavation.

HABITATS. Litter and the uppermost soil strata (down to 20 cm deep) [Mikhajlova, 1983b] of a *Quercus mongolica* forest at a small pass (150-250 m a.s.l.) in the Zapovednyi Mt. Range, S Sikhote-Alin Mts. The numbers reach up to 166 ind. per sq. m [Mikhajlova, 1981c].

DISTRIBUTION (Map 12). This species is only known from the southeastern part of the Lazovskii Reserve, Maritime Prov., its terra typica.



Map 12. Distribution of *Levizonus malewitschi* (1) *L. distinctus* (2), *L. laqueatus* (3), *L. thaumasius* (4), *L. variabilis* (5).

Карта 12. Распространение *Levizonus malewitschi* (1), *L. distinctus* (2), *L. laqueatus* (3), *L. thaumasius* (4), *L. variabilis* (5).

Figs 210-217. *Levizonus thaumasius* Att: 210 — sides of body segments 14 and 15; 211 — gonopods (mesal view); 212-213 — distal part of gonopod telopodite (lateral view); 214-217 — distal part of gonopod telopodite (ventral view); b — interior edge of apex of gonopod telopodite; z — dentiform process of gonopod telopodite. — Scales in mm (210 — after Golovatch [1979d], 211-213 — after Lokšina & Golovatch [1977], 214-217 — after Mikhajlova [1981a]).

Рис. 210-217. *Levizonus thaumasius* Att: 210 — стороны 14 и 15 сегментов тела; 211 — гоноподии (вид изнутри); 212-213 — дистальная часть телоподитов гоноподий (вид сбоку); 214-217 — дистальная часть телоподитов гоноподий (вид снизу); b — внутренний край вершины телоподита гоноподий; z — зубовидный отросток телоподита гоноподий. — Масштаб в мм (210 — по [Головач, 1979d], 211-213 — по [Локшина, Головач, 1977], 214-217 — по [Михалева, 1981a]).

Levizonus thaumasius Attems, 1898
Figs 210-217, Map 12.

Levizonus thaumasius Attems, 1898: 352, fig.

Levizonus thaumasius — Attems, 1931: 69, fig.; 1938: 173, figs; Golovatch, 1979d: 17, figs; Lokšina & Golovatch, 1979: 385; Mikhajlova, 1981a: 66, figs, map; 1983b: 81; 1984b: 14; 1988b: 70; 1990: 136; 1993: 33; 1997a: 143; Mikhajlova & Petukhova, 1983: 53; Mikhajlova & Bakurov, 1989: 40; Ganin, 1997: 121.

Levizonus orientalis Lokšina & Golovatch, 1977: 77, figs.
DESCRIPTION. Adult ♂ 27-30 mm long, 3.8-4.0 mm wide. Adult ♀ 25-30 mm long, 4.0-4.5 mm wide. Colouration shining whitish. Head with 2+2 vertigial setae. Antennae long and slender. Collum ovoid. Peritremata poorly-developed, slender laterally (Fig. 210). Peritremata 19 somewhat reduced.

♂ coxa 2 with a large setose process curved forward.
♀ coxa 2 with a large pointed process.

Gonopod coxite (Fig. 211) with three strong setae and a cannula. Telopodite coiled ring-like, with a densely setose prefemur. Distal part of telopodite (Figs 212, 213) with an external dentiform, curved process = solenomerite (z) terminating seminal groove. Inner edge of telopodite apex (b) smooth or carrying one to numerous, small outgrowths (Figs 214-217).

HABITATS. Litter and the uppermost soil strata (down to 20 cm deep) [Mikhajlova, 1983b] of different types of mountainous and valley forests, sometimes probably troglomorphic [Mikhajlova, 1997a]. In the S Maritime Province, the numbers reach up to 172.5 ind. per sq. m [Mikhajlova, 1988b]. This species is characterized by an extended period of reproduction, egg-laying and earliest instars occurring throughout the warm season

[Mikhajlova, 1984b]. As a result, 81-99% of the population are represented by juveniles mostly restricted to the uppermost soil. In contrast, adults prefer dwelling in forest litter [Mikhajlova, 1983b].

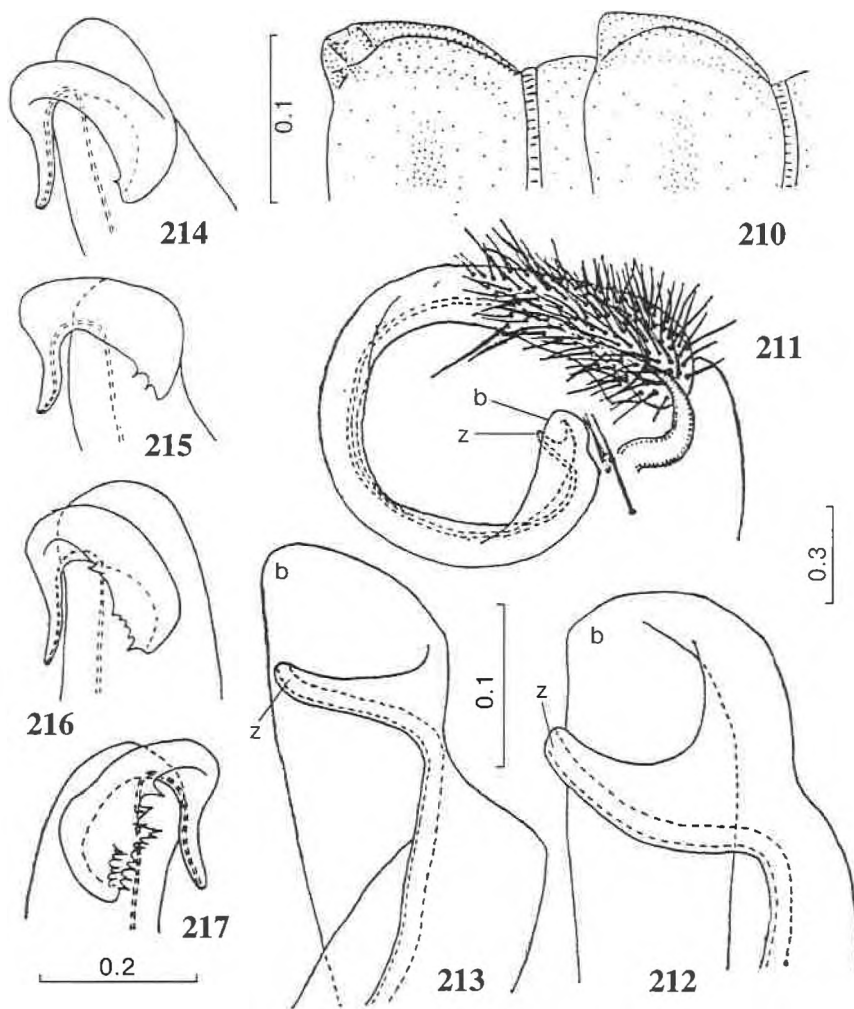
DISTRIBUTION (Map 12). Originally described from near Vladivostok, this species appears to be widespread in the southern part of the Maritime Province.

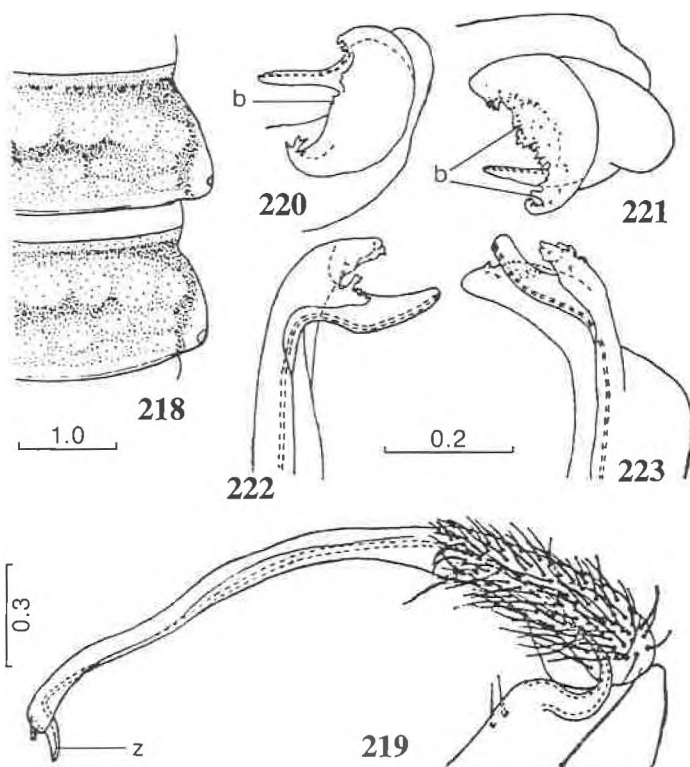
Levizonus variabilis Lokšina & Golovatch, 1977
Figs 218-223, Map 12.

Levizonus variabilis Lokšina & Golovatch, 1977: 76, figs.

Levizonus variabilis — Lokšina & Golovatch, 1979: 385; Kurcheva & Mikhajlova, 1980: 120; Mikhajlova, 1981a: 66, figs, map; 1981c: 87; 1983b: 81; 1990: 136; 1993: 34; Mikhajlova & Petukhova, 1983: 53; Ganin, 1997: 124.

DESCRIPTION. Adult ♂ 20-30 mm long, 3.3-3.8 mm wide. Adult ♀ 25-32 mm long, 3.0-4.0 mm wide. Colouration shining whitish, dorsally often brown. Metazona with transverse rows of bosses (Fig. 218) increasingly evident from somite 5 on, especially so in ♂. Head with 2+2 vertigial setae. Antennae long and somewhat slender. Collum and two subsequent segments arcuate. Peritremata poorly-developed, peritremata 19 especially strongly reduced. Telson with a long setose epiproct.





Figs 218-223. *Levizonus variabilis* Lok. et Gol.: 218 — body segments 12 and 13; 219 — gonopods (mesal view); 220-221 — distal part of gonopod telopodite (ventral view); 222-223 — distal part of gonopod telopodite (lateral view); b — interior edge of gonopod telopodite apex; z — dentiform process of gonopod telopodite. — Scales in mm (218, 220-223 — after Mikhajlova [1981a], 219 — after Lokšina & Golovatch [1977]).

Рис. 218-223. *Levizonus variabilis* Lok. et Gol.: 218 — 12 и 13 сегменты тела; 219 — гоноподии (вид изнутри); 220-221 — дистальная часть телоподитов гоноподий (вид снизу); 222-223 — дистальная часть телоподитов гоноподий (вид сбоку); b — внутренний край вершины телоподита гоноподий; z — зубовидный отросток телоподита гоноподий. — Масштаб в мм (218, 220-223 — по [Михалева, 1981а], 219 — по [Локшина, Головач, 1977]).

Genus *Sichotanus* Attems, 1898

A single, rather strongly variable species previously referred to as four different species [cf. Jeckel, 1988]. Distributed in Korea, North-east China, and the Far East of Russia.

The main distinguishing characters of the genus are as follows: gonopod femorite with a groove mesally, distal part of gonopod telopodite strongly twisted, very complex, post-femoral portion demarcated by a transverse sulcus, with 4-5 processes.

Gonopod coxite (Fig. 219) with three strong setae and a cannula. Telopodite in situ holding parallel to each other, with a densely setose prefemur. Distal part of telopodite (Figs 220-223) with an external dentiform process = solenomerite (z) terminating seminal groove. Inner edge of telopodite apex (b) with outgrowths and spinules of varying shape and size.

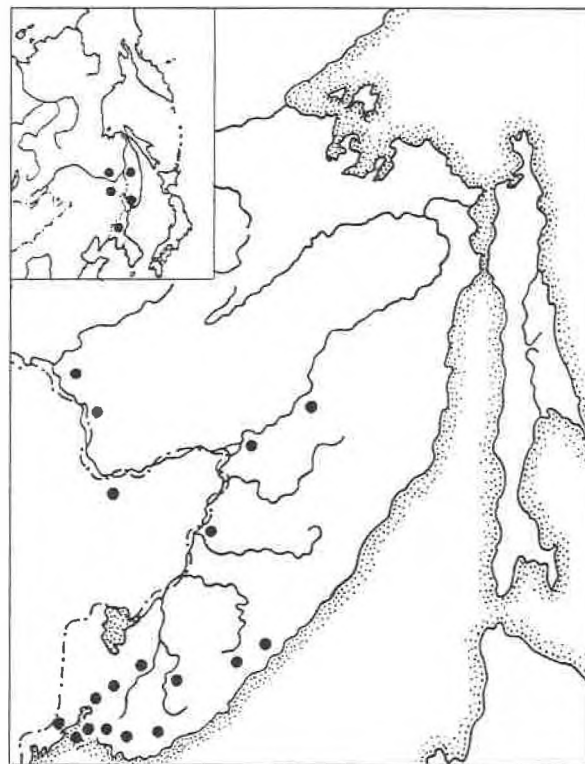
HABITATS. Litter and the uppermost soil strata (down to 20 cm deep) of different types of mountainous and valley forests. In the S Maritime Province, the numbers reach up to 143 ind. per sq. m [Mikhajlova, 1981c]. Due to an extended period of reproduction, soil-dwelling instars prevail in the populations, while adults prefer living in forest litter [Mikhajlova, 1983b].

DISTRIBUTION (Map 12). Originally described from the Kavalerovo and Lazo districts, Maritime Prov., this species appears to be widespread in the Province's southeastern part.

Family Paradoxosomatidae Daday, 1898

About 190 genera. Distributed in Eurasia, Africa, Australia and South America, remarkably absent from the Nearctic. In the Far East of Russia, four genera and species are known to occur.

The main distinguishing characters of the family are as follows: paraterga of somite 2 set lower than those of somite 3, and lateral end of collum; upper seta on anal valves removed from caudal margin; peritremata on paraterga present; metaterga almost always with a transverse sulcus, macrosculpture / setation usually wanting; sternal lamina / cones between ♂ coxae 4 usually present; gonopod aperture mostly transverse-oval, gonopods never fused medially; cannula present; solenomerite branch largely well-developed, usually flagelliform.

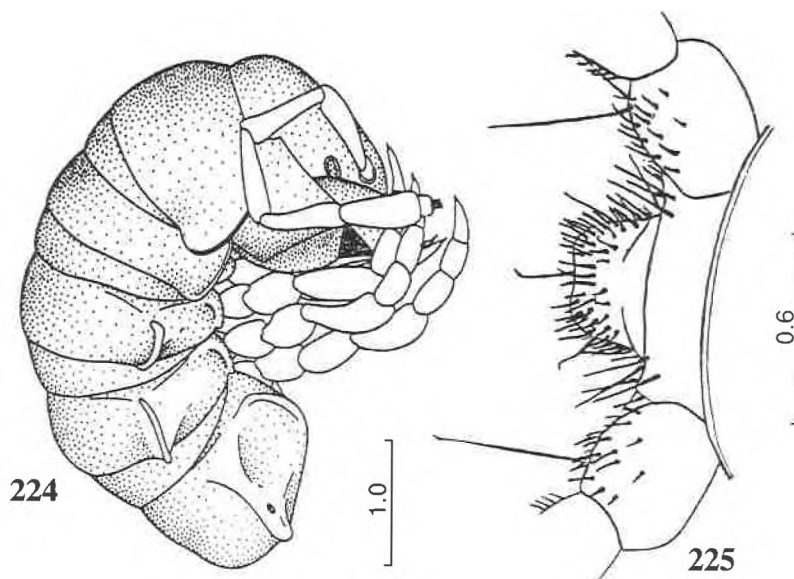


Map 13. Distribution of *Sichotanus curygaster* (●).

Карта 13. Распространение *Sichotanus curygaster* (●).

Figs 224-228. *Sichotanus eurygaster* (Att.): 224 — fore part of body; 225 — lamina between ♂ coxae 4; 226-228 — gonopods; b, c, d, e, y — processes of postfemoral part; fo — femoral groove; sl — solenomerite; sph — solenophore; tt — tibiotarsus. — Scales in mm (224-225 — after Golovatch [1976a], 226-228 — after Golovatch [1978a]).

Рис. 224-228. *Sichotanus eurygaster* (Att.): 224 — передний конец тела; 225 — пластинка между коксами 4-й пары ног у ♂; 226-228 — гоноподии; b, c, d, e, y — отростки постфеморальной части; fo — феморальное углубление; sl — соленомерит; sph — соленофор; tt — тибииотарсус. — Масштаб в мм (224-225 — по [Головач, 1976а], 226-228 — по [Головач, 1978а]).



Sichotanus eurygaster
(Attems, 1898)

Figs 224-228, Map 13.

Strongilosoma eurygaster Attems, 1898: 303, figs.

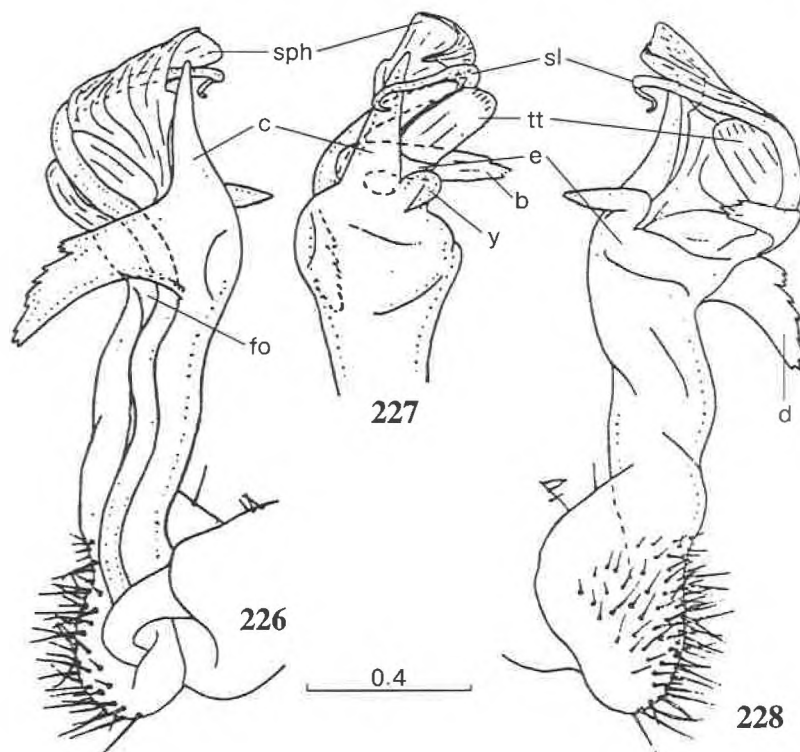
Sichotanus eurygaster — Attems, 1914: 216; 1937: 215, figs; Lokšina & Golovatch, 1979: 382; Mikhajlova, 1982b: 1267, figs; 1983b: 85; 1988b: 70; 1993: 30; 1997a: 145; Mikhajlova & Petukhova, 1983: 52; Ursova, 1983: 305; Ganin, 1988: 7; 1989a: 145; 1992: 92; 1993: 120; 1994: 60; 1995: 370; 1997: 10; Mikhajlova & Bakurov, 1989: 40; Gromyko, 1990: 66.

Sichotanus popowi Golovatch, 1976a: 1569, figs; Lokšina & Golovatch, 1979: 382.

DESCRIPTION. Adult ♂ 26-31 mm long, 3.0 mm wide. Adult ♀ 27-32 mm long, 3.0 mm wide. Body light brown to brown with yellow peritremata. Antennae long and slender. Head smooth, finely setose frontally, with 1+1 vertigial setae. Collum narrower than head. Metazona with small peritremata and a few short setae. Transverse metatergal sulcus starting already from somite 4, fully developed on somites 5-18. Pleurotergal keels present only on somites 2-9 (Fig. 224), onward traceable only as ventrolateral swellings.

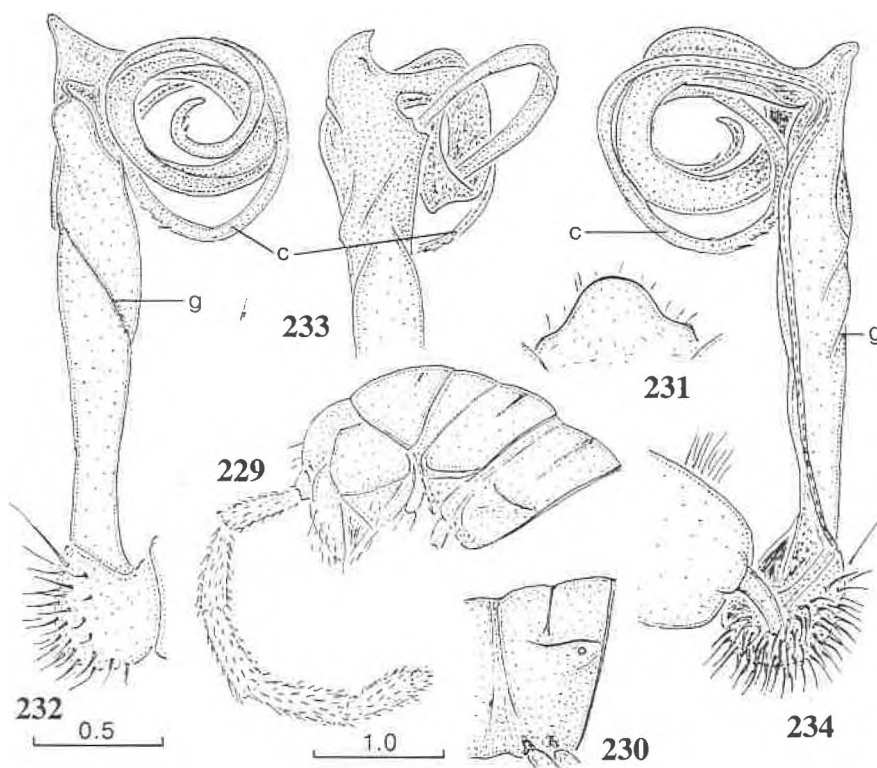
Legs long. Setose lamina between ♂ coxae 4 subquadrate (Fig. 225).

Gonopods (Figs 226-228) particularly complex. Femorite with a mesal groove (fo) flanked by edges which can be even or with small outgrowths. Postfemoral part of telopodite with a large, twisted, phylloid solenophore (sph) supporting a flagelliform solenomerite (sl); a slightly fringed, similarly phylloid tibiotarsus (tt), and up to five process (b, c, y, d, e). Process b phylloid, with or without teeth apically. Process y unciform, curved. Processes c, e, d with or without teeth distally.



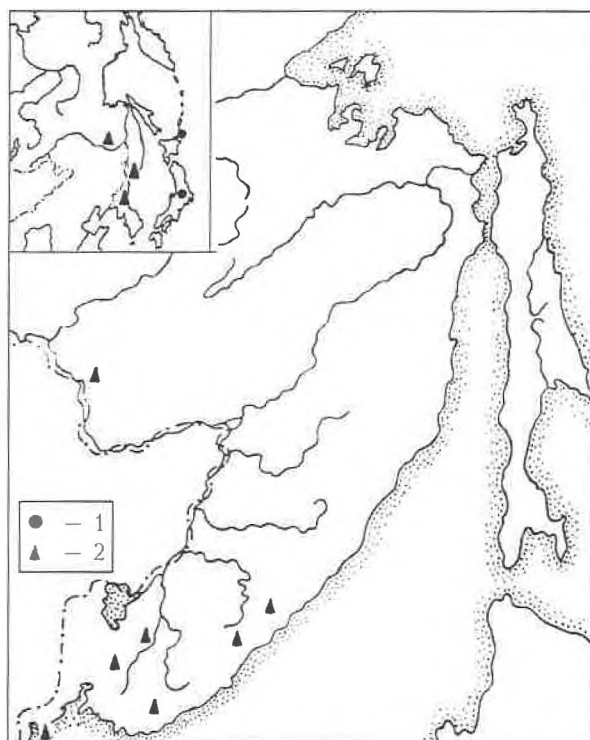
HABITATS. Litter, rotten wood and the uppermost soil strata of different types of mountainous and valley forests. This species has been recorded as deep in the soil as 20-30 cm [Mikhajlova, 1983b]. In the S Maritime Province as well as in the Khabarovsk Province, the numbers range from 1.1 to 8.0 ind. per sq. m [Mikhajlova, 1988b; Ganin, 1997]. This is one of the region's most active destructors of leaf litter which can also serve as indicator of environmental pollutions with heavy metals [Ganin, 1992, 1997].

DISTRIBUTION (Map 13). Originally described from the environs of Vladivostok, this species appears to be widespread in Korea, Northeast China, and the southern part of the Russian Far East.



Figs 229-234. *Haplogonosoma implicatum* Bröl. 229 — fore part of body; 230 — body segment 10; 231 — lamina between ♂ coxae 4; 232 — gonopod (lateral view); 233 — gonopod (subventral view); 234 — gonopod (mesal view); c — solenomerite; g — groove dividing femorite and postfemoral part. — Scales in mm (after Golovatch et al., 1995).

Рис. 229-234. *Haplogonosoma implicatum* Bröl.: 229 — передний конец тела; 230 — сегмент тела 10; 231 — пластинка между коксами 4-й пары ног у ♂; 232 — гоноподии (вид сбоку); 233 — гоноподии (вид почти снизу); 234 — гоноподии (вид изнутри); c — соленомерит; g — бороздка, разделяющая феморит и постфеморальную часть. — Масштаб в мм (по [Golovatch et al., 1995]).



Map 14. Distribution of *Haplogonosoma implicatum* (1), *Cawjeekelia koreana* (2).

Карта 14. Распространение *Haplogonosoma implicatum* (1), *Cawjeekelia koreana* (2).

Genus *Haplogonosoma* Brölemann, 1916

Two species known from Japan (Honshu and Kyushu islands), the Kuriles (Kunashir Island), and ?Sumatra [Golovatch et al., 1995]. Only one species occurring in Russia.

The main distinguishing characters of the genus are as follows: peritremata particularly poorly developed: distal part of gonopod femorite with a ventrolateral sulcus demarcating a postfemoral portion; latter with a very large tooth at splitting site of a very slender, spiralling solenophore and a flagelliform solenomerite.

Haplogonosoma implicatum Brölemann, 1916

Figs 229-234, Map 14.

Haplogonosoma implicatum — Golovatch et al., 1995: 74, figs.

DESCRIPTION. Length ca. 18-19 (♂) and 15-17 mm (♀), width of midbody pro- and metazona 0.9-1.0 and 1.2-1.3 (♂), 1.1-1.3 and 1.4-1.6 mm (♀), respectively. Colouration varying from beige to brown. Tip of antennae and lateral peritremata yellowish to whitish. Head densely setose, especially so anteriorly. Antennae rather long, slender, slightly clavate. Collum either narrower than head and subequal in width to somite 2 (♂) or subequal in width to head and narrower than somite 2 (♀); body parallel-sided on somites 5(6)-16, onward gradually tapering. Paraterga very poorly developed, displayed rather as lateral swellings, a bit better so in ♂ as compared to ♀, set low (at about midheight of midbody somites); only on somite 2 delimited by a sulcus not only dorsally but ventrally as well, rather narrow, ridge-shaped (Fig. 229), on subsequent metaterga delimited only by a well-developed dorsal sulcus, in lateral aspect considerably broad-

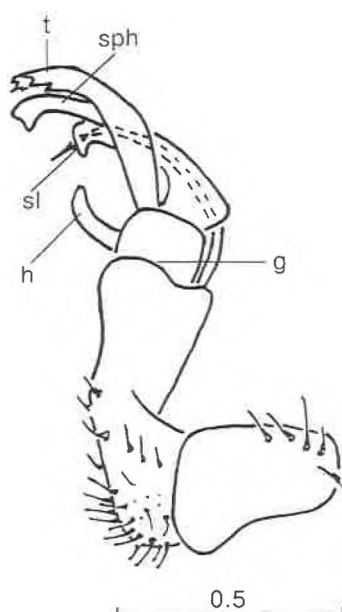


Fig. 235. *Oxidus gracilis* (C.L.K.), gonopod: g — groove dividing femur and postfemoral part; h — process of postfemoral part; sph — solenophore; sl — solenomerite; t — tibiotarsus. — Scale in mm (after Lokšina [1969], with changes).

Рис. 235. *Oxidus gracilis* (C.L.K.), гоноподии: g — бороздка, разделяющая фемур и постфеморальную часть; h — отросток постфеморальной части; sph — соленофор; sl — соленомерит; t — тибитарсус. — Масштаб в мм (по [Локшина, 1969], с изменениями).

ened on pore-bearing somites (Fig. 230); both frontal and caudal corners invariably rounded and never projecting beyond rear tergal contour, only caudal corner on collum like a quite narrowly rounded lappet. A little pore-bearing knob instead of paratergum only on somite 19. Collum with a poorly expressed, shallow, transverse sulcus at rear 1/3. Transverse sulcus on metaterga thin, deep, lineiform, starting already from somite 2, on somites 2-4 more shallow and short, onward fully developed and reaching to almost reaching the base of paraterga, absent from 19th. Pleurotergal keels present as small swellings only on somites 2-4. Epiproct long, digitiform.

Legs long and slender, pregonopodal pairs with tarsal brushes. Lamina between ♂ coxae 4 large, broadly rounded, densely setose frontally, not very high (Fig. 231).

Gonopods (Figs 232-234) with moderately long, distoventrally setose, subcylindrical coxites. Prefemoral part small, setose, well demarcated from femur by a lateral sulcus. Femur high, slender, without evidence of torsion, set off from postfemoral portion by an oblique ventrolateral demarcation sulcus (g). Postfemoral part prominent, apically with a large tooth marking at base both a subrectangular knee of solenophore and a free solenomerite (c). Solenophore great, long, laminate, coiled, gradually attenuating toward tip, in situ directed mostly caudally, supporting but not sheathing a similarly very long, slender, coiled, at places slightly spiculate, ribbon-shaped, subfiliform solenomerite.

HABITATS. No data available on habitat preferences.

DISTRIBUTION (Map 14). Originally described from Japan [Brolemann, 1916], this species has since been recorded also in the southern part of the Kuriles (Kunashir Island).

Genus *Oxidus* Cook, 1911

About four species from East China, Korea, Japan, and Indochina; one species nearly ubiquitous through human agency.

The main distinguishing characters of *Oxidus* are as follows: starting from somite 4, metazona with a deep transverse groove; peritremata well-developed, bordered; gonopod femur without evidence of torsion but with a distinct postfemoral region delimited by a lateral sulcus; distal part of gonopod telopodite with four processes.

Oxidus gracilis (C.L. Koch, 1847)

Fig. 235.

Oxidus gracilis — Lokšina & Golovatch, 1979: 383; Mikhajlova, 1993: 30.

DESCRIPTION. Adult ♂ 18-21 mm long, 1.9-2.0 mm wide. Adult ♀ 19-22 mm long, 2.0-2.1 mm wide. Colouration brown to reddish-brown. Head smooth, setose anteriorly. Epicranial suture distinct, somewhat not reaching the level of antennal sockets. Vertigial setae 1+1. Antennae long and slender. Collum subequal in width both to head with genae and somite 2. Body parallel-sided on somites 5-17, onward gradually tapering. Metazona with peritremata distinctly bordered. Their anterior corners rounded, posterior ones beak-like pointed starting from somite 15. Metazona 3(4)-18 each with a deep transverse sulcus. Pleurosternal carinae present on somites 2-8, onward like small ventrolateral swellings. Epiproct long, setose, somewhat flattened dorsoventrally, apex bifurcated. Subanal scale trapeziform, with rounded caudal corners and 1+1 setae, caudal margin with a mesal cut.

Legs long, ♂ legs 1-2 somewhat reduced, ♂ tarsal brushes present. Sternites moderately densely setose, without modifications except for a subquadrate lamina between ♂ coxae 4.

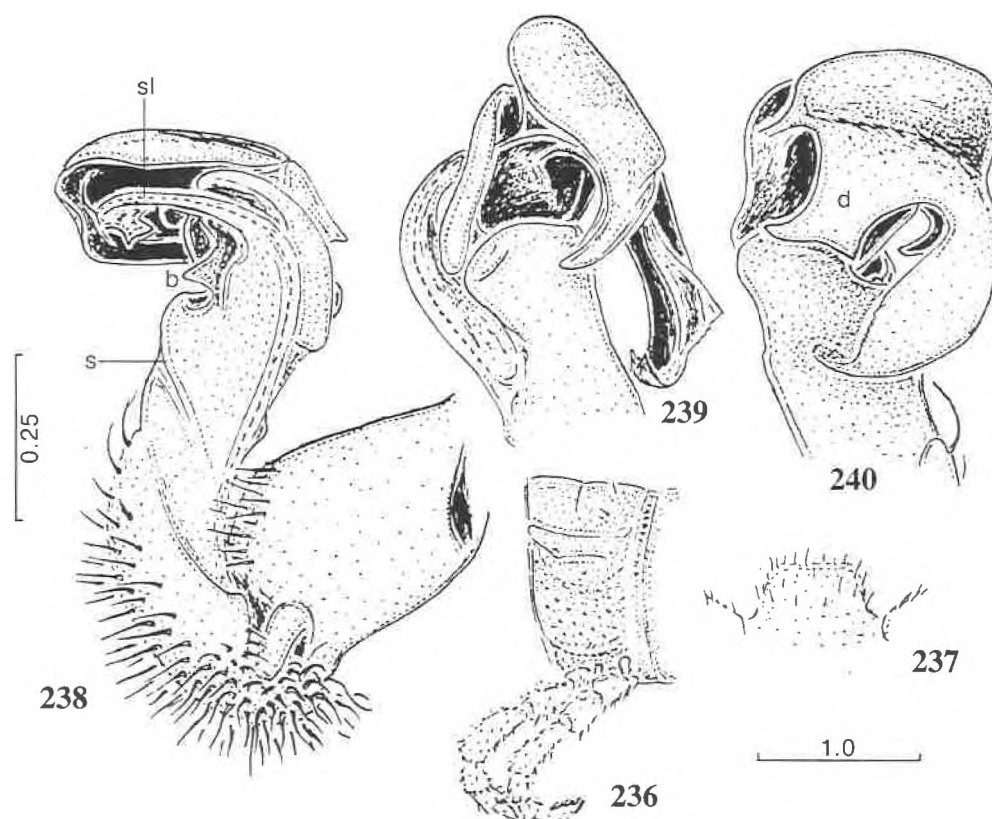
Gonopods (Fig. 235) with frontally setose coxites. Prefemoral part covered with dense long setae. Femur slender and smooth, without evidence of torsion, set off from postfemoral portion by a lateral demarcation sulcus (g). Edges of femoral groove without distinct outgrowths. Distal part of telopodite with solenomerite (sl) mostly sheathed by solenophore (sph), tibiotarsus (t) and an unciform postfemoral process (h).

HABITATS AND DISTRIBUTION. This cosmopolitan species has been reported from the Russian Far East solely from anthropogenic habitats (greenhouses).

Genus *Cawjeekelia* Golovatch, 1980

Six species in China, Korea, Japan, Taiwan, and the Russian Far East. Only one species has been recorded in Russia.

The main distinguishing characters of *Cawjeekelia* are as follows: body less than 20 mm long; peritremata poorly developed; pleurotergal keels present; a trapeziform lamina between ♂ coxae 4; femur of gonopods without evidence of torsion, set off from postfemoral portion by a demarcation sulcus, distoventrally with an inconspicuous folded process; solenophore lamellate, directed laterad, with specific folds, ridges, processes; solenomerite moderately long, flagelliform, mostly sheathed by solenophore.



Figs 236-240. *Cawjeekelia koreana* (Gol.): 236 — body segment 10; 237 — lamina between ♂ coxae 4; 238 — gonopod (mesal view); 239 — gonopod (dorsolateral view); 240 — gonopod (sublateral view); b — process of postfemoral part; d — lateral process of solenophore; s — groove dividing femorite and postfemoral part; sl — solenomerite. — Scales in mm (after Golovatch (1995)).

Рис. 236-240 *Cawjeekelia koreana* (Gol.): 236 — сегмент тела 10; 237 — пластинка между коксами 4 у ♂; 238 — гоноподии (вид изнутри); 239 — гоноподии (дорсолатеральный вид); 240 — гоноподии (вид почти сбоку); b — отросток постфеморальной части телоподита; d — боковой отросток соленофора; s — бороздка, разделяющая феморит и постфеморальную часть; sl — соленомерит. — Масштаб в мм (по [Головач, 1995]).

Cawjeekelia koreana (Golovatch, 1980)

Figs 236-240, Map 14.

Orientosoma koreanum — Mikhaljova & Petukhova, 1983: 53; Mikhaljova, 1983b: 85; 1988b: 70; Mikhaljova & Bakurov, 1989: 40.

Cawjeekelia koreana — Jeckel, 1988: 98; Mikhaljova, 1993: 30; Golovatch, 1995: 89, figs; Ganin, 1997: 13.

DESCRIPTION. Length 16-17 mm, width of mid-body pro- and metazona 1.5-1.6 mm and 1.95-2.0 mm, respectively. Colouration uniform pale yellowish-brown to brown, peritremata always yellowish; antennae mostly brownish, antennomeres 6-7 distinctly infuscate, dark brown, tip whitish.

Head moderately densely setose. Collum narrowest, only a bit narrower than both head and somite 2. Antennae relatively short and stout. Peritremata moderately well-developed, set low, bordered both dorsally and ventrally, slightly sloping down, at best faintly surpassing rear tergal contour, mostly evidently rounded caudally, almost pointed dentiform and a bit better protruding caudally only on somites 18-19, like a broadly rounded lobe already on collum; in lateral view like rather thick and skewed (porc-bearing) or thin and straight (porcless) ridges devoid of incisions (Fig. 236). Transverse metatergal sulcus starting already from somite 4, fully developed

on somites 5-18, lineiform, poorly beaded at bottom, rather shallow, not reaching the bases of peritremata, missing on somite 19.

Pleurosternal carinae strongly developed on somites 2-7. Epiproct relatively long, distinctly flattened dorsoventrally. Subanal scale semicircular, caudal margin rounded, with a pair of little, setigerous knobs at caudal margin.

Legs long: ♂ tarsal brushes present almost throughout, missing only on two last legpairs. Setose lamina between ♂ coxae 4 (Fig. 237) subtrapeziform, slightly emarginate.

Gonopods (Figs 238-240) with a relatively stout coxite and a highly complex telopodite. Coxite strongly setose distally. Prefemoral part prominent, strongly setose. Femorite without evidence of torsion, with an oblique ventromesal sulcus (s) modestly demarcating a postfemoral portion, distoventrally with an inconspicuous folded process (b). Solenophore in situ directed laterad, somewhat coiled, virtually consisting only of lamina lateralis, subdivided into a shorter parabasal fold, two midway ridges, a subsecuriform lateral process (d) and an elongated end portion supplied with a lateral serrate lamella and a shaggy tip. Solenomerite (sl) moderately long, flagelliform, mostly sheathed by solenophore, latter supporting distal end of solenomerite with a small inner lobule.

HABITATS. Litter and the uppermost soil strata of different forest types. In the S Maritime Province, the numbers range from 0.3 to 2.3 ind. per sq. m [Mikhaljova, 1981c, 1988b; Mikhaljova & Bakurov, 1989]. Juveniles seem to prefer the uppermost soil (0-20 cm deep), while adults inhabit forest litter [Mikhaljova, 1983b]. The maximum locomotor activity is in the end of May to the beginning of June as well as in September [Mikhaljova & Bakurov, 1989].

DISTRIBUTION (Map 14). Originally described from North Korea [Golovatch, 1980b], this species appears to be rather widespread in the southern part of the Russian Far East.

Order Julida Leach, 1814

Altogether 15 families, overall distribution mainly Holarctic. The Far East of Russia supports four families.

The main distinguishing characters of the group are as follows: body worm-like, subcylindrical to cylindrical, devoid of paraterga, with metazonital striations at least ventrolaterally; pleurites usually fused with tergites into a single pleurotergal arch (=ring), sternites usually free but inconspicuous; ♂ legs 8 and 9 modified into gonopods, often hidden in a special pouch inside somite 7, more rarely exposed; ♂ leg 1 modified, either reduced (more often) or enlarged, sometimes also ♂ leg 2 and/or certain subsequent ♂ legs with modifications, e.g. coxal projections, sole pads, etc.

KEY TO FAMILIES AND GENERA OF JULIDA:

- 1(6) Surface of metazonites striate all over circumference. Gonopods retractible inside somite 7 Family Julidae
- 2(3) Telson without epiproct. Metazonites without setae Genus *Cylindroiulus*
- 3(2) Telson with an epiproct (= tail). Metazonites bare or with a row of setae near caudal edge 4
- 4(5) Telson sparsely setose only along hind margin; epiproct with a large claw curved upwards. Metazonites bare, without setae. Gonopods consisting of two pieces: promerite and opisthomerite Genus *Anaulaciulus*
- 5(4) Telson entirely setose; epiproct with a small claw directed caudoventrad. Metazonites with sparse setae at caudal margin. Gonopods consist of three pieces: pro-, meso-, and opisthomerite Genus *Pacifiulus*
- 6(1) Surface of metazonites striate only below ozopore level. Gonopods always fully exposed, not retractible into a pouch hidden inside somite 7 7
- 7(12) ♂ legpair 1 without outgrowths on tibia, very strongly enlarged Family Mongoliulidae
- 8(11) ♂ legpair 7 more or less modified, either with a long coxal process (Fig. 275) or very considerably reduced compared to subsequent legs (Fig. 287) 9
- 9(10) Body dark brown. Anterior gonopods with a pair of long flagella basally (Figs 269, 276) Genus *Skleroprotopus*
- 10(9) Body beige. Anterior gonopods without evident flagella, latter only vestigial (Figs 280, 288) Genus *Kopidoiulus*
- 11(8) ♂ legpair 7 normal Genus *Ussuriulus*
- 12(7) ♂ legpair 1 with outgrowths on tibia, if enlarged then only modestly so 13
- 13(14) Eyes in a triangular or oval eyepatch Family Nemasomatidae (Genus *Orinisobates*)

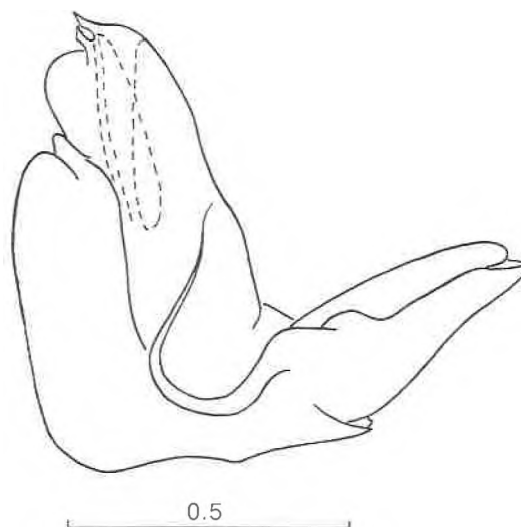


Fig. 241. *Cylindroiulus latestriatus* (Curtis): gonopods (mesal view). — Scale in mm (original).

Рис. 241. *Cylindroiulus latestriatus* (Curtis): гоноподии (вид изнутри). — Масштаб в мм (оригинал).

- 14(13) Eyes few, arranged in one row
..... Family Blaniulidae (Genus *Nopoiulus*)

Family Julidae Leach, 1814

Widely distributed in the Palearctic, several European or Mediterranean species introduced through human agency almost all over the world (the Americas, Australia, Africa). About 80 genera. The Far East of Russia supports three genera.

The main distinguishing characters of the family are as follows: metazonital surface striate all over the circumference; molar plate of mandibles with two deep, transverse grooves; ♂ legpair 1 reduced, mostly uniform, with tibial outgrowth directed orad or mesad-orad; gonopods retractible inside a pouch in lumen of somite 7, anterior gonopods (= promerites) with barely traceable telopodite vestiges at most.

Genus *Cylindroiulus* Verhoeff, 1894

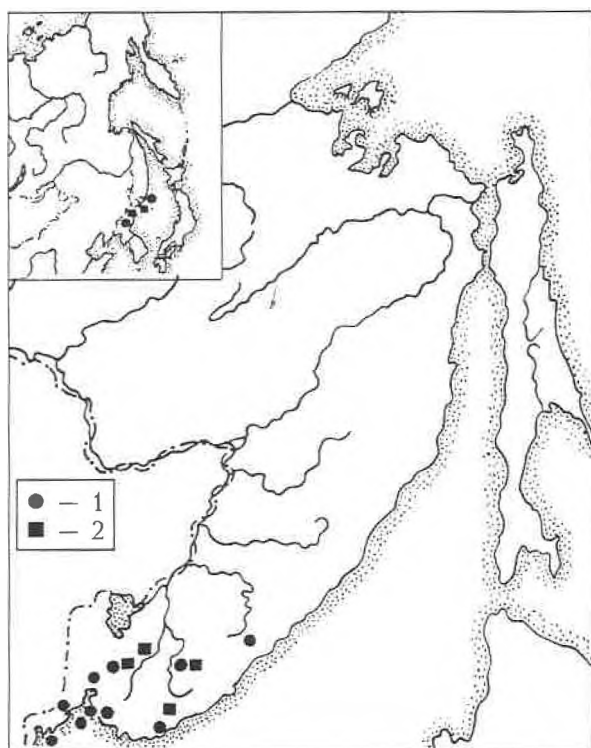
Over 100 species distributed in Europe + ancient Mediterranean, with a few introductions in North and South America, Africa, Australia, India. The Far East of Russia supports one such anthropochorous species.

The main distinguishing characters of *Cylindroiulus* are as follows: eyes present; epicranial suture wanting; ♂ genae often with ventrad projections; body usually pigmented; ozopores lying behind and immediately adjacent to a thin suture between pro- and metazonite; metazona virtually bare, even telson relatively poorly setose; vertigial setae absent; anterior gonopods with thin flagella; mesomerites strongly attached to promerites, opisthomerites strongly shifted caudad; coxal region of posterior gonopods strongly inflated.

Cylindroiulus latestriatus (Curtis, 1845)

Fig. 241.

Cylindroiulus latestriatus — Mikhaljova, 1998: 6, fig.



Map 15. Distribution of *Anaulaciulus golovatchi* (1), *Ussuriulus pilifer* (2).

Карта 15. Распространение *Anaulaciulus golovatchi* (1), *Ussuriulus pilifer* (2).

DESCRIPTION. Length 8.6-12.5 (♂) and 8.7-16.0 mm (♀), diameter 0.8-1.0 (♂) and 0.9-1.3 mm (♀). 30-37(39) (♂) and 30-43 (♀) body segments. Colouration light brown, sometimes darker. Legs whitish, antennae light with brown basal part of antennomeres. About 40 ocelli in an oval-triangular eyepatch on each side of head. Epicranial suture absent. Genae unmodified. Body slender, cylindrical. Metazona not setose. A thin suture between pro- and metazona almost not constricting the ring. Striation of metazona not reaching the very rear margin of ring, 4-5 striae in a square with sides equal to metazonal length of a midbody ring. Prozona smooth. Ozopores small, touching suture between pro- and metazona from behind. Telson without epiproct. Anal valves bearing a few setae only near mesal margin. Anal scale with two setae.

Legs slender, not very long, claws normal. ♂ legpair 1 unciform, strongly reduced.

Gonopods (Fig. 241) consisting of distinct pro-, meso-, and opisthomerite. Promerite with a thin flagellum mesoparabasally. Mesomerite tightly attached to and a little shorter than promerite. Opisthomerite set well off caudally, broad, its coxal portion strongly inflated.

HABITATS. Litter of deciduous forests, roots of some plants, seashores, sandy soil, gardens, greenhouses and about any other situation associated with human activity.

DISTRIBUTION. Europe, introduced into Canada, the U.S.A. and as far as Peru, Chile, St. Paul Island (Antarctica), Gough Island in the Atlantic and Mexico [see Blower, 1985]. The only record in Asia is Kunashir Island, Kuriles.

Genus *Anaulaciulus* Pocock, 1895

Distributed from Japan in the east to Pakistan in the west, common also in the southern Far East of Russia, Korea, China, Taiwan, North Burma and the Himalaya of India, Nepal and Bhutan (44 species with five subspecies). The Far East of Russia supports a single species, however variable.

The main distinguishing characters of this genus are as follows: metazonal setae and lobes on ♂ genae absent; anterior gonopod (=promerite) with a short, broad, plate-shaped, coxal process, a rudimentary telopodite and a parabasal flagellum; posterior gonopod simple, without mesomerite or mesomerital processes, represented only by an opisthomerite; penes bifid apically.

Anaulaciulus golovatchi Mikhajlova, 1982

Figs 242-254, Map 15.

Anaulaciulus golovatchi Mikhajlova, 1982a: 214, figs.

Anaulaciulus golovatchi — Mikhajlova & Petukhova, 1983: 53; Mikhajlova, 1983b: 87; 1988b: 70; 1993: 10; 1997a: 145; Ganin, 1997: 22.

non *Anaulaciulus golovatchi* — Ganin, 1997: 105, 112.

DESCRIPTION. Length 15-30 (♂) and 17-34 mm (♀), diameter 0.8-2.0 (♂) and 1.2-2.1 mm (♀). Body segments without telson 43(-4) to 55(-1) (♂) and 44(-3) to 56(-1) (♀). ♂ with five apodous segments before telson (figures in brackets) juvenile. Colouration brown with marbled spots and stripes. Legs and antennae light brown. About 40 dark ocelli in a round-triangular eyepatch. Vertigial setae 1+1, supralabral ones 2+2, labral ones 10+10.

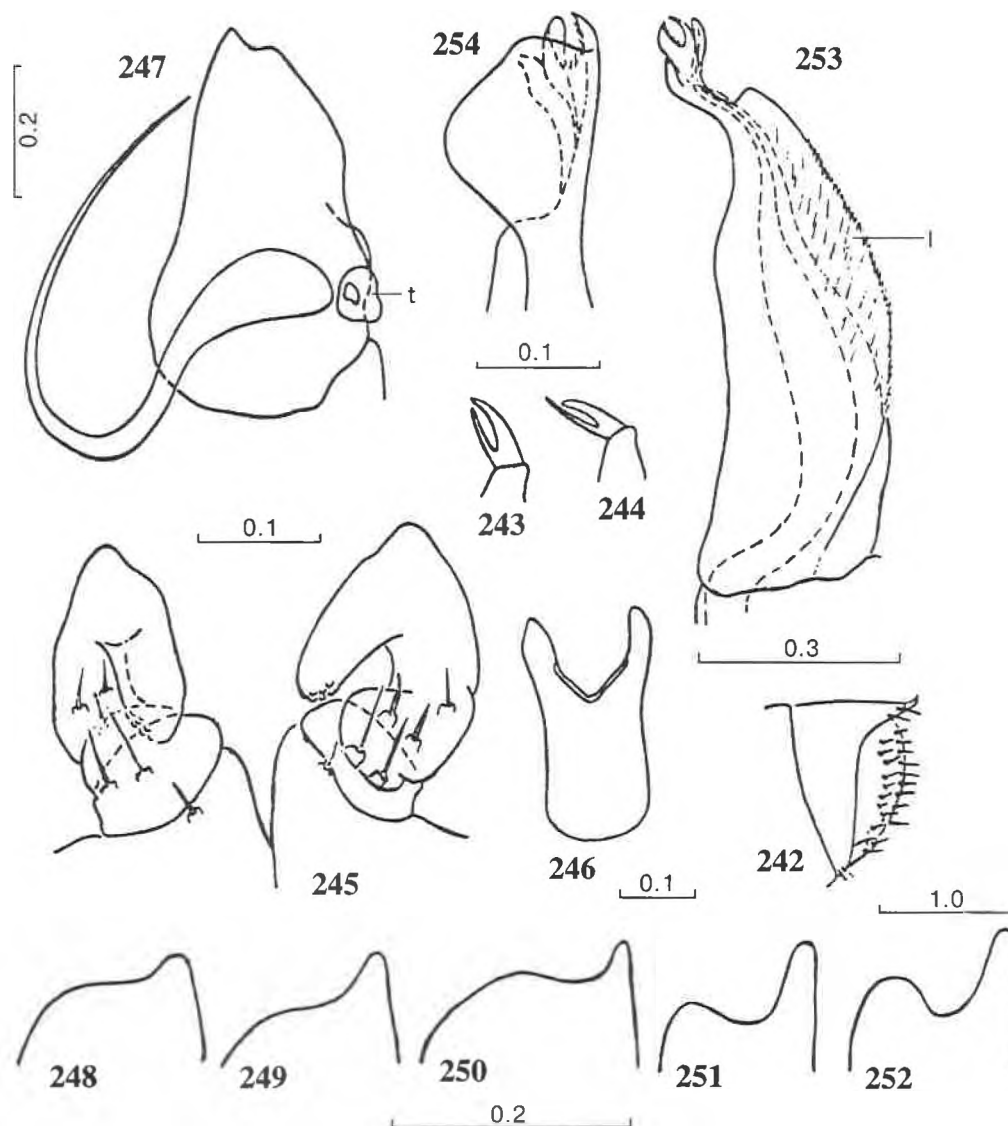
♂ genae unmodified. Antennae slender. Sensory bacilli at distal end of antennomere 5 rather few (about 8), forming no corolla. Caudal edge of collum with short striae, ventrally striae being longer, one of them reaching the fore collar margin.

Body subcylindrical, metazona not setose. Metazonites striate all along their length, 6-7 striae in a square with sides equal to metazonal length of a midbody ring. Ozopores small, set off behind suture dividing pro- and metazonites. Telson (Fig. 242) with epiproct surmounted by a strong claw curved dorsally. Anal valves covered with dense and short setae. Anal scale bearing setae only near caudal margin.

Legs slender. Claw with a somewhat thin, long, setiform outgrowth at base ventrally (Figs 243, 244). ♂ legpair 1 (Fig. 245) unciform, with an apical outgrowth and ventrally with strong setae. ♂ postfemur and tibia with sole pads. Penes flat, apically bifid (Fig. 246).

Anterior gonopods (= promerites) (Fig. 247) plate-shaped, triangular, each with a long flagellum and a rudimentary, barely distinguishable telopodite (t). Apex with a broad, rounded, median outgrowth. Apex of promerite ranging from rounded to excavated (Figs 248-252). Posterior gonopods (= opisthomerites) (Fig. 253) each with a broad, mesal blade (l) nearly all along its height. This blade delicately fringed at a thin margin. Apex of opisthomerite (Fig. 254) with a narrow blade bearing three small processes, of which one serrate at inner margin.

HABITATS. Mountain and valley forests of various types. This species has also been recorded in caves



Figs 242-254. *Anaulaciulus golovatchi* Mikh.: 242 — telson; 243 — claw of ♂ leg 2; 244 — claw of ♂ leg 17; 245 — ♂ leg-pair 1; 246 — penes; 247 — anterior gonopods (=promerite); 248-252 — variation in shape of promerite apex; 253 — opisthomerite; 254 — apex of opisthomerite; l — lobe of opisthomerite; t — telopodite of anterior gonopods. — Scales in mm (after Mikhajlova [1982a]).

Рис. 242-254. *Anaulaciulus golovatchi* Микх.: 242 — тельсон; 243 — коготок 2-й ноги у ♂; 244 — коготок 17-й ноги у ♂; 245 — 1-я пара ног у ♂; 246 — пенис; 247 — передние гоноподии (=промерит); 248-252 — изменчивость вершины промерита; 253 — опистомерит; 254 — вершина опистомерита; l — лопасть опистомерита; t — телоподит передних гоноподий. — Масштаб в мм (по [Михалева, 1982а]).

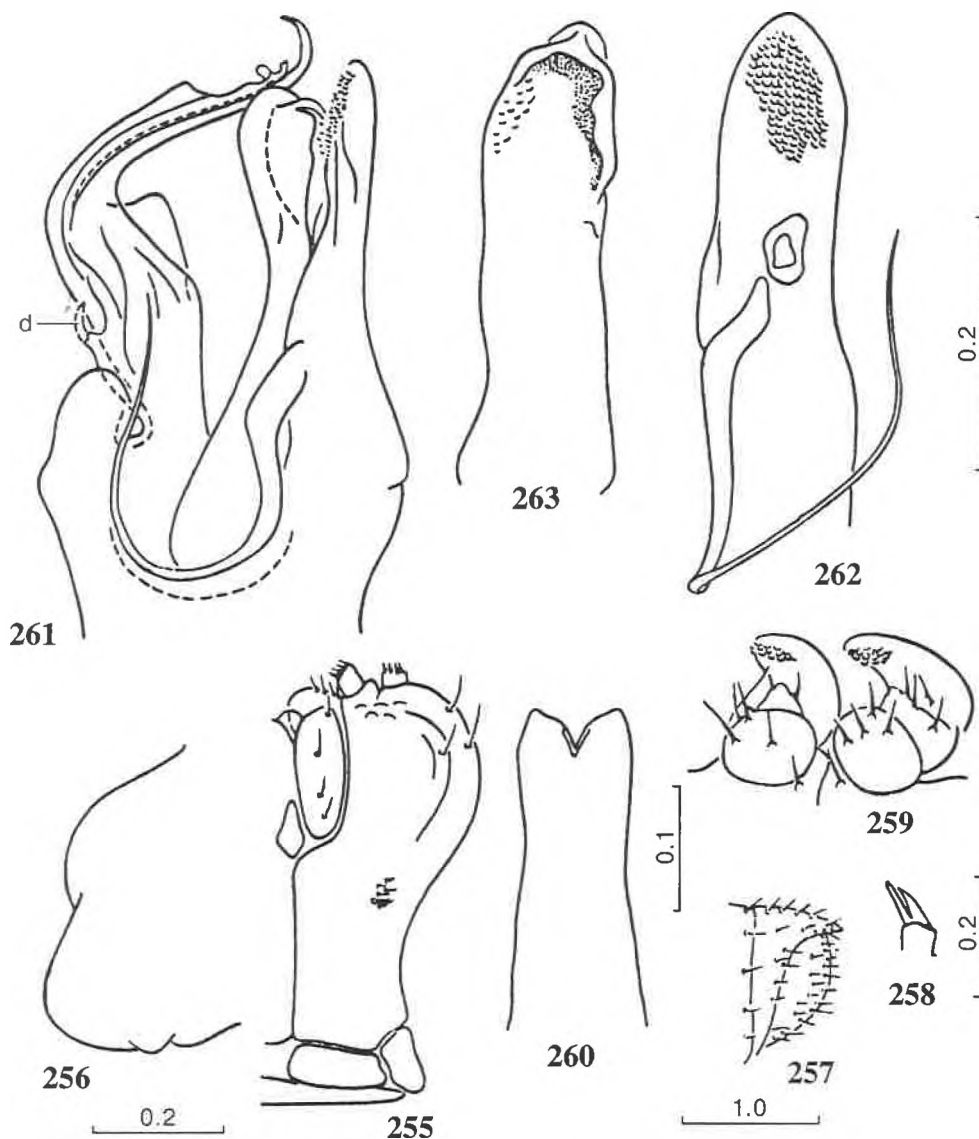
[Mikhajlova, 1997a]. Apparently preferring litter and the uppermost soil strata, dependent on the hygrothermal conditions and soil texture, it can readily migrate along the soil profile down to 20 cm depth [Mikhajlova, 1983b]. In the S Maritime Province, the numbers range from 0.5 to 32.0 ind. per sq. m [Mikhajlova, 1988b].

DISTRIBUTION(Map 15). Originally described from the Ussuriyskii and Lazovskii reserves as well as from the Chuguyevka Distr. and the environs of Vladivostok, all within Maritime Prov., this species appears to be widespread in the southern part of the Province and has since been reported also from North Korea [Mikhajlova & Kim, 1993]. Certain records by Ganin [1997] appear to be wrong.

Genus *Pacifiulus* Mikhajlova, 1982

Monobasic, hitherto known from southern Siberia and the Far East of Russia.

The main distinguishing characters of this genus are as follows: body pigmented; ocelli arranged in roundly triangular eyepatches; gnathochilarium unmodified; vertical setae 1+1; caudal edges of metazonites with thin short setae; epiproct pointed; ♂ genae unmodified; ♂ leg 1 reduced, unciform; gonopods consisting of three pieces, promerite with a long caudo-parabasal flagellum mesally, mesomerite set off from opisthomerite, fronto-apically with a spoon-shaped excavation; entire coxosternal region modestly developed, not inflated; opisthomerite



Figs 255-263 *Pacifiulus amurensis* (Gerstf.): 255 — ♂ gnathochilarium; 256 — ventral edge of ♂ segment 7; 257 — telson; 258 — claw of ♂ leg 2; 259 — ♂ leg-pair 1; 260 — penes; 261 — anterior and posterior gonopods (mesal view); 262 — promerite (caudal view); 263 — mesomerite (front view); d — parabasal outgrowth of opisthomerite. — Scales in mm (after Mikhajlova [1982a]).

Рис. 255-263 *Pacifiulus amurensis* (Gerstf.): 255 — ♂ гнатохилирий; 256 — вентральный край сегмента 7 у ♂; 257 — тельсон; 258 — коготок 2-й ноги ♂; 259 — 1-я пара ног ♂; 260 — пенис; 261 — передние и задние гоноподии (вид изнутри); 262 — промерит (вид сзади); 263 — мезомерит (вид спереди); d — парабазальный шип опистомерита. — Масштаб в мм (по [Михалева, 1982а]).

curved orad, with a well-developed coxite, but both velum and phylacum poorly-developed.

Pacifiulus amurensis (Gerstfeldt, 1859)

Figs 255-263, Map 16.

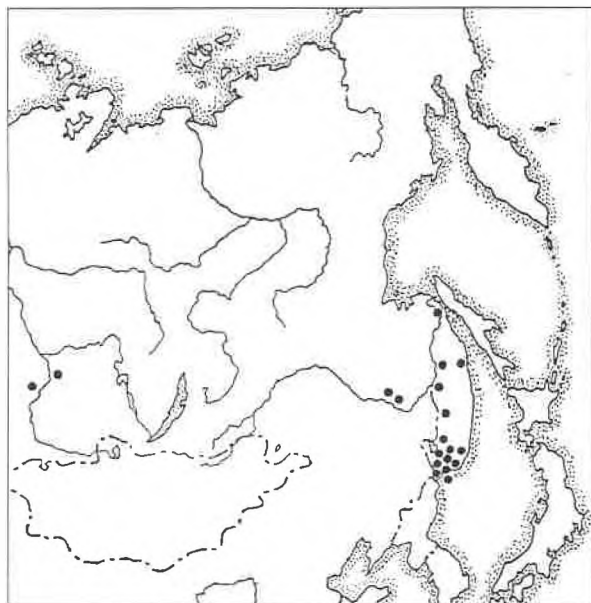
Julus amurensis Gersfeldt, 1859: 271.

Pacifiulus imbricatus Mikhajlova, 1982a: 212, figs; 1983b: 87; 1988b: 70; 1993: 12, map; 1997a: 145; Mikhajlova & Petukhova, 1983: 53; Ganin, 1988: 7; 1989a: 145; 1994: 60; 1995: 370; 1997: 10; Ryabinin et al., 1988: 31; Mikhajlova & Bakurov, 1989: 40; Gromyko, 1990: 66; Engstoff, 1994.

Pacifiulus amurensis — Mikhajlova, 1998: 5.

DESCRIPTION. ♂ body 16-18 mm long, 0.6-0.8 mm in diameter, body segments without telson 46(-1). ♀ body

18-27 mm long, 0.9-1.5 mm in diameter, body segments without telson 46(-4) to 50(-2). Colouration reddish-brown, each body segment with a dark spot laterally. Legs brownish. About 45 ocelli in a black, round-triangular cycpatch on each side of head. Vertical setae 1+1, supralabral ones 2+2, labral ones 10+10. Antennae slender. Sensory bacilli at distal end of antennomere 5 rather few (about 8), forming no corolla. Gnathochilarium (Fig. 255) with little setae at border between stipetes and mentum. ♂ genae unmodified. Metazonal striations failing to reach rear margin. 4-5 striae in a square with sides equal to metazonal length of a midbody ring. Ventral edge of metazonite 7 roundly explanate (Fig. 256). Ozopores lying behind and set off from suture dividing pro- and metazona. Caudal edges of metazonites



Map 16 Distribution of *Pacifiulus amurensis* (●)
Карта 16 Распространение *Pacifiulus amurensis* (●)

with thin short setae. Telson (Fig. 257) with a short epiproct and a small claw directed caudoventrad.

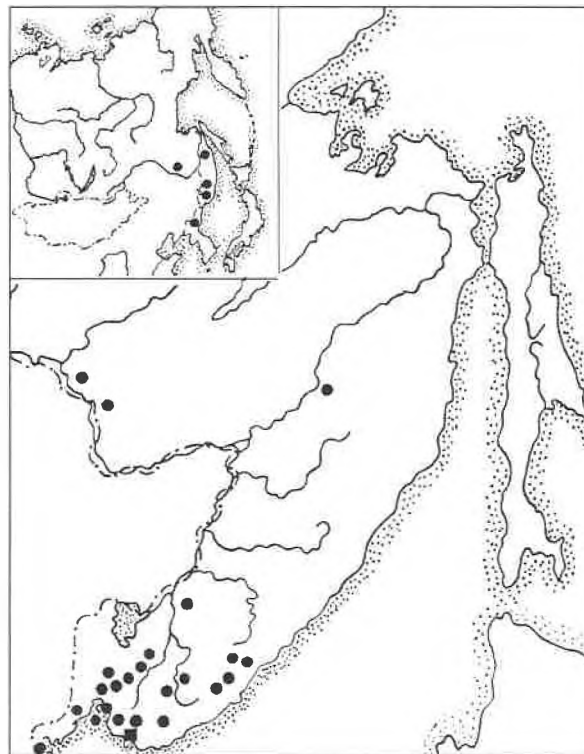
Legs moderately long. Claws with a thin, long, setiform outgrowth ventrally (Fig. 258). ♂ legpair 1 (Fig. 259) unciform, with ventral strong setae and a basal outgrowth of telopoditomere 2, with a papillate fold apically. Penes flat and bifid (Fig. 260).

Gonopods (Fig. 261) consisting of pro-, meso-, and opisthomerite. Promerite (Fig. 262) with a long flagellum and a papillate distocaudal fold. Mesomerite (Fig. 263) set off from opisthomerite, fronto-apically with a spoon-shaped excavation, latter's inner surface covered with papillae. Opisthomerite narrow, curved forward, with a well-developed coxite. Interior parabasal spine (d) well-developed. Both velum and phylacum small, more or less hyaline. Distal part of solenomerite terminating like a hook.

HABITATS. Litter and the uppermost soil strata (0-10 cm) of different kinds of mountainous and valley forests [Mikhaljova, 1983b]. This species has also been recorded in caves [Mikhaljova, 1997a]. The locomotor activity of *P. amurensis* is extended all over the warm season [Mikhaljova & Bakurov, 1989]. In the southern parts of both Maritime and Khabarovsk provinces, the numbers range from 0.5 to 21.5 ind. per sq. m, depending on the region and forest type [Mikhaljova, 1988b; Ganin, 1997]. This diplopod species is among the most active destructors of forest litter in the S Khabarovsk Province [Ganin, 1997].

This species is characterized by marked parthenogenesis, with males (almost) absent from the populations deriving from the Far East (Maritime and Khabarovsk Prov., Amurskaya Area), whereas in the southern part of the Krasnoyarsk Prov., Siberia, the sex ratio seems to be close to 50:50 [Mikhaljova, 1993, see also Enghoff, 1994].

DISTRIBUTION (Map 16). Originally described from between what is currently known as Khabarovsk and Komsomolsk-on-Amur, this species appears to be widespread both in Siberia (Krasnoyarsk Prov.) and the Far East [cf. Mikhaljova, 1998].



Map 17. Distribution of *Skleroprotopus coreanus* (●) and *S. schmidtii* (■).

Карта 17. Распространение *Skleroprotopus coreanus* (●) и *S. schmidtii* (■).

Family Mongoliulidae Pocock, 1903

This East Asian family comprises seven genera in Japan, Korea, China, and Russia. The Russian Far East of Russia supports three genera.

The main distinguishing characters are as follows: surface of metazonites striate only below ozopore level; ♂ legpair 1 strongly enlarged; claw of ♂ legpair 1 vestigial; penes single; ♂ legpair 7 with enlarged coxae and reduced telopodites (except in *Ussuriulus*); gonopods not retractile, anterior ones with evident telopodite vestiges.

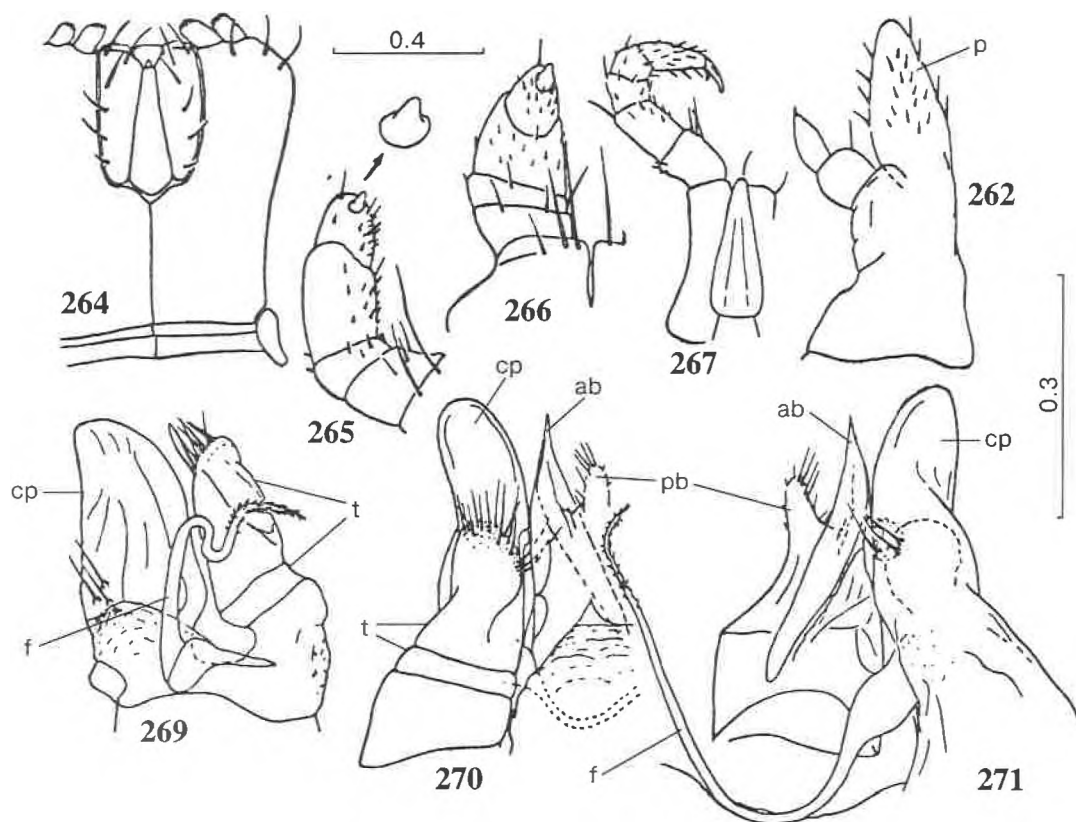
Genus *Skleroprotopus* Attems, 1901

About 12 species, mainly from Japan and Korea. The Far East of Russia supports two species.

The main distinguishing characters of *Skleroprotopus* are as follows: ♂ legpair 1 very strongly enlarged; ♂ legpair 7 with a 2-segmented telopodite and an elongate coxal process; anterior gonopod with a coxal process and a flagellum at base; posterior gonopods 2-branched.

KEY TO SPECIES OF *SKLEROPROTOPLUS*:

- 1(2) ♂ ca. 22 mm long; ♂ legpair 1 with a blunt claw apically (Fig. 260), ♂ legpair 7 with a relatively short coxal process covered with short setae (Fig. 268). Anterior gonopods (Fig. 269) with 2-segmented telopodites..... *S. schmidtii*
- 2(1) ♂ 30-43 mm long; ♂ legpair 1 with transverse swelling apically (Fig. 273), ♂ legpair 7 with a long coxal process covered with long setae (Fig. 275).



Figs 264-271. *Skleroprotopus schmidtii* Gol. 264 — ♂ gnathochilarium; 265 — ♂ leg-pair 1 (lateral view); 266 — ♂ leg-pair 1 (front view); 267 — ♂ leg-pair 2; 268 — ♂ leg-pair 7; 269 — anterior gonopods (caudal view); 270 — gonopods (lateral view); 271 — gonopods (mesal view); ab — anterior branch of posterior gonopods; cp — coxal process of anterior gonopods; f — flagellum of anterior gonopods; p — coxal outgrowth of ♂ leg pair 7; pb — posterior branch of posterior gonopods; t — anterior gonopod telopodite. — Scales in mm (after Golovatch [1979a]).

Рис. 264-271. *Skleroprotopus schmidtii* Gol. 264 — гнатохиларий ♂; 265 — 1-я пара ног у ♂ (вид сбоку); 266 — 1-я пара ног у ♂ (вид спереди); 267 — 2-я пара ног у ♂; 268 — 7-я пара ног у ♂; 269 — передние гоноподии (вид сзади); 270 — гоноподии (вид сбоку); 271 — гоноподии (вид изнутри); ab — передняя ветвь задних гоноподий; cp — коксальный отросток передних гоноподий; f — жгутик передних гоноподий; p — коксальный выступ 7-й пары ног у ♂; pb — задняя ветвь задних гоноподий; t — телоподит передних гоноподий. — Масштаб в мм (по [Головач, 1979а]).

Anterior gonopods (Fig. 276) with 1-segmented telopodites *S. coreanus*

Skleroprotopus schmidtii Golovatch, 1979
Figs 264-271, Map 17.

Skleroprotopus schmidtii Golovatch, 1979a: 905, figs.

Skleroprotopus schmidtii — Lokšina & Golovatch, 1979: 387; Mikhailjova, 1993: 16.

DESCRIPTION. Body ca. 22 mm long, 1.9 mm in diameter (♂), with 47(-2) segments regardless of telson (♂). Prozonites yellowish-red, metazonites grey-brown with marble-yellowish spots. Ventral part of body yellowish, legs reddish tan. About 30 ocelli in a black oval-triangular eyepatch on each side of head. Vertigial setae absent. Genae with a small plate subtruncate ventrally. Gnathochilarium (Fig. 264) with three setae on stipetes, a stretched promentum and six setae on each lamella lingualis. Antennae relatively short, clavate, without sensory bacilli. Ozopores beginning from somite 6 on, lying behind suture dividing pro- and metazona. Telson without epiproct.

♂ legpair 1 (Figs 265, 266) very large, with a blunt claw apically. ♂ legpair 2 (Fig. 267) somewhat reduced,

claw with an additional small claw. Penes triangular, bare. ♂ legpair 7 (Fig. 268) with a 2-segmented telopodite and a setose interior coxal process (p).

Anterior gonopods (Fig. 269) with 2-segmented telopodites (t), interior coxal processes (cp) bearing three medial setae, and parabasal long flagella (f) bearing small spines apically. Posterior gonopods (Figs 270, 271) 2-branched, their anterior branch = solenomerite (ab) with an interior seminal groove, posterior one (pb) with short setae apically.

HABITATS. Bank of a lake.

DISTRIBUTION (Map 17). Originally described from the environs of Nakhodka, Maritime Prov., this species has since never been rediscovered.

Skleroprotopus coreanus (Pocock, 1895)
Figs 272-277, Map 17.

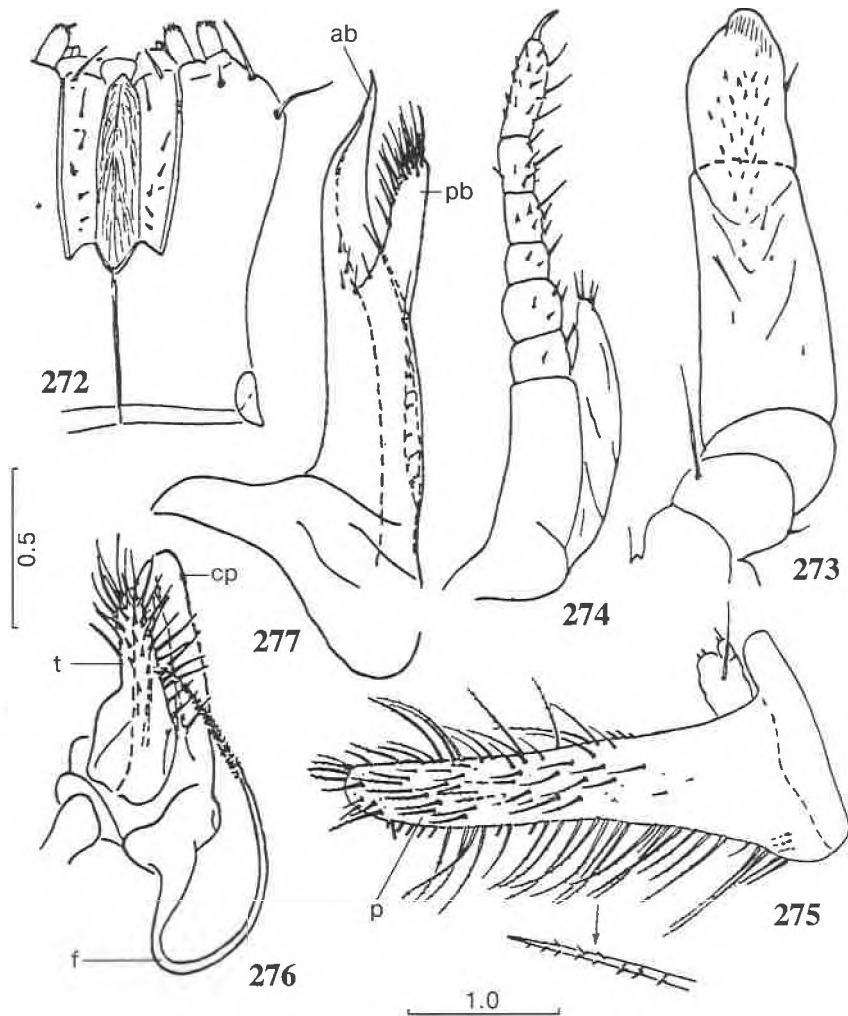
Skleroprotopus similiserratus Golovatch, 1979a: 906, figs.

Skleroprotopus similiserratus — Lokšina & Golovatch, 1979: 387; Mikhailjova, 1981c: 87;

Skleroprotopus coreanus — Mikhailjova, 1982b: 1266, figs; 1983b: 87; 1988b: 70; 1993: 15, map; 1997a: 145; Mikhailjova & Petukhova, 1983: 53; Ursova, 1983: 305; Ganin, 1988: 7; 1989a:

Figs 272-277. *Skleroprotopus coreanus* (Poc.): 272 — ♂ gnathochilarium; 273 — ♂ leg-pair 1; 274 — ♂ leg-pair 2; 275 — ♂ leg-pair 7; 276 — anterior gonopods (caudal view); 277 — posterior gonopods (mesal view); ab — anterior branch of posterior gonopods; cp — coxal process of anterior gonopods; f — flagellum of anterior gonopods; p — coxal process of ♂ leg-pair 7; pb — posterior branch of posterior gonopods; t — anterior gonopod telopodite. — Scales in mm (after Golovatch [1979a]).

Рис. 272-277. *Skleroprotopus coreanus* (Poc.): 272 — гнатохиларий ♂; 273 — 1-я пара ног у ♂; 274 — 2-я пара ног у ♂; 275 — 7-я пара ног у ♂; 276 — передние гоноподии (вид сзади); 277 — задние гоноподии (вид изнутри); ab — передняя ветвь задних гоноподий; cp — коксальный отросток передних гоноподий; f — жгутик передних гоноподий; p — коксальный отросток 7-й пары ног у ♂; pb — задняя ветвь задних гоноподий; t — телоподит передних гоноподий. — Масштаб в мм (по [Головач, 1979а]).



145; 1994: 60; 1995: 371; 1997: 10; Mikhailjova & Bakurov, 1989: 40.

DESCRIPTION. ♂ and ♀ body 30-43 mm long, 1.9-2.6 mm in diameter. Body segments without telson up to 62(-1) in ♂, 63(-1) in ♀, 51(-4) to 53(-4) in juveniles. Colouration grey-brown with light marble spots and bands. Legs reddish-brown. About 60 ocelli in a black oval-triangular cypatch on each side of head.

Vertigial setae absent. Genae with two (♂) or one (♀) ventral outgrowth. Gnathochilarium (Fig. 272) with three setae on stipites, a stretched and prominent promontum, and 6-7 setae on each lamella lingualis. Antennae short, without sensory bacilli. Telson without epiproct.

♂ legpair 1 (Fig. 273) very strongly enlarged, apically with a transverse swelling and a setose front surface of 2 last segments. Penes (Fig. 274) with 3-4 setae apically. ♂ legpair 7 (Fig. 275) with a 2-segmented telopodite and a long coxal process (p) bearing plumose/spinose setae.

Anterior gonopods (Fig. 276) with 1-segmented setose telopodites (t), flat coxal processes (cp) and a pair of flagella (f) bearing small thorns apically. Posterior gonopods (Fig. 277) 2-branched, their anterior branch = solenomerite (ab) pointed, posterior one (pb) setose.

In subadult ♂, legpair 1 not so strongly enlarged, legpair 7 reduced more strongly than in adult ♂, and genae as in ♀.

HABITATS. Litter and the uppermost soil strata (0-10 cm deep) [Mikhailjova, 1983b], rotten wood in various forest types, in mushrooms as well as in caves [Mikhailjova, 1997a]. The greatest locomotor activity in May and September [Mikhailjova & Bakurov, 1989]. In the southern parts of both Maritime and Khabarovsk provinces, the numbers range from 0.5 to 33.0 ind. per sq. m [Mikhailjova, 1988b; Ganin, 1997]. This millipede species is one of the most active destructors of plant debris in the S Khabarovsk

Province, also being a potential indicator of environmental pollutions with heavy metals [Ganin, 1997].

DISTRIBUTION (Map 17). This species, originally described from southeastern Korea [Pocock, 1895, 1903], seems to be widespread throughout Korea (Golovatch, 1980b; Mikhailjova & Kim, 1993) and the southern part of the Russian Far East (Maritime Prov., Khabarovsk Prov. together with its Jewish Autonomous Region, Amurskaya Area).

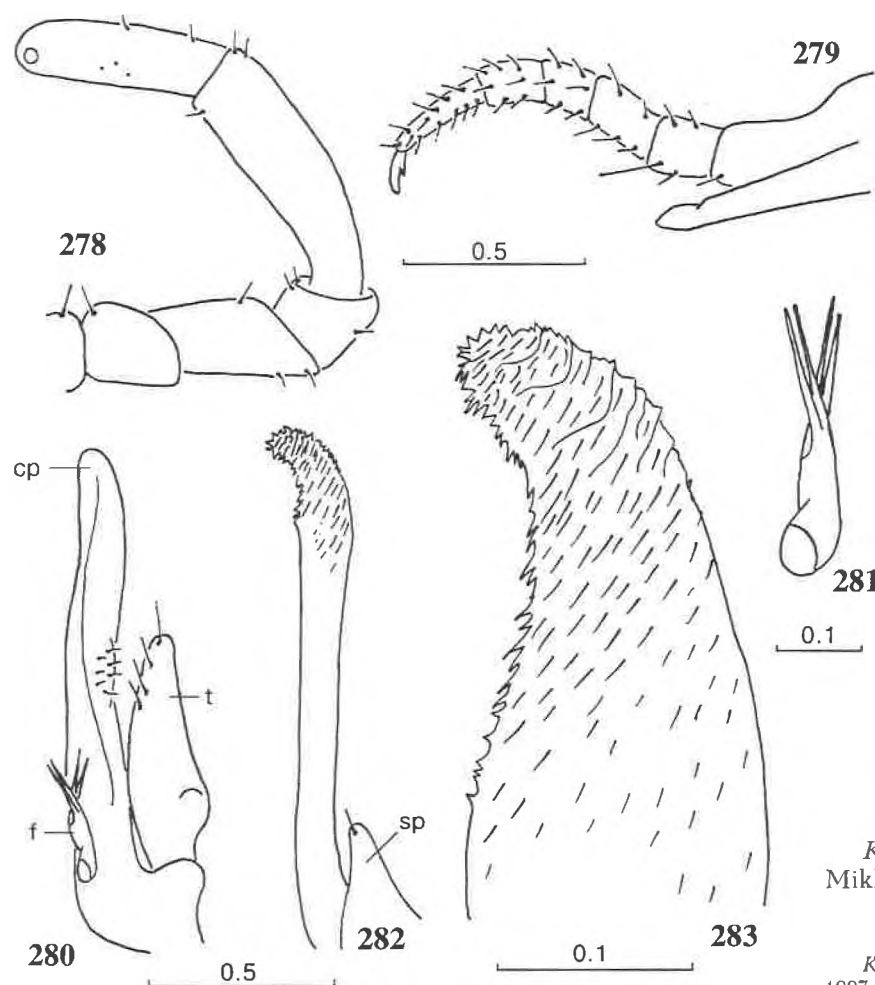
Genus *Kopidoiulus* Attems, 1909

Seven species in Japan (5), Northeast China (1), and the southern part of the Russian Far East (2 species).

The main distinguishing characters of this genus are as follows: ♂ legpair 1 very large; ♂ legpair 7 very small, otherwise unmodified; anterior gonopods with long interior coxal processes and vestigial blade-like flagella with a few prongs; posterior gonopods not split, flattened distally.

KEY TO SPECIES OF *KOPIDOIULUS*:

- 1(2) Eyes absent. Segment 5 of ♂ legpair 1 cylindrical *K. khasanicus*
- 2(1) Eyes present. Segment 5 of ♂ legpair 1 elliptical *K. continentalis*



Figs 278-283. *Kopidoiulus khasanicus* Mikh.: 278 — ♂ leg-pair 1; 279 — ♂ leg-pair 2; 280 — anterior gonopods (caudal view); 281 — remnant of flagellum of anterior gonopods; 282 — posterior gonopods (caudal view); 283 — apex of posterior gonopod; cp — coxal process of anterior gonopods; f — remnant of flagellum of anterior gonopods; sp — syncoxital process at base of the posterior gonopods; t — anterior gonopod telopodite. — Scales in mm (after Mikhajlova [1997a]).

Рис. 278-283. *Kopidoiulus khasanicus* Mikh.: 278 — 1-я пара ног у ♂; 279 — 2-я пара ног у ♂; 280 — передние гоноподии (вид сзади); 281 — рудимент жгутика передних гоноподий; 282 — задние гоноподии (вид сзади); 283 — вершина задних гоноподий; cp — коксальный отросток передних гоноподий; f — рудимент жгутика передних гоноподий; sp — отросток синкокситы в основании задних гоноподий; t — телоподит передних гоноподий. — Масштаб в мм (по [Михалева, 1997а]).

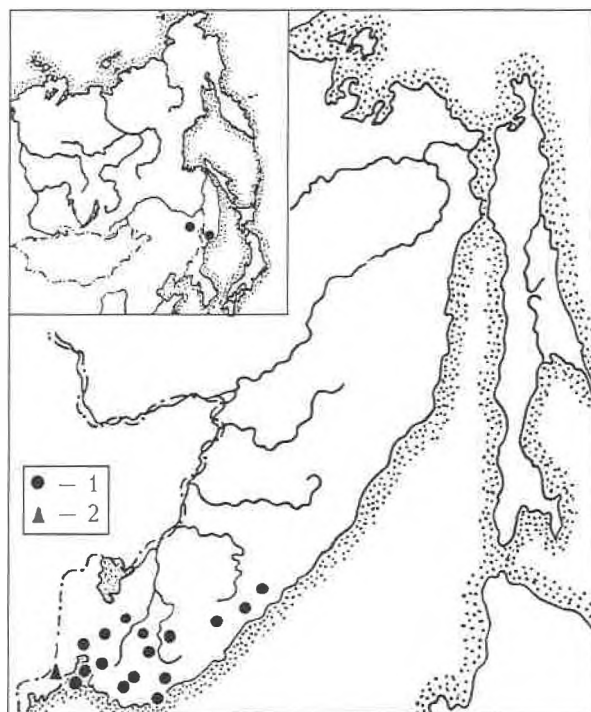
Kopidoiulus khasanicus
Mikhajlova, 1997

Figs 278-283, Map 18.

Kopidoiulus khasanicus Mikhajlova, 1997a: 148, figs.

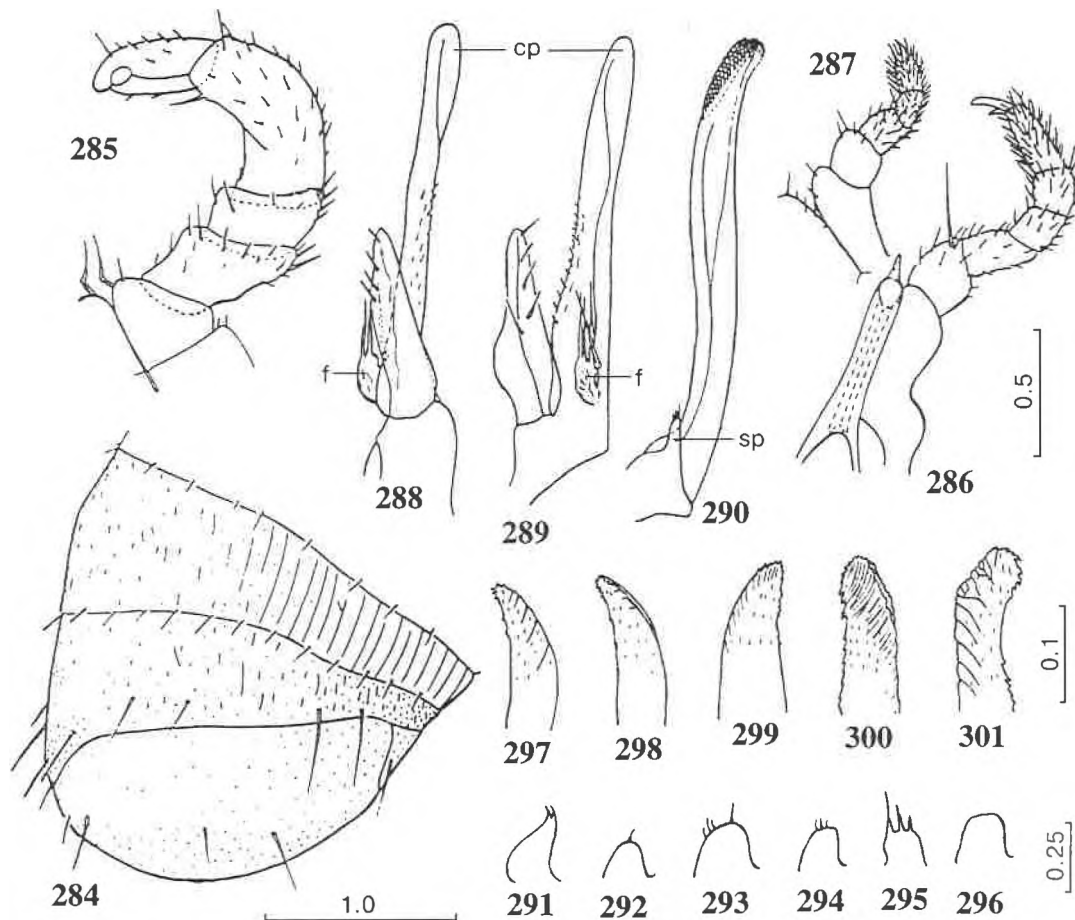
DESCRIPTION. ♂ 34 mm long, with 47 podous + 2 apodous (= 47(2)) body segments of excluding telson. ♀ 26-35 mm long, 46-50 podous + 3-2 apodous body segments excluding telson. Colour beige, fore portion of metazonites dark beige. Legs and antennae pale. Eyes absent. Vertigial setae 2+2, labral ones 10+10. Frons and clypeus sparsely setose. Genae somewhat swollen at distoventral corner. Gnathochilarium as in *K. continentalis*. Antennae long and slender. Antennomere 5 with an external subapical group of sensory bacilli, antennomeres 6 and 7 each with a subapical corolla of short or minute sensory bacilli, respectively. Metazonites of midbody segments ovoid in cross section, compressed on sides (vertical = 1.4 mm, horizontal = 1.0 mm), with 13 distinct sublateral striae and dense, barely visible subdorsal and lateral striations on each side, also with a row of short sparse setae at caudal margins. Ozopores very small, beginning from somite 6 on. Telson setose along hind margin, without epiproct. Anal lobes with thin setae. Subanal scale with 1+1 setae.

Legs long and slender. ♂ legpair 1 (Fig. 278) incrassate, segment 5 (tibia) cylindrical, segment 6 (tarsus) tiny. ♂ legpair 2 (Fig. 279) somewhat reduced, claw with an additional minute claw at base. Penes



Map 18. Distribution of *Kopidoiulus continentalis* (1) and *K. khasanicus* (2).

Карта 18. Распространение *Kopidoiulus continentalis* (1) и *K. khasanicus* (2).



Figs 284-301. *Kopidoiulus continentalis* Gol: 284 — caudal part of body; 285 — ♂ leg-pair 1; 286 — ♂ leg-pair 2; 287 — ♂ leg-pair 7; 288 — anterior gonopods (lateral view); 289 — anterior gonopods (caudal view); 290 — posterior gonopods (mesal view); 291-296 — syncoxital process at base of posterior gonopods; 297-301 — apex of posterior gonopods; cp — coxal process of anterior gonopods; f — remnant of flagellum of anterior gonopods; sp — syncoxital process at base of posterior gonopods. — Scales in mm (284-290 — after Golovatch [1979c], 291-301 — after Mikhajlova [1996a]).

Рис. 284-301. *Kopidoiulus continentalis* Gol: 284 — задний конец тела; 285 — 1-я пара ног у ♂; 286 — 2-я пара ног у ♂; 287 — 7-я пара ног у ♂; 288 — передние гоноподии (вид сбоку); 289 — передние гоноподии (вид сзади); 290 — задние гоноподии (вид изнутри); 291-296 — отросток синкокситы в основании задних гоноподий; 297-301 — вершина задних гоноподий; cp — коксальный отросток передних гоноподий; f — рудимент жгутика передних гоноподий; sp — отросток синкокситы в основании задних гоноподий. — Масштаб в мм (284-290 — по [Головач, 1979c], 291-301 — по [Михалева, 1996а]).

single, longer than coxae, cylindrical, flattened distally, with a pointed apex. ♂ legpair 7 visibly reduced.

Anterior gonopod telopodites (Fig. 280) longer than midway of coxal process, gradually tapering toward apex, each with 5 distomesal setae. A long and slender coxal process of anterior gonopod with a field of several smaller setae on external side opposing the setae of coxal process. Basal flap (=rudimentary flagellum) with four long apical spikes/branches (Fig. 281). Posterior gonopods (Fig. 282) long, flattened distally, each with a basal syncoxital process like a cone with one apical short seta. Distal part of posterior gonopods tapering and slightly curved toward apex, densely pilose (Fig. 283).

HABITATS. Litter of mixed forests, caves.

DISTRIBUTION (Map 18). Originally described from the Khasan Distr., Maritime Prov., this species has since never been rediscovered.

Kopidoiulus continentalis Golovatch, 1979 Figs 284-301, Map 18.

Kopidoiulus continentalis Golovatch, 1979c: 339, figs.

Kopidoiulus continentalis — Lokšina & Golovatch, 1979: 387; Kurcheva & Mikhajlova, 1980: 121; Mikhajlova, 1983b: 89; 1988b: 69; 1993: 15; 1997a: 147-148, figs; Mikhajlova & Petukhova, 1983: 53; Mikhajlova & Bakurov, 1989: 40; Murakami, 1990: 8, figs; Ganin, 1997: 121.

DESCRIPTION. ♂ 22-61 mm long, ♀ 22-69 mm long. Colour from light beige to red brown. Body like in *K. khasanicus*. About 35-40 ocelli in an oval-triangular eyepatch on each side of head. Size, shape and pigmentation of eyepatch varying with age. Vertigial setae 2+2. Genae with a pointed anteroventral corner and a drop-shaped projection. Gnathochilarium with a distal seta on stipetes and with 4-5 distomedial and 1-2 basal setae on narrow lamellae linguales, latter completely divided by

promentum. Antennae long and slender. Antennomere 5 with an external subapical group of sensory bacilli, antennomeres 6 and 7 each with a subapical corolla of short or minute sensory bacilli, respectively. Metazonites of midbody segments with distinct sublateral striae and dense, barely visible subdorsal and lateral striations on each side, also with a row of short thin setae at caudal margins. Ozopores beginning from somite 6 on. Telson (Fig. 284) sparsely setose, without epiproct.

Legs long. ♂ legpair 1 (Fig. 285) incrassate, segment 5 (tibia) elliptical, segment 6 (tarsus) tiny. ♂ legpair 2 (Fig. 286) somewhat reduced, claw with an additional minute claw at base. Penes flattened, long. ♂ legpair 7 (Fig. 287) visibly reduced.

Anterior gonopod (Figs 288, 289) with a long coxal process (cp) setose laterally. Basal flap (= rudimentary flagellum) with 2-3 (more seldom 5 — see Mikhajlova [1996a]) apical spikes/branches. Anterior gonopod telopodite from less to more than half as short as interior coxal processes. Number and location of setae on anterior gonopod telopodite ranging from one subapical to five nearly midway, telopodite 2 being mostly traceable. Posterior gonopods (Fig. 290) long, flattened distally, each with a basal syncoxital process (sp). Shape and armature of latter ranging from almost pointed with 1-2 setae to rounded, bare to surmounted with a few spikes/setae (Figs 291-296). Distal part of posterior gonopods striate and, along edge, serrate. Shape of tip and the degree of striation somewhat variable (Figs 297-301).

HABITATS. Litter and soil of various forest types. In addition, this species has been recorded in caves [Mikhajlova, 1997a]. *K. continentalis* can occur as deep in the soil as 40-50 cm. Adults seem to prefer litter and the uppermost soil strata (down to 10 cm deep). Juveniles dispersed all along the soil profile down to 50 cm deep [Mikhajlova, 1983b]. In the S Maritime Province, the numbers range from 0.5 to 10.0 ind. per sq. m [Mikhajlova, 1988b; Mikhajlova & Bakurov, 1989].

DISTRIBUTION (Map 18). Originally described from the Shkotovo Distr., Maritime Prov., this species appears to be quite widespread in the province's southern part and it has also been recorded in Northeast China [Murakami, 1990].

Genus *Ussuriulus* Golovatch, 1980

Monobasic, known from the Maritime Province and North Korea.

The main distinguishing characters are as follows: ♂ collum and body segment 6 enlarged; caudal edge of metazonites with setae; ♂ legpair 1 enlarged; claw of ♂ legpair 1 vestigial; penes single; sternite of ♂ legpair 10 with a large process; complex gonopods fused basally, without seminal groove; anterior gonopods without flagella.

Ussuriulus pilifer Golovatch, 1980 Figs 302-311, Map 15.

Ussuriulus pilifer Golovatch, 1980a: 206, figs.

Ussuriulus pilifer — Mikhajlova, 1981c: 87; 1983b: 87; 1993: 16; Mikhajlova & Petukhova, 1983: 53; Mikhajlova & Bakurov, 1989: 40; Ganin, 1997: 121.

DESCRIPTION. ♂ 20-24 mm long, 1.0-1.1 mm wide, body segments from 39(-2) to 47(-2), ♀ 23-28 mm long, 1.0-

1.2 mm wide, body segments from 39(-3) to 54(-2). Body segments of juveniles up to 40(-4) (♂) or 43(-3) (♀). Colour from light yellow to brown-grey. About 35 ocelli in a black oval-triangular eyepatch on each side of head. Vertigial setae 2+2. Antennae long. Mandible with nine rows of pectinate lamellae. Genae with an oval plate ventrally. Gnathochilarium with narrow lamellae linguales divided by a broad, almost rectangular (♂) (Fig. 302) or triangular (♀) (Fig. 303) promentum. Each lamella lingualis with six (♂) or three (♀) setae. Metazonites with distinct sublateral striae below ozopores, also with a row of short, thin, sparse setae at caudal margins. Ozopores beginning from segment 6 on (Fig. 304). Telson (Fig. 305) with a short, apically blunt epiproct.

Legs moderately long. Claws with an additional tiny claw and a long seta at base. ♂ legpair 1 (Fig. 306) 6-segmented, very strongly enlarged, bent forward at right angles; claw of ♂ legpair 1 vestigial. Penes erect, long. Sternite of ♂ legpair 10 with a large, front, beak-shaped process covering gonopods from behind.

Anterior gonopods (Figs 307, 308) with 1-segmented telopodites (t) covered from behind with tiny and sparse setae and papillae. Coxal processes (cp) large, fused basally, flattened laterally. Caudally and laterally, coxal processes with outgrowths and crests. Dense and short setation along base of basal and medial of lateral crests. Sometimes coxal processes with apical setae as well. Posterior gonopods (Figs 309-311) flattened, fused medially with each other and sternite. Coxosternal part boat-shaped, with a low front and a large caudal conical projection (cst). Posterior gonopods proper strongly sclerotized caudally and clothed with tiny papillae, membranous anteriorly, and hyaline with a flagellum (fl) near apex. Anterior part (ap) split near apex into a large membrane and a smaller caudal branchlet (a). Posterior part (hp) mesally with a groove and a short pocket. Posterior gonopods completely covered by anterior ones from below.

HABITATS. Litter and the uppermost soil strata (0-10 cm deep) in various forest types [Mikhajlova, 1983b]. In the S Maritime Province, the numbers range between 1.0 and 5.0 ind. per sq. m [Mikhajlova, 1981c, 1988b].

DISTRIBUTION (Map 15). Originally described from the Ussuriyskii Reserve and Chuguyevka Distr., this species appears to be quite widely spread in the southern and, partly, central Maritime Prov., also recorded in North Korea [Jędrzykowski, 1982].

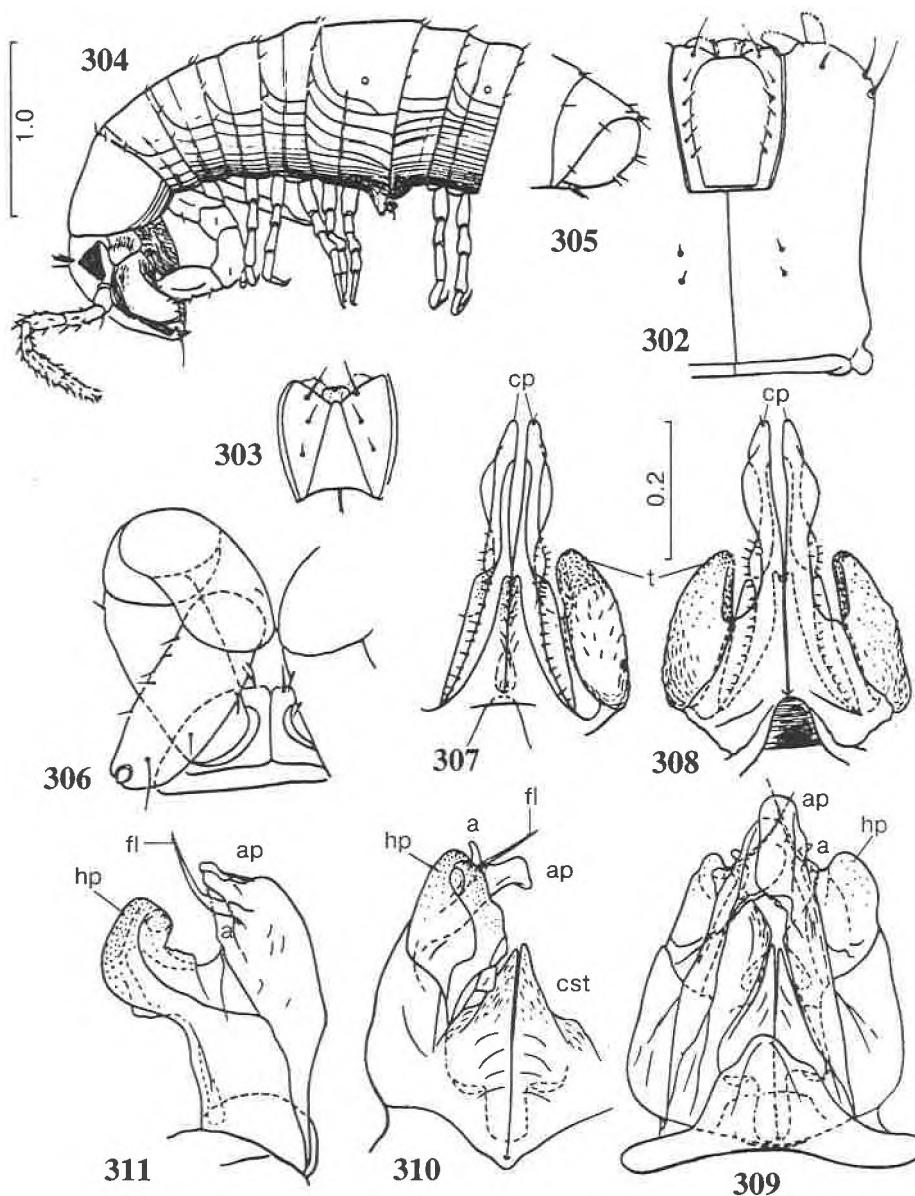
Family Nemasomatidae Bollman, 1893

Seven genera, almost strictly Holarctic. The Far East of Russia supports one genus.

The main distinguishing characters of the family are as follows: metazonites striate only below ozopore level; sternites not fused with pleuroterga; no distinct suture dividing pro- and metazonites; epiproct absent; gonopods not retractile; anterior gonopods with evident, mostly setose telopodite vestiges and a pair of flagella; posterior gonopods mostly with a field of short rod-like setae; ♂ legpair 1 modified, somewhat reduced.

Genus *Orinisobates* Lohmander, 1933

Seven species distributed in the Nearctic and East Palearctic, from Tien-Shan Mts in the west to Kamchat-



Figs 302-311. *Ussuriulus pilifer* Gol.: 302 — ♂ gnathochilarium; 303 — lamellae linguales with promentum of ♀ gnathochilarium; 304 — fore part of body; 305 — telson; 306 — ♂ leg-pair 1; 307 — anterior gonopods (caudal view); 308 — anterior gonopods (front view); 309 — posterior gonopods (front view); 310 — posterior gonopods (caudal view); 311 — posterior gonopods (lateral view); a — caudal branch of posterior gonopod frontal part; ap — frontal part of posterior gonopods; cp — coxal process of anterior gonopods; cst — caudal eminence of posterior gonopod coxosternal part; fl — flagellum; hp — posterior gonopod caudal part; t — anterior gonopod telopodite. — Scales in mm (after Golovatch [1980a]).

Рис. 302-311. *Ussuriulus pilifer* Gol.: 302 — гнатохилирий ♂; 303 — язычковые пластинки с проментумом гнатохилирия у ♀; 304 — передний конец тела; 305 — тельсон; 306 — 1-я пара ног у ♂; 307 — передние гоноподии (вид сзади); 308 — передние гоноподии (вид спереди); 309 — задние гоноподии (вид спереди); 310 — задние гоноподии (вид сзади); 311 — задние гоноподии (вид сбоку); а — задняя веточка передней части задних гоноподий; ар — передняя часть задних гоноподий; ср — коксальный отросток передних гоноподий; cst — заднее возвышение коксо-стернального района задних гоноподий; fl — жгутик; hp — задняя часть задних гоноподий; t — телоподит передних гоноподий. — Масштаб в мм (по [Головач, 1980а]).

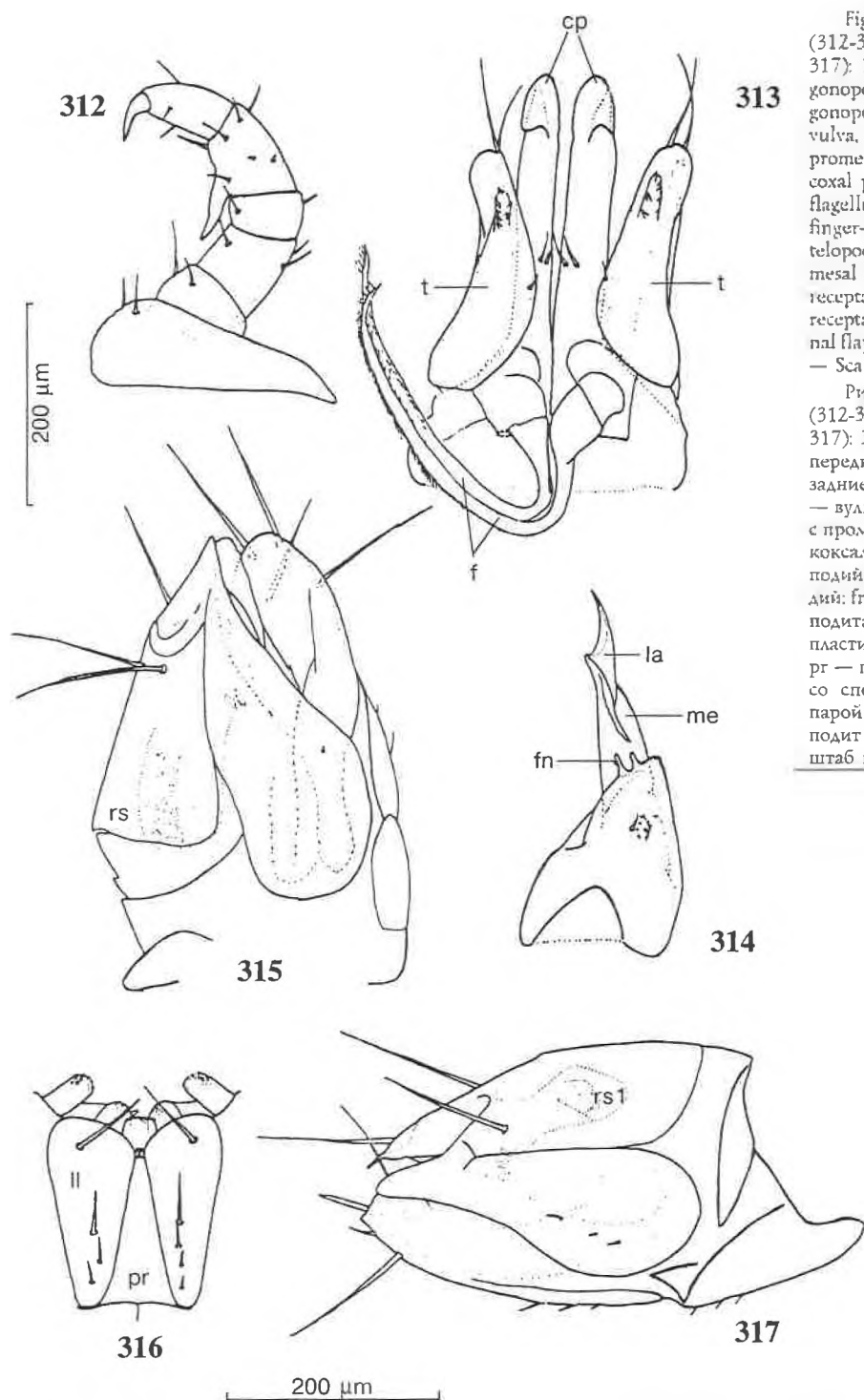
ka Peninsula and the Kurile Islands in the east. The Far East of Russia supports two species.

The main distinguishing characters of the genus are as follows: posterior gonopods with a subterminal row of digitiform processes; anterior gonopods with apical hooks on coxal processes and with basal telopodital flaps more or less covering basis of flagella; ♂ legpair 2 with an oral,

coxal pore-group; eyes present; receptaculum seminis with a pair of internal flaps except in *O. soror*.

KEY TO SPECIES OF *ORINISOBATES*:

- 1(2) Setae on metazona present..... *O. soror*
 2(1) Setae on metazona absent..... *O. microthylax*



Orinisobates soror Enghoff, 1985
Figs 312-315, Map 19.

Orinisobates soror Enghoff, 1985: 49, figs.

Orinisobates soror — Mikhajlova, 1990: 137; 1993: 16, map; 1998: 7; Mikhajlova & Basarukin, 1995: 91, map; Ganin, 1997: 133.

DESCRIPTION. ♂ 10.5-14 mm long, body segments 42(-2) to 47(-1). ♀ 10.5-13 mm long, body segments 43(-2) to 45(-2). Colouration light brown, darkest laterally.

Figs 312-317. *Orinisobates soror* Engh. (312-315). *O. microthylax* Engh. (316-317): 312 — ♂ leg 1; 313 — anterior gonopods (caudal view); 314 — posterior gonopods (lateral view); 315, 317 — vulva, 316 — lamellae linguales with promentum of gnathochilarium; cp — coxal process of anterior gonopods; f — flagellum of anterior gonopods; fn — finger-like process of posterior gonopod telopodite; la — lateral lamella; me — mesal lamella; pr — promentum; rs — receptaculum seminis with sperm; rs1 — receptaculum seminis with pair of internal flaps; t — anterior gonopod telopodite. — Scales in mm (after Enghoff [1985]).

Рис. 312-317. *Orinisobates soror* Engh. (312-315), *O. microthylax* Engh. (316-317): 312 — 1-я пара ног у ♂; 313 — передние гоноподии (вид сзади); 314 — задние гоноподии (вид сбоку); 315, 317 — вульва; 316 — язычковые пластинки с проментумом гнатохилария у ♂; cp — коксальный отросток передних гоноподий; f — жгутик передних гоноподий; fn — пальцевидный отросток телоподита задних гоноподий; la — боковая пластинка; me — срединная пластинка; pr — проментум; rs — семяприемники со спермой; rs1 — семяприемник с парой внутренних клапанов; t — телоподит передних гоноподий. — Масштаб в мм (по [Enghoff, 1985]).

Head with four frontal setae of almost equal length. About 12-15 ocelli in a narrow triangular eyepatch on each side of head. Gnathochilarium with three setae on each of stipites and lamella lingualis. Caudal part of both prozonite and metazonite with a number of striae in ventral half, uppermost striae progressively shortened from behind. Midbody segments with 17-18 metazonital setae. Epiproct absent. Telson with setae along caudal edge and with two dorsal, non-marginal setae. Anal valves and subanal scale each with two setae.

Legs slender. Claws normal, without additional claws. ♂ legpair 1 somewhat shorter than in congeners.

tibia with a long outgrowth (Fig. 312). ♂ legpair 2 with an oral, coxal pore-group. Penes short, double, each lobe with two setae. ♂ legs posterior to legpair 2 with ventral, soft, transversely ridged pads on femur, postfemur, and tibia.

Anterior gonopods (Fig. 313) with long slender coxal processes (cp), apically curved as hook. Mesal part of coxal process with two small setae. Coxae with long flagella (f) densely covered with pointed, needle-shaped spinules distally and apically. Telopodites (t) 1-segment-

ed, about $2/3$ length of coxal processes, each telopodite with 1-3 long apical setae, 1-2 small setae near midlength of mesal margin, and a subapical group of 2-8 minute spine-like setae. Posterior gonopods as in Fig. 314, only with 1-2 digitiform processes (fn).

Vulvae (Fig. 315) as typical of the genus, except for the absence of internal flaps in the receptaculum seminis (rs).

HABITATS. Sea-coast under pebbles, stones and logs of wood.

DISTRIBUTION (Map 19). This littoral species has originally been described from the Kunashir Island, Kuriles, and appears to be widespread in the southern part of Sakhalin Island (Korsakov and Aniva districts) and Kuriles (Kunashir, Shikotan, Zelyonyi, Chornye Bratya, Ushishir, Rasshua islands).

Orinisobates microthylax Enghoff, 1985
Figs 316, 317, Map 19.

Orinisobates microthylax Enghoff, 1985: 51, figs.

Orinisobates microthylax — Mikhajlova, 1988b: 70; 1993: 16, map; 1998: 7; Mikhajlova & Basarukin, 1995: 91, map.

DESCRIPTION. ♂ unknown. ♀ 11.0-14.5 mm long. Colouration pale brown to brown. Head with four frontal setae in a transverse row, median pair longer, lateral one shorter, situated near mesal margin of eye. About 40 ocelli in a triangular to ovoid eyepatch on each side of head. Gnathochilarium with 4-5 setae on each lamella lingualis (Fig. 316), length of setae increasing towards apex of lamellae linguales. Prozonite and metazonite separated by a distinct constriction. Posterior part of prozonite, and metazonite, with a number of continuous striae in ventral half, uppermost striae shortened from behind. Metazonital setae absent. Telson without epiproct, with sparse setae along caudal edge. Anal valves and subanal scale each with two setae.

Vulvae (Fig. 317) ovoid. Operculum and bursa of about equal length. Operculum with 3-4 long, distal setae. Bursa with aperture extending about $1/4$ down its aboral side, distally with hyaline lobes fitting against operculum, sclerotized in basal $2/3$, with a vertical suture on each side. Bursa with three long setae near aperture margin, and with setae distributed irregularly. Receptaculum seminis (rs1) forming a sac, near its opening with two sclerotizations. Receptaculum seminis much smaller than in congeners, with a pair of flaps inside.

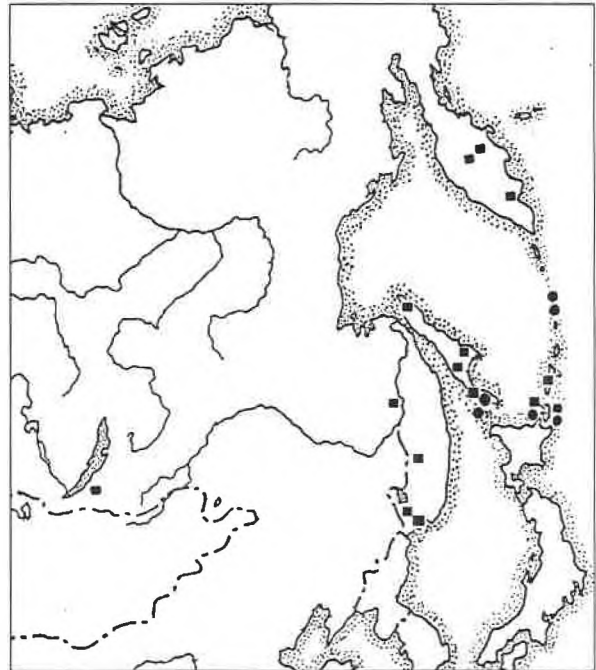
HABITATS. Litter of forests, also under tree bark and logs of wood. This species is characterized by thelytoky, with no males hitherto recovered.

DISTRIBUTION (Map 19). Originally described from Buryatia, Siberia, the Kamchatka Peninsula (near Kozyrevsk and Esso), and Vladivostok, this species appears to be widespread in Sakhalin and the southern part of Kuriles, also recorded in the Ussuriyskii Reserve, Maritime Prov., and in the Khabarovsk Province.

Family Blaniulidae Koch, 1847

About 20 genera in the western Palearctic (bulk) and eastern North America (1). Several anthropochoric species, subcosmopolitan in distribution. Only one genus occurs in the Far East of Russia.

The main distinguishing characters of the family are as follows: metazonites distinctly striate only below ozopore level; no distinct suture dividing pro- and



Map 19. Distribution of *Orinisobates soror* (●) and *O. microthylax* (■).

Карта 19. Распространение *Orinisobates soror* (●) и *O. microthylax* (■).

metazonites; telson without epiproct; sternites fused with pleurotergites; legs, including caudal pairs, with 1-2 lancet-shaped setae on postfemur, tibia and, sometimes, femur; gonopods not retractile; anterior gonopods with mesal coxal processes and lateral 1-segmented telopodites, without flagella; posterior gonopods long and slender, with small coxae, a very strongly reduced sternite and outgrowths distally; ♂ legpair 1 modified, reduced.

Genus *Nopoiulus* Menge, 1851

Eleven species indigenous in Turkey, the Caucasus, and Iran. The Far East of Russia supports one ubiquitous species.

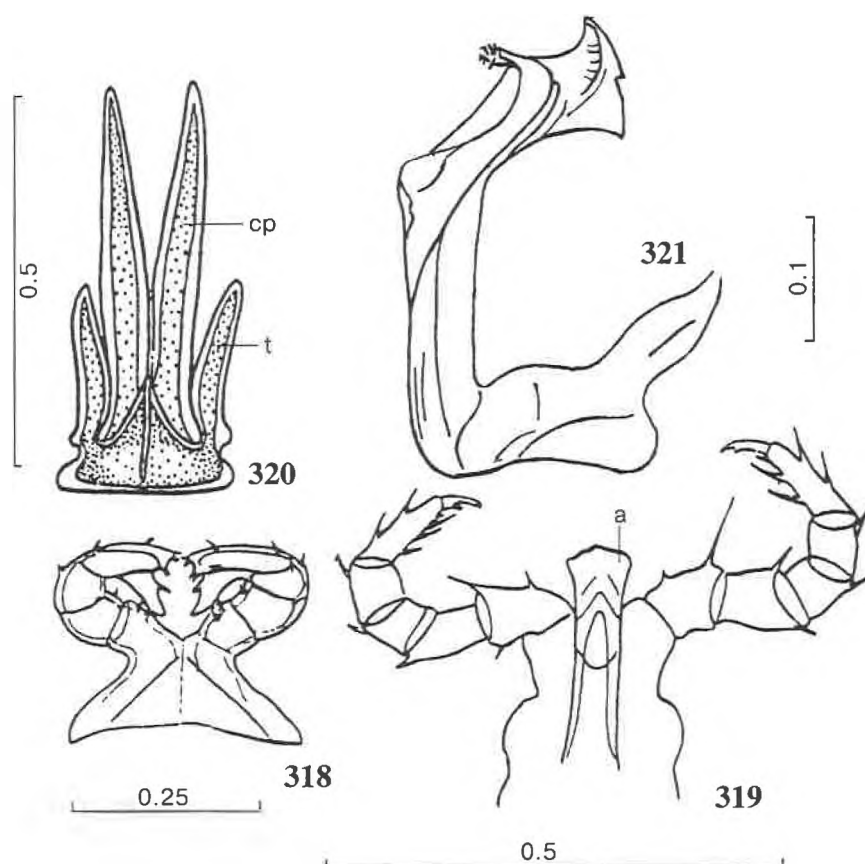
The main distinguishing characters of the genus are as follows: sternite of posterior gonopods prolonged dorsoventally; posterior gonopods apically divided into two lamellae of subequal size; operculum of valvae much longer than bursa.

Nopoiulus kochii (Gervais, 1847)
Figs 318-321.

Nopoiulus kochii — Lokšina & Golovatch, 1979: 385; Golovatch & Enghoff, 1990: 115; Mikhajlova, 1993: 9; 1998: 6.

DESCRIPTION. ♂ 7.5-10 mm long, 0.5-0.6 mm wide, body segments without telson 32(-4) to 43(-2). ♀ 11-12 mm long, 0.7-0.8 mm wide, body segments without telson 35(-2) to 39(-2). Colouration yellow-brown, sometime with brown spots laterally. Eyes black. Five ocelli in one vague line. Vertigial setae 2+2. ♂ genae with two pointed outgrowths from beneath (one each on cardo and stipe), in ♂ unmodified. Antennae long.

Body slightly compressed on sided. Somites distinctly striate below ozopore level. Metazonites with sparse,



Figs 318-321. *Nopoiulus kochii* (Gerv.): 318 — ♂ leg-pair 1; 319 — ♂ leg-pair 2; 320 — anterior gonopods; 321 — posterior gonopods; a — penes; cp — coxal process of anterior gonopods; t — anterior gonopod telopodite. — Scales in mm (318-320 — after Lokšina [1969], 321 — after Enghoff [1984], with some changes).

Рис. 318-321. *Nopoiulus kochii* (Gerv.): 318 — 1-я пара ног у ♂; 319 — 2-я пара ног у ♂; 320 — передние гоноподии; 321 — задние гоноподии; а — пенис; cp — коксальный отросток передних гоноподий; t — телоподит передних гоноподий. — Масштаб в мм (318-320 — по [Локшина, 1969], 321 — по [Enghoff, 1984], с некоторыми изменениями).

thin, short setae along caudal margin. Telson without epiproct, with sparse setae along posterior edge.

♂ legpair 1 (Fig. 318) unciform, with a strong outgrowth apically. Penes (a) (Fig. 319) with a truncated apex.

Anterior gonopods (Fig. 320) without flagella at base; telopodites (t) 1-segmented, without setae in distal part; coxites with long, slender, somewhat curved processes (cp). Posterior gonopods as in Fig. 321.

HABITATS. Natural and anthropogenic biotopes, also in soil, rotten wood and caves. In the Far East, this species has been reported from hothouses (on onion), a kitchen-garden near Vladivostok (on haricot and onion) as well as in a coniferous-broadleaved forest patch of the Vladivostok Botanical Garden.

DISTRIBUTION. A ubiquitous species widely distributed over Eurasia, the Americas, North Africa, and New Zealand.

Acknowledgements

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5. The journal follows certain semiological rules which the authors must respect. Generic and specific names should be typed in *italic*. Names of new taxa, synonyms, etc., should be concluded by **sp.n.**, **gen.n.**, **syn.n.** given **bold**. A word underlined once means *italics*, a word underlined twice means **bold**.

6. Authors should strictly follow the last edition of the International Code of Zoological Nomenclature. A species mentioned in the text for the first time must be supplied with its author(s) and the year of publication. If the paper contains descriptions of new species-group taxa, the author(s) should indicate the museum where types (type series) are deposited together with the respective registration numbers of the type specimens. As depositories, the Zoological Museum of the Moscow Lomonosov State University and/or the Zoological Institute of the Russian Academy of Sciences, St.-Petersburg, are preferable.

ARTICLES. The manuscript sent to the editors should be arranged as follows.

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- the title of the paper in two languages (the first one in the language of the paper);
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- introduction;
- main part of the paper;
- acknowledgements;
- references;
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ILLUSTRATIONS. Line drawings, maps, graphs and photographs are designated as "Fig(s)" in the English texts and as "Рис." in the Russian ones. They must be numbered in a sequential order according to the sequence of references in the text. If a figure consists of several parts, they should be lettered in small Latin letters. All figures should be completely ready for publication. The maximal size of line drawings and photographs is 20 x 28 cm. The author(s) name(s) and title of the paper should be pencil-indicated either on the upper edge by an arrow or on the opposite side. Illustrations can be returned to the author(s) after publication at request.

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Example of a list of references.

- Brodsky K.A. 1959. [Calanoida of the Far Eastern Seas of USSR and the Polar Basin]. Moscow-Leningrad: AN SSSR Publ. 442 p. [in Russian]
- Mauchline J. 1980. Growth and production of Euphausiacea (Crustacea) in the Rockall Trough // Marine Biology. Vol.90. No.1. P.19-26.
- Eskov K.Y. 1988. [Spiders of Central Siberia] // Zhivotnyi mir taigi. Moscow: Nauka Publ. P.67-98 [in Russian].

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ПРАВИЛА ДЛЯ АВТОРОВ

Российский журнал исследований по членистоногим "Arthropoda Selecta" публикует оригинальные, нигде более не опубликованные работы по морфологии, систематике, филогении и эволюции, развитию, жизненным циклам и зоогеографии ракообразных, паукообразных, пикногонид, многоножек и других групп членистоногих, как рецессивных, так и вымерших, за исключением частных работ по пассивным, клещам и трилобитам.

1. Журнал публикует статьи на русском, английском, немецком и французском языках, однако предпочтение отдается работам на английском языке. Работы на русском языке должны содержать краткий англоязычный реферат (до 2-3 страниц стандартного машинописного текста). Все переводы представляются авторами.

Русскоязычным авторам при переводе настоятельно рекомендуется возможно больше руководствоваться лексикой современных работ англоязычных авторов.

При транслитерации кириллицы следует передавать э как e, ж — zh, й — y, х — kh, ц — ts, ч — ch, ш — sh, щ — shch, ю — yu, я — ya. В названиях административных единиц переводить область как Area, край — Prov., район — Distr. Прилагательные от географических названий заменяются существительными в именительном падеже (Vologda Area, Krasnoyarsk Prov. и т.д.).

2. Объем рукописи ограничен объемом номера.

3. Предпочтительно представление рукописей, набранных в IBM-совместимых текстовых редакторах. При представлении статьи необходимы два экземпляра текста (распечатки), таблиц, иллюстраций и подписей к ним. Текст везде должен быть напечатан через два интервала на стандартной машинописной странице (формат A4).

4. При представлении статей русскоязычных авторов на иностранном языке обязательно представление русского варианта текста.

5. Авторы в своих статьях должны строго придерживаться Международного кодекса зоологической номенклатуры. Первое упоминание каждого вида в тексте статьи должно сопровождаться указанием автора и года описания. При описании новых таксонов видовой группы необходимо указывать название научного учреждения, в которое переданы на хранение типовые экземпляры и швейцарские номера хранения. В качестве учреждений для хранения типовых материалов рекомендуются Зоологический Музей МГУ и Зоологический Институт РАН.

6. Названия таксонов родового и видового ранга должны быть выделены *курсивом*. Обороты типа **sp.n.**, **gen.n.**, **sup.n.** даются **полужирным шрифтом**. В рукописи места, которые следует набирать *курсивом*, подчеркиваются волнистой линией, **полужирным шрифтом** — двойной прямой линией.

Текст направляемой в редакцию статьи должен быть оформлен следующим образом:

- краткий колонтитул на языке статьи;
- название статьи на двух языках;
- фамилии и адреса авторов (на двух языках);
- ключевые слова (не более 8) на двух языках;
- краткое (10-20) строк резюме на двух языках;
- подробный реферат статьи на английском языке (только для статей на русском языке);
- основной текст статьи, благодарности;
- список литературы;

- таблицы (пронумерованные арабскими цифрами);
- подписи к рисункам (на двух языках на отдельной странице).

ТАБЛИЦЫ. Все таблицы должны быть напечатаны на отдельных листах и пронумерованы арабскими цифрами. Заголовки и текстовые части таблиц в русскоязычных статьях должны быть снабжены английским переводом. Употребления вертикальных линий в таблицах следует избегать, равно как и знаков "+", заменяя их на "•", и знаков "-", заменяя их на "...", или оставляя пробел.

ИЛЛЮСТРАЦИИ. Штриховые рисунки и таблицы рисунков, фотографии, карты, графики должны быть подготовлены в виде, пригодном для сканирования. Иллюстрации обозначаются как "рис." в русских текстах и "Fig." в английских текстах и нумеруются арабскими цифрами по порядку их упоминания в тексте. Рисунки, сведенные в таблицы, обозначаются сплошной нумерацией арабскими цифрами: каждое изображение получает свой номер. Допустимы дополнительные обозначения деталей рисунков строчными латинскими буквами. Размер рисованной иллюстрации и фототаблицы не должен превышать 20 x 28 см. Таблицы рисунков следует компоновать в пропорции к размеру печатной полосы (16 x 20 см, учитывая место для подрисовочных подписей) или колонки (7,8 x 20 см). Рисунки на таблицах размещают возможно более плотно и равномерно по площади прямоугольного пространства, избегая заметных свободных мест, особенно по углам. На обороте каждой иллюстрации должна быть указана фамилия автора и название статьи, стрелкой — верхняя сторона.

АББРЕВИАТУРЫ. Все аббревиатуры, используемые в тексте, таблицах и иллюстрациях, должны иметь ключ-легенду, в котором они расшифрованы в алфавитном порядке.

СПИСОК ЛИТЕРАТУРЫ. Ссылки на русскоязычных авторов в английском тексте должны приводиться латинскими буквами. Ссылки на работы более чем двух авторов следует приводить как [Макаров и др., 1982] или [Reid et al., 1978]. В списке литературы к англоязычным статьям названия работ на языках, не использующих латинский алфавит, должны переводиться на английский, названия источников должны транслитерироваться (например, Trudy Instituta Okeanologii), в конце ссылки указывается язык оригинала (например, [in Russian]). Названия источников и работ указываются полностью.

Томы и номера журналов указываются на языке издания: Bd. (Band), H. (Heft), Fasc. (Fascicule), T. (Tome, Tomus), Vol. (Volume) и т.д.

Примеры оформления списка литературы:

- Бродский К.А. 1950. Веслоногие рачки Calanoida дальневосточных морей СССР и полярного бассейна. М.-Л.: Изд-во АН СССР. 442 с.
- Brodsky, K.A. 1950. [Calanoida of the Far Eastern Seas of USSR and the Polar Basin] M.-L.: AN SSSR Publ. 442 p. [in Russian]
- Mauchline, J. Growth and production of Euphausiacea (Crustacea) in the Rockall Trough // Marine Biology. Vol.90. No.1. P.19-26.
- Veselova, E.M., Mikhailov K.G. 1987. [About the vertical structure of a spider population] // Ispolzovanie i okhrana resursov flory i fauny SSSR. Doklady MOIP 1985. Zoologiya i botanika. Moscow: Nauka Publ. P.83-85 [in Russian].
- Vagner, V.A. 1892. Araneina // Dwigubsky. Primitiae Faunae Mosquensis [Second Ed.]. Opyt kataloga predstaviteley Moskovskoy fauny. Moscow. P.117-120 [in Russian].
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Information. Announcements. Информация. Объявления

Announcements. Titles to appear in forthcoming issues of *Arthropoda Selecta*: Phylogeny and system of the Arthropoda, by *Ya.I. Starobogotov*; Arthropod evolution from apody to myriapody, as paraphyletic walk with homeotic and neotenic steps, by *D.E. Shcherbakov*; A new species of the genus *Pseudocrangonyx* Akatsuka et Komai (Crustacea: Amphipoda) from the subterranean fresh waters on the Island Sakhalin, by *V.S. Labay*; Some crangonid shrimps of the Toza Bay, Japan, by *R.N. Burukovsky*; Notes on variability and distribution of five species of hermit crabs (Crustacea: Decapoda Paguridae) in the Norwegian Sea, by *V.I. Sokolov*; Solpugids of Turkmenistan, by *A.V. Gromov*; Contribution to the knowledge of the harvestmen in Siberia (Arachnida: Opiliones), by *A.N. Chemeris, D.V. Logunov & N. Tsurusaki*; On the spiders (Aranei) collected during a joint American-Mongolian-Russian expedition to Central Mongolia in 1997, by *Yu.M. Marusik & D.V. Logunov*; Remarks on the Ural spider fauna, 8-9, by *S.L. Esysunin & V.E. Efimik*; Remarks on the Ural spider fauna, 10, by *S.L. Esysunin, V.E. Efimik & N.S. Mazura*; A new species of the mygalomorph genus *Atypus* from Russian Far East, by *T.I. Oligier*; Spiders of the genus *Pholcus* from Maritime Province, Russian Far East, by *T.I. Oligier*; Spiders of the family Liocranidae (Aranei) of Siberia and Far East, by *S.N. Danilov*; Miscellaneous notes on the Middle Asian jumping spiders (Aranei: Salticidae), by *D.V. Logunov & S.Yu. Rakov*; On the jumping spider fauna of the southern part of West Siberia (Aranei: Salticidae), by *S.Yu. Rakov*; A review of the spider genus *Tibellus* Simon, 1875 in North Asia (Aranei: Philodromidae), by *V.E. Efimik*; Notes on the spider genus *Styloctetor* Simon, 1884 and some related genera, with description of two new species from Siberia (Aranei: Linyphiidae), by *Yu.M. Marusik & A.V. Tanasevitch*; Introduced millipeds of the family Paradoxosomatidae on Pacific Islands (Polydesmida), by *R.M. Shelley & P.T. Lehtinen*.

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