Arthropoda Selecta 2(1): 25-40

Taxonomical structure of the genus *Simocephalus* Schödler, 1858 (Crustacea Daphniiformes Daphniidae).

Таксономическая структура рода *Simocephalus* Schödler, 1858 (Crustacea Daphniiformes Daphniidae).

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KEY WORDS: Daphniidae, *Simocephalus*, taxonomy, species groups, check-list.

КЛЮЧЕВЫЕ СЛОВА: Daphniidae, *Simocephalus*, таксономия, группы видов, список видовых и подвидовых названий.

ABSTRACT: Examination of 19 species and subspecies (8 from types) of the genus *Simocephalus* and information derived from the descriptions of 56 species and subspecies suggest that the genus can be divided into four species groups: the *S.exspinosus*, the *S.vetulus*, the *S.serrulatus*, and the *S.latirostris* group. The former contains 4 subgroups: the *S.exspinosus*, the *S.acutirostratus*, the *S.iheringi*, and the *S.obtusatus* subgroup. The other groups appear to be more homogeneous. No between-group / subgroup intermediate forms have been found. The taxonomical status of these groups and subgroups requires further revision. A check-list of all names available within *Simocephalus* is presented.

РЕЗЮМЕ: Исследование материала по 19 видам и подвидам рода *Simocephalus* а также сопоставление описаний 56 видов и подвидов показало, что род может быть разделен на четыре группы: *S.vetulus*, *S.serrulatus*, *S.latirostris* и *S.exspinosus*. Три первые группы довольно однородны по составу, 4ая имеет четыре подгруппы: *S.exspinosus*, *S.acutirostratus*, *S.iheringi* и *S.obtusatus*. Промежуточных форм не обнаружено. Таксономический статус групп и подгрупп требует выяснения. В работе представлен список всех видовых и подвидовых названий.

Introduction

The cladoceran genus *Simocephalus* comprises typical inhabitants of the littoral aquatic vegetation of freshwater bodies in all continents except the Antarctica. *Simocephalus* spp. are known for over 200 years, yet their taxonomy remains rather obscure.

Some species and subspecies are suspected to be highly widespread. However, since the descriptions of numerous species are insufficient, verification of identifications and literature records is nessessary. For instance, it is doubtful that *S.vetulus spinosulus*, described from the Hawaiian Islands, really occurs in Europe, as noted by Behning [1941], as the latter region is inhabited by *S.vetulus vetulus*, while two subspecies even theoretically cannot co-exist. On the other hand, some specific or subspecific names may be synonyms. For example, 5 species based on their descriptions, practically indistinguishable from *S.serrulatus* and 3 subspecies of *S.serrulatus* proper have been reported from South America alone (Tab. 4).

The last world-wide revision of this genus belongs to Schödler [1877] who listed only 13 names of specific and variation rank. At present, 56 names have already been proposed. All later reviews are regional: Sweden [Lilljeborg, 1900], the Caucasus [Behning, 1941], Czechoslovakia [Šrámek-Hušek et al., 1962], the USSR [Manuilova, 1964; Smirnov, 1977], Germany [Flössner, 1972], Romania [Negrea, 1983], Italy [Margaritora, 1985], China [Chiang & Du, 1979], Australia [Dumont, 1983], Argentina [Olivier, 1960], etc. Numerous authors have mentioned close similarities existing between some species but there have been no attempt to revise the taxonomical structure of the genus as a whole.

Morphological variability of *Simocephalus* is

poorly known. This makes the taxonomical status of certain forms doubtful, since they may actually represent not taxa, but morphological varieties. There are only a few studies concerning the variability of *Simocephalus* [Yermakov, 1964; Green, 1966; Revenko, 1983; Hann, Hebert, 1986; Orlova & Korovchinsky, 1991].

This paper does not deal with the taxonomical status of particular forms. Its main aim is to reveal the infrageneric structure of *Simocephalus*, since a division of the genus into groups of morphologically close species can provide a step toward future group-by-group revisions. Another aim of the paper is to present a check-list of all hitherto described species or subspecies of *Simocephalus*.

Material and methods

I have studied material of 19 species and subspecies, including types (Tab. 1-5). Original drawings were made with a «RA-4» drawing-tube. Micrographs were made with a JEOL JSM-50A scanning electron microscope. I use the terms «species group» or «subgroup», for the taxonomical status of such taxa is yet unknown. I also use some original diagnostic characters, including recently described features of trunk limb morphology [Orlova-Bienkowskaja, 1993]. Morphological terms are explained in Fig. 1.

Results and discussion

The genus *Simocephalus* can be divided into 4 clear-cut morphological groups, i.e. the *S.exspinosus*, the *S.vetulus*, the *S.serrulatus*, and the *S.latirostris* group. The *S.exspinosus* group contains 4 subgroups: the *S.exspinosus*, the *S.acutirostratus*, the *S.iheringi*, and the *S.obtusatus* subgroup. The other groups seem to be less morphologically diverse.

The diagnostic characters of the groups and subgroups are stable and well-expressed in all representatives. Since intermediate forms are absent, these groups and subgroups can be considered as taxa. The diagnostic features concern the setules on the postabdominal claw, the morphology of the antennule and rostrum, the shape and denticulation of the head in both sexes, the shape of the supra-anal angle of the postabdomen, the position of the male spermaduct opening, and the morphology of the female 2nd trunk limb and posterior angle of the valves.

The *S.vetulus* group.

Tab. 1, Figs 2-4.

DIAGNOSIS. Both sexes: internal* and external sides of postabdominal claw with a row of fine setules (Figs 3:*4-5*; 4); front of head rounded, without denticles (Fig. 2:*10*); insertion of antennules at base of rostrum; internal side of antennule with neither ridges nor denticles (Fig. 2:*7,8*); rostrum of moderate size; setules on internal side of posterior margin of valves very fine (Fig. 3:*1*).

Female: ocellus elongate (Fig. 2:*10*); 2nd prominence of endite of 2nd (Fig. 3:*6*) trunk limb with a very thin, one-jointed seta ca. 4 times as short as basal joint of plumose seta of 1st prominence; 3rd prominence with a very thin, one-jointed seta more than 6 times as short as basal joint of plumose seta of 1st prominence.

Parthenogenetic female (Fig. 2:*1,4-6,9*): posterior angle of valves regularly rounded or with a rounded prominence; denticles of a moderate size, on part of dorsal and on entire posterior edge.

Male: supra-anal angle of postabdomen sharp, spermaduct opening on its top (Fig. 3:*3*).

REMARKS. The world-wide *S.vetulus* group is rather homogeneous. The main characters distinguishing its constituent taxa are the size of the posterior prominence of the valves and the shape of the brood chamber. These characters being highly variable and the limits of variation overlapping in different taxa, it is difficult to estimate the real number of species and subspecies composing this group, as some names may be synonyms. However, there is no doubt that the group is represented by more than one species for, according to my data, in the vicinity of Sydney, Australia, two forms from this group, *S.vetulus spinosulus* and *S.gibbosus*, do co-exist without forming intermediate forms. The integrity of the *S.vetulus* group is beyond doubt.

The *S.exspinosus* group.

Tab. 2,3. Figs 5-7.

DIAGNOSIS. Both sexes: internal side of postabdominal claw with a row of fine to coarse setules (Figs 6:*3,4*), external side with a series of dentiform setules at base and with a row of fine or coarse setules distally (Figs 6:*1,2,6-8*; 7); front of head rounded or pointed, without denticles; insertion of antennules at base of rostrum; internal side of

* The internal side of the postabdominal claw and antennule is referred to here as the one which is the nearest to the sagittal plane of the body.

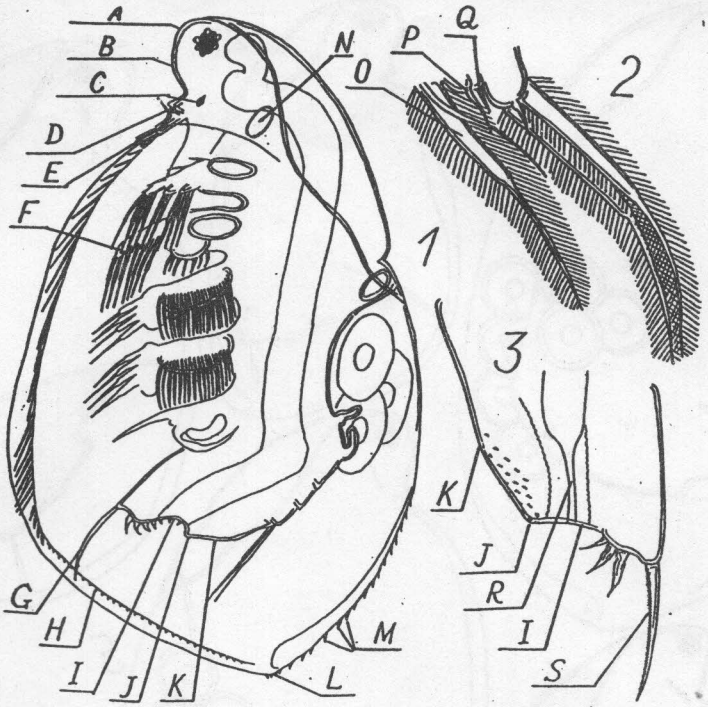

Fig.1 The morphology of *Simocephalus*. *1* - general morphology of a parthenogenetic female; *2* - endite of the 2nd trunk limb of a female; *3* - postabdomen of a male. A - front of a head; B - ventral edge of a head; C - ocellus; D - rostrum; E - antennule; F - the 2nd trunk limb; G - postabdominal claw; H - setules of internal side of posterior margin of valve; I - anal concavity; J - supra-anal angle of postabdomen; K - dorsal edge of postabdomen; L - posterior angle of a valves; M - denticles of valves; N - insertion of an antenna (here and below the antennae are not drawn); O - plumose seta of the 1st prominence; P - seta of the 2nd prominence; Q - seta of the 3rd prominence; R - spermaduct; S - setules of postabdominal claw.

Рис.1. Морфология *Simocephalus*. *1* - общая морфология партеногенетической самки; *2* - эндит 2ой торакальной конечности самки; *3* - постабдомен самца; A - передняя часть головы; B - вентральный край головы; C - глазок; D - рострум; E - антеннула; F - 2ая торакальная конечность; G - постабдоменальный коготок; H - сетулы внутренней стороны заднего края створок; I - анальная выемка; J - супрааналный угол постабдомена; K - дорзальный край постабдомена; L - задний угол створок; M - зубчики створок; N - место прикрепления антенн (здесь и далее антенны не изображены); O - оперенная щетинка 1го выступа; P - щетинка 2го выступа; Q - щетинка 3го выступа; R - семяпровод; S - сетулы постабдоменального коготка.

antennule with neither ridges nor denticles; rostrum of a moderate size; setules of internal side of posterior margin of valves very fine (Fig. 5:*12*).

Female: ocellus short; 2nd prominence of endite of 2nd trunk limb (Fig. 6:*5*) with a very thin, one-jointed seta ca. 1.5 times as short as basal joint of plumose seta of 1st prominence; 3rd prominence with a very thin, one-jointed seta longer than basal joint of plumose seta of 1st prominence.

Parthenogenetic female (Figs. 5:*1-5*): posterior angle of valves either regularly rounded or with a rounded or pointed prominence; denticles on valves of a moderate size, on parts of dorsal and posterior edges.

Male: supra-anal angle of postabdomen rounded, spermaduct opening in anal concavity (Fig. 5:*11*).

REMARKS. The *S.exspinosus* group seems to be the most heterogeneous within the genus. It contains 4 subgroups differing from each other in the shape of the head and supra-anal angle and in the pattern of setulation on the postabdominal claws (Tab. 3).

The *S.exspinosus* subgroup is world-wide in distribution, the *S.acutirostratus* subgroup occurs in Australia, Southeast Asia, South Africa, and South America, the *S.iheringi* subgroup is restricted to South America, the *S.obtusatus* subgroup has been recorded in China and Sumatra. I have failed to discover any intermediate forms between the subgroups. In spite of numerous differences, most characters are identical in all representatives of the *S.exspinosus* group.

Undoubtedly, the *S.exspinosus* subgroup contains more than one species for, according to my data, two well-distinguishable species of this subgroup, *S.exspinosus* and *S.congener*, co-exist in Moscow Region without forming intermediate forms. The same can be noted for the *S.acutirostratus* subgroup as, in the environs of Sydney, Australia, two species, *S.acutirostratus* and *S.victoriensis*, co-exist as well. It cannot be excluded that the *S.iheringi* and the *S.obtusatus* subgroups are actually species with some subspecies and/or syno-

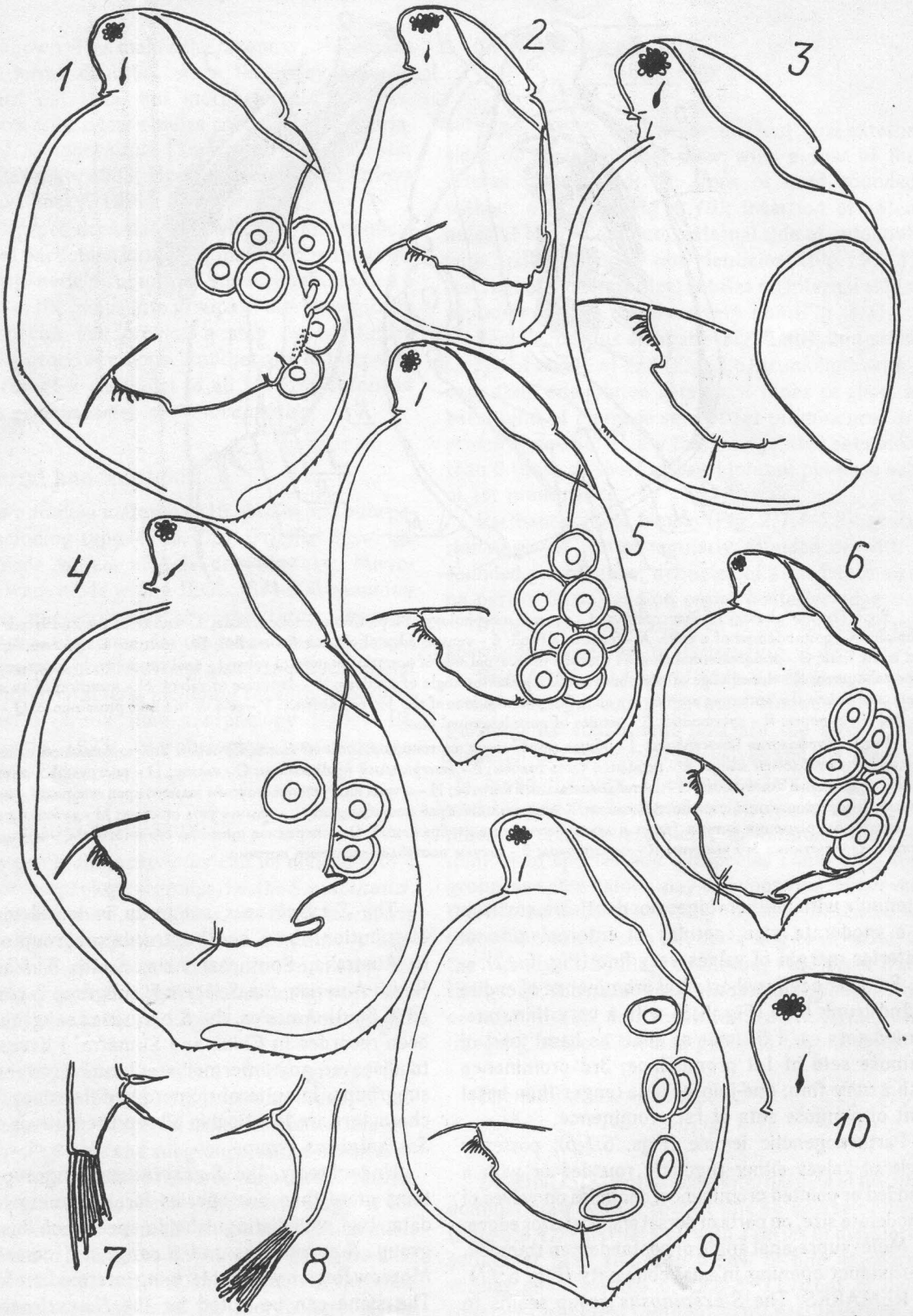

Fig.2. The *S. vetulus* group. *1-3* - *S.vetulus*: *1* - parthenogenetic female ; *2* - male; *3* - gamogenetic female; *4-6,9* - parthenogenetic females: *4* - *S.mixtus* (from the type locality); *5* - *S.gibbosus* (type material); *6* - *S.elizabethae* (after Sars [1888]); *9* - *S.vetuloides* (type material); *7,8* - antennule of *S.vetulus*: *7* - male; *8* - female; *10* - ventral part of a head of *S.vetulus* female.

Рис. 2. Группа видов *S. vetulus*. *1-3* - *S.vetulus*: *1* - партеногенетическая самка; *2* - самец; *3* - гамогенетическая самка; *4-6,9* - партеногенетические самки: *4* - *S.mixtus* (из типового местообитания); *5* - *S.gibbosus* (типовой материал); *6* - *S.elizabethae* (по [Sars, 1888]); *9* - *S.vetuloides* (типовой материал); *7,8* - антеннула *S.vetulus*: *7* - самец, *8* - самка; *10* - вентральная часть головы самки *S.vetulus*.

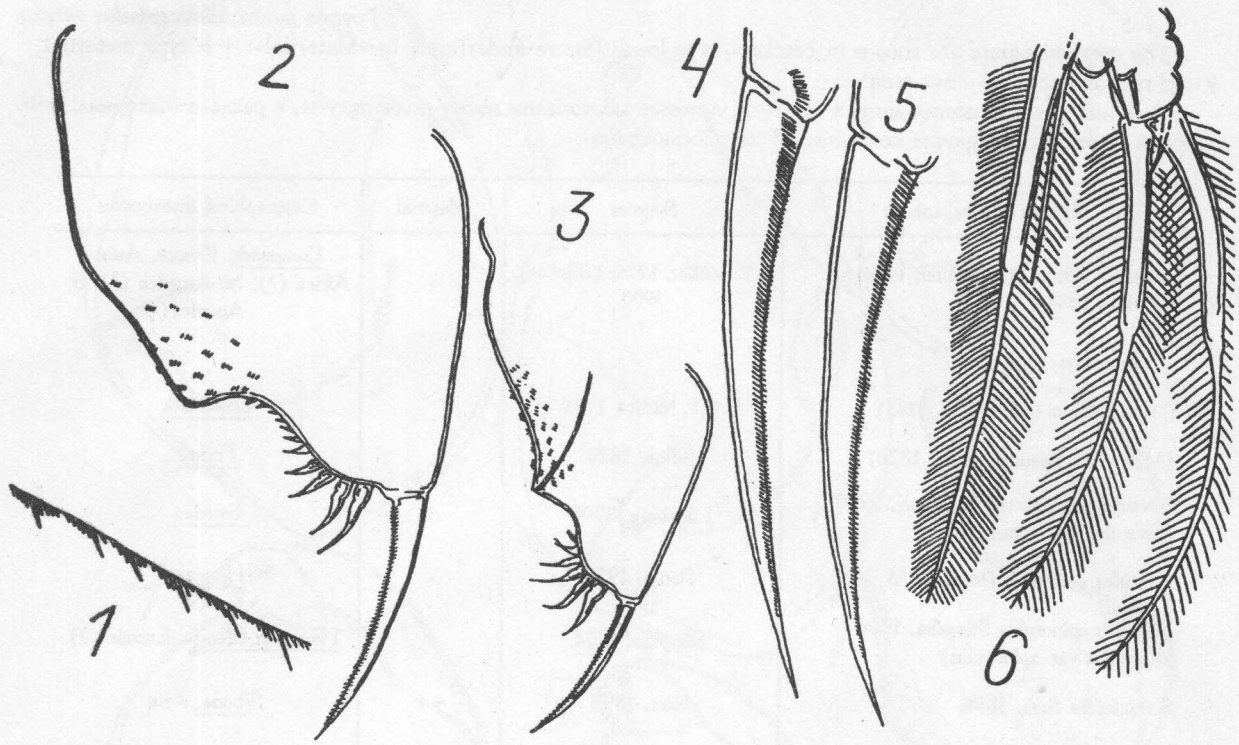

Fig. 3. Morphological details of *S.vetulus*. *1* - setules of the internal side of posterior margin of valve; *2* - postabdomen of a female; *3* - postabdomen of a male; *4,5* - sides of postabdominal claw of a female: *4* - external; *5* - internal; *6* - endite of the 2nd trunk limb of a female.

Рис. 3. Морфологические особенности *S.vetulus*. *1* - сетулы внутренней стороны заднего края створок; *2* - постабдомен самки; *3* - постабдомен самца; *4,5* - постабдоменальный коготок: *4* - снаружи; *5* - изнутри; *6* - эндит 2ой торакальной конечности самки.

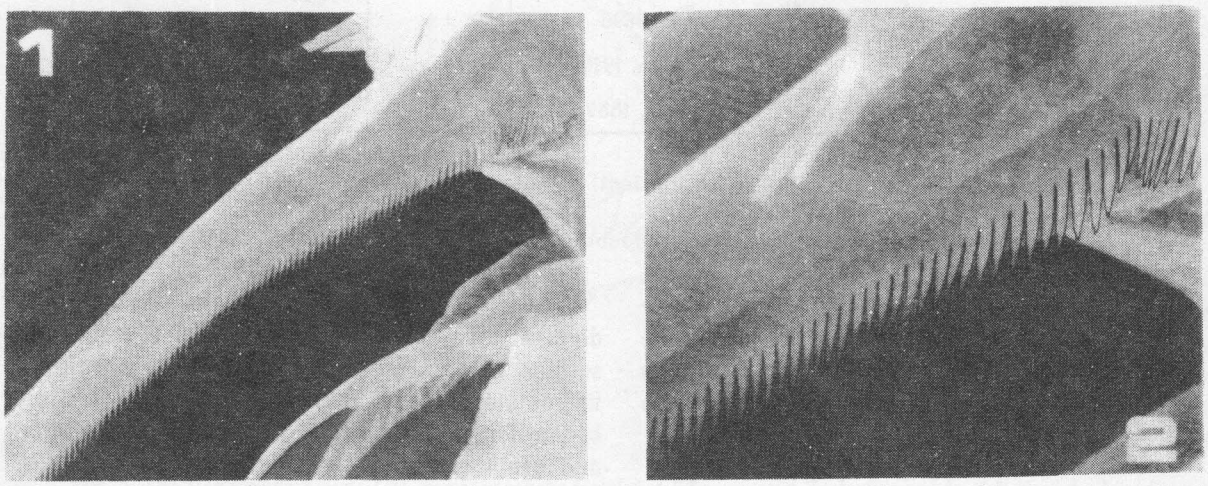

Fig. 4. Morphological details of *S.vetulus*. *1* - basal part of external side of postabdominal claw of female; *2* - the same, enlarged.

Рис. 4. Морфологические особенности *S.vetulus*. *1* - базальная часть постабдоменального коготка самки снаружи; *2* - то же, увеличено.

Table 1. Таблица 1.
The *Simocephalus vetulus* group.
Группа видов *Simocephalus vetulus*.

The original names are shown in brackets, type localities are underlined, in «Materilal»: ++ type materilal, + ordinary collections, - not seen.

Оригинальные названия даны в скобках, типовые местонахождения подчеркгуты, в разделе Материал: ++ типовой материал, + прочие коллекции, - не просмотрено.

Species and subspecies	Sources	Material	Geographical distribution
S.vetulus vetulus (O.F.Müller, 1776) (Daphnia vetula)	O.F. Müller, 1776; Lilljeborg, 1900	+	Danemark, Europe, Asia, Africa (?), N. America (?), S. America (?)
synonyms:			
(Daphnia sima O.F. Müller, 1785)	O.F. Müller, 1785		Danemark
(Monoculus nasutus Jurine, 1820)	Jurine, 1820		France
S.vetulus angustifrons Lilljeborg, 1900 (S.vetulus var. angustifrons)	Lilljeborg, 1900	+	Sweden
S.vetulus gebhardti Ponyi, 1955	Ponyi, 1955	-	Hungary
S.vetulus spinosulus Stingelin, 1904 (S.vetulus var. spinosulus)	Stingelin, 1904	+	Hawaiian Islands, Europe (?)
S.vetuloides Sars, 1898	Sars, 1898	++	Siberia, Asia
S.mixtus mixtus Sars, 1903	Sars, 1903	++	Mongolia, Asia
S.mixtus hungaricus Ponyi, 1956	Ponyi, 1956	-	Hungary
S.aegyptiaca Fischer, 1860 (Daphnia aegyptiaca)	Fischer, 1860; Richard, 1894	-	Egypt
S.elizabethae (King, 1853) (Daphnia Elizabethae)	King, 1853a; Sars, 1888	-	Australia, Asia(?), Europe(?)
S.dulvertonensis Smith, 1909	Smith, 1909	-	Tasmania
S.gibbosus Sars, 1896	Sars, 1896	++	Australia
S.corniger Methuen, 1910	Methuen, 1910	-	S. Africa
S.cacicus Moniez, 1889	Moniez, 1889	-	S. America: Lake Titicaca

Notes: 1) The original descriptions are often unsufficient. In those cases I base my notion of species on the other descriptions.

2) The localities, where determination of species is doubtful, are marked with a question-mark.

nyms. It is rather difficult to determine whether the *S.obtusatus* subgroup deserves the rank of a separate subgroup or it should be united with the *S.exspinosus* subgroup, because no species of the former subgroup have become available for my study.

The *S.serrulatus* group.
Tab. 4. Figs 8,9.

DIAGNOSIS. Both sexes: internal side of postabdominal claw (Fig. 8:*8*) with a row of dentiform setules, external side (Figs 8:*7*; 9) with a series of fine setules at base (about 1/3 of lenth) and a row of dentiform setules distally; front of head projecting and forming an angle, with denticles** (Fig. 8:*10*); insertion of antennules near tip of rostrum; internal side of antennule with ridges and denticles (Fig. 8:*5,6*); rostrum of a moderate size; setules of

** Delachaux has described a form devoid of denticles at the front: *S.serrulatus* var. *nudifrons* [cited after Behning, 1941]. Most probably, however, he has overlooked the denticles because of their minute size.

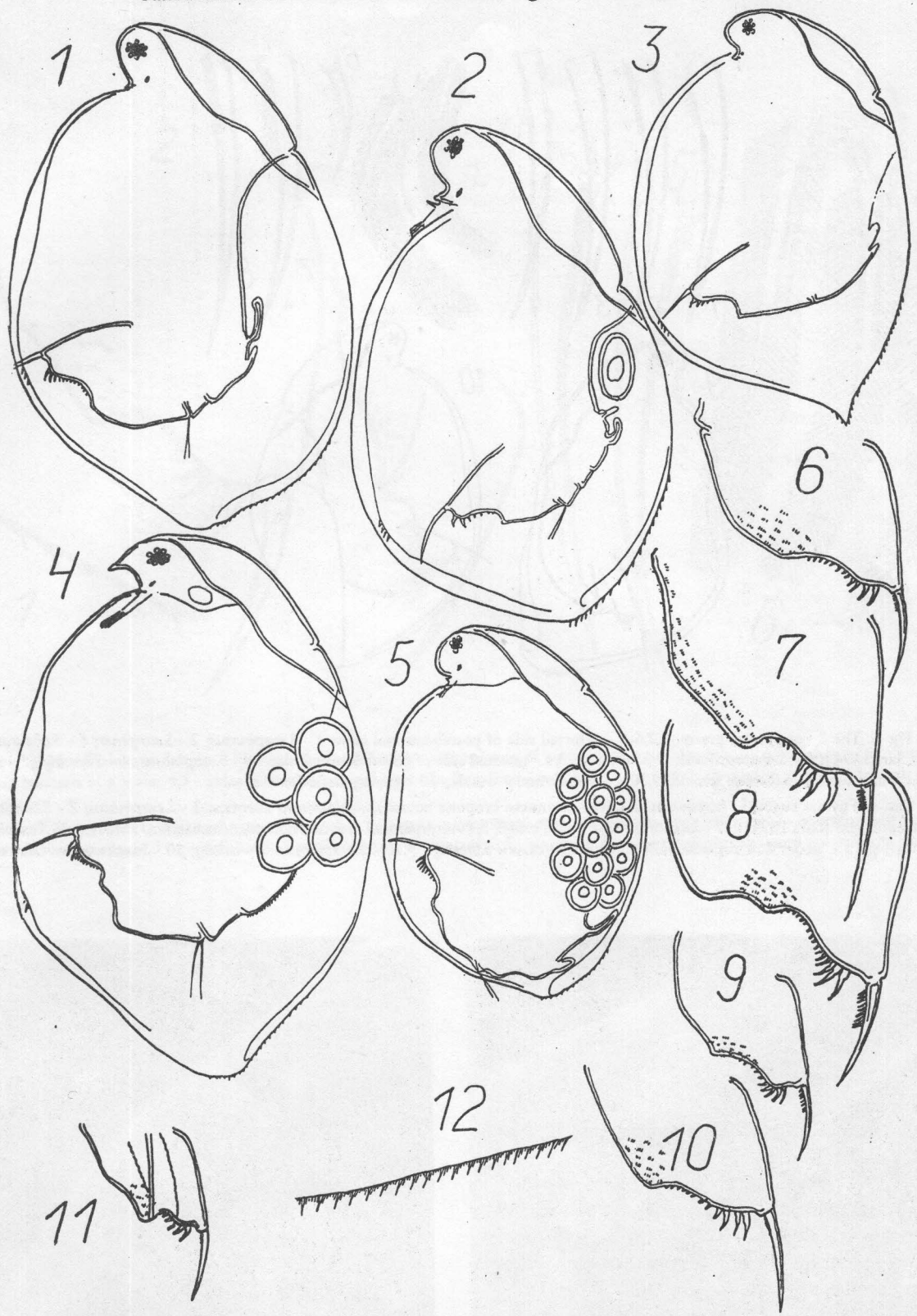

Fig. 5. The *S. exspinosus* group. *1-5* - parthenogenetic females: *1* - *S.exspinosus*; *2* - *S.congener*; *3* - *S.iheringi*; *4* - *S.acutirostratus*; *5* - *S.obtusatus*; *6-10* - postabdomen of females: *6* - *S.exspinosus*; *7* - *S.congener*; *8* - *S.acutirostratus*; *9* - *S.obtusatus* (after Sars [1894]); *10* - *S.iheringi*; *11* - postabdomen of *S.exspinosus* male; *12* - setules of the internal side of the posterior margin of valve of *S.exspinosus* female.

Рис. 5. Группа видов *S. exspinosus*. *1-5* - партеногенетические самки: *1* - *S.exspinosus*; *2* - *S.congener*; *3* - *S.iheringi*; *4* - *S.acutirostratus*; *5* - *S.obtusatus*; *6-10* - постабдомены самок: *6* - *S.exspinosus*; *7* - *S.congener*; *8* - *S.acutirostratus*; *9* - *S.obtusatus* (по [Sars,1894]); *10* - *S.iheringi*; *11* - постабдомен самца *S.exspinosus*; *12* - сетулы внутренней стороны заднего края створок *S.exspinosus*.

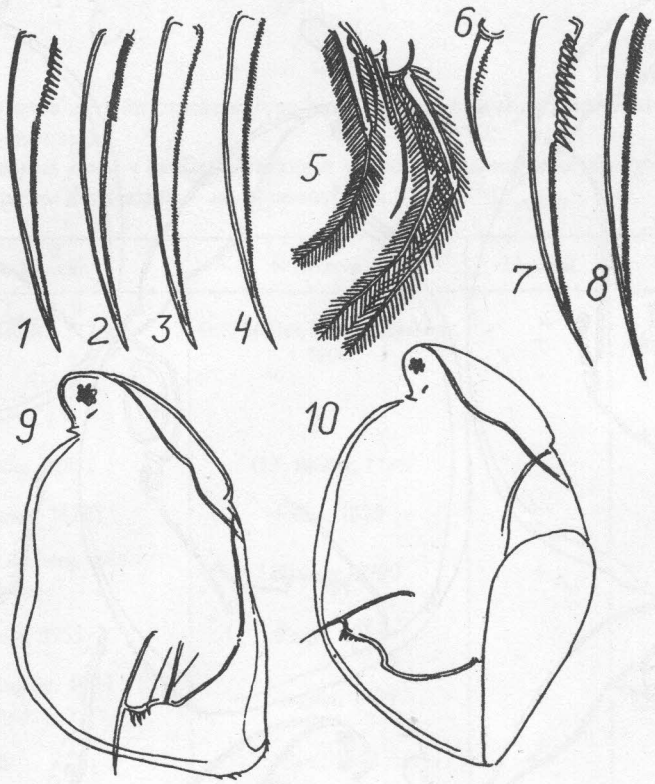

Fig. 6. The *S. exspinosus* group. *1,2,6-8* - external side of postabdominal claw: *1* - *S.exspinosus*; *2* - *S.congener*; *6* - *S.obtusatus* (*6* - after Sars,1894); *7* - *S.acutirostratus*; *8* - *S.iberingi*; *3,4* - internal side of postabdominal claw: *3* - *S.exspinosus*; *4* - *S.iberingi*; *5* - endite of 2nd trunk limb of *S.iberingi* female; *9,10* - *S.exspinosus*: *9* - male; *10* - gamogenetic female.

Рис. 6. Группа видов *S. exspinosus*. *1,2,6-8* - внешняя сторона постабдоменального коготка: *1* - *S.exspinosus*; *2* - *S.congener*; *6* - *S.obtusatus* (по [Sars,1894]); *7* - *S.acutirostratus*; *8* - *S.iberingi*; *3,4* - внутренняя сторона постабдоменального коготка: *3* - *S.exspinosus*; *4* - *S.iberingi*; *5* - эндит 2ой торакальной конечности самки *S.iberingi*; *9,10* - *S.exspinosus*: *9* - самец; *10* - гамогенетическая самка.

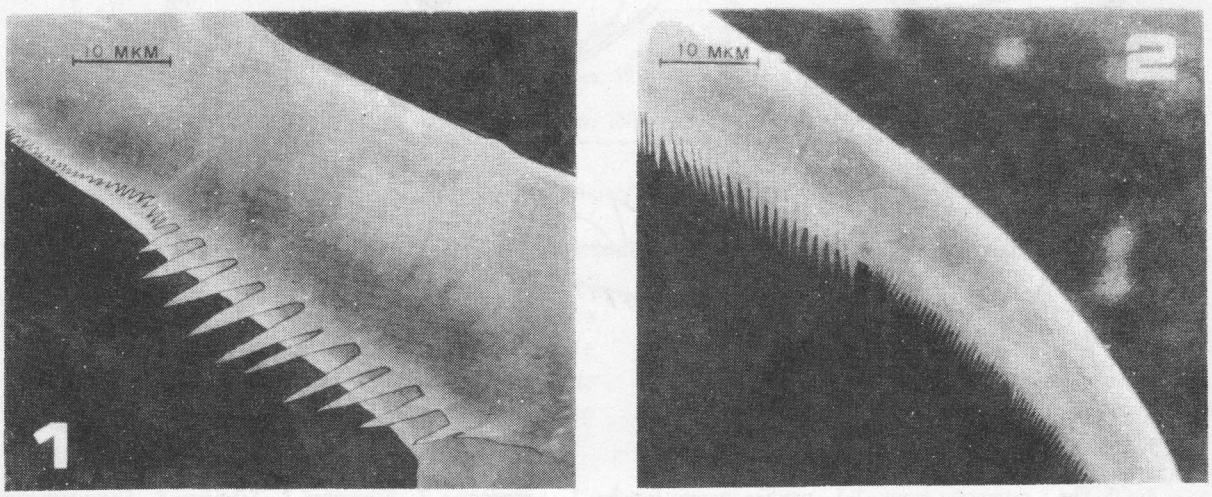

Fig. 7. The *S. exspinosus* group. Basal part of the external side of the postabdominal claw in females: *1* - *S.exspinosus*; *2* - *S.congener*.

Рис. 7. Группа видов *S. exspinosus*. Базальная часть внешней стороны постабдоменального коготка самки: *1* - *S.exspinosus*; *2* - *S.congener*.

Table 2. Таблица 2.
The *Simocephalus exspinosus* group.
Группа видов *Simocephalus exspinosus*.

The original names are shown in brackets, type localities are underlined, in «Material»: ++ type material, + ordinary collections, - not seen.

Оригинальные названия даны в скобках, типовые местонахождения подчеркнуты, в разделе Материал: ++ типовой материал, + прочие коллекции, - не просмотрено.

Species and subspecies	Sources	Material	Geographical distribution
The exspinosus subgroup			
S.exspinosus (De Geer, 1778) (Monoculus exspinosus)	Lilljeborg, 1900	+	Europe, Asia, N. Africa(?), N. America(?), S. America(?)
S.sibiricus Sars, 1898	Sars, 1898	++	Siberia, Asia, Europe(?)
S.productus Sars, 1903	Sars, 1903	++	Kazakhstan, Asia
S.vamani Rane, 1985	Rane, 1985	-	India
S.australiensis (Dana, 1852) (Daphnia australiensis)	~~Sars, 1852~~; Dumont, 1983	+	Australia, N. Africa(?)
S.congener (Koch, 1841) (Daphnia congener)	Lilljeborg, 1900	+	Germany, Europe
The acutirostratus group			
S.acutirostratus acutirostratus (King, 1853) (Daphnia Elizabethae var.acuti-rostrata)	King, 1853b; Sars, 1896	+	Australia, Asia, S. America
synonyms:			
S.paradoxus Schödler, 1877	Schödler, 1877		Australia
S.acutirostratus brehmi (Gauthier, 1939) (Simosa acutirostratus brehmi)	Gauthier, 1939	-	Central Africa: Lake Chad, Brazil(?)
S.acutifrons Johnson, 1954	Johnson, 1954	-	S. Africa
S.vidyae Rane, 1983	Rane, 1983	-	India
S.vidyae gajareae Rane, 1986	Rane, 1986	-	India
S.victoriensis Dumont, 1983	Dumont, 1983	+	Australia
The iheringi subgroup			
S.iheringi Ricard, 1897 (Simocephalus Iheringi)	Richard, 1897	+	S. America
S.fonsecai Bergamin, 1931	Bergamin, 1939	-	Brazil
S.fonsecai sinucristatus Bergamin, 1939 (S.fonsecai var. sinucristatus)	Bergamin, 1939	-	Brazil
The obtusatus subgroup			
S.obtusatus (Thomson, 1878) (Daphnia obtusata)	Sars, 1894	-	New Zealand
S.himalayensis Chiang et Chen, 1977	Chiang, 1979	-	China

Table 3. Таблица 3.
Diagnoses of the subgroups belonging to the *S.exspinosus* group.
Диагнозы подгрупп из группы видов *S.exspinosus*.

Neither males nor gamogenetic females of the groups *S.acutirostratus* and *S.iheringi* are known, so the diagnoses concern only parthenogenetic females.

Самцы и гамогенетические самки в группах видов *S.acutirostratus* и *S.iheringi* неизвестны, поэтому диагнозы включают характеристики только партеногенетических самок.

Characters	the S.exspinosus subgroup	the S.acutirostratus subgroup	the S.iheringi subgroup	the S.obtusatus subgroup
Front	rounded	pointed	rounded	rounded
Ventral edge of head very convex	no	no	no	yes
Dorsal edge of postabdomen, proximal to supra-anal angle, forms a big prominence	no	yes	no	no
Row of setules on the internal side of postabdominal claw	fine	medium	coarse	unknown
Dentiform setules of proximal part of external side of terminal claw	small (S.congener), big (others)	big	small	big
Dense or not dense	dense	dense	dense	not dense
Their number	20-25 (S.congener), 10-15 (others)	10-14	23-27	about 12
Posterior angle of valves evenly rounded or with a rounded (pointed) prominence	rounded or with a rounded prominence	with a rounded prominence	with a pointed prominence	rounded

internal side of posterior margin of valves rather stiff (Fig. 8:*11*).

Female (Fig. 8:*10*): ocellus short; 2nd prominence of endite of 2nd trunk limb (Fig. 8:*12*) with a very thin, one-jointed seta more than thrice shorter than basal joint of plumose seta of 1st prominence; 3rd prominence with a thick, two-jointed seta shorter than basal joint of plumose seta of 1st prominence.

Parthenogenetic female (Fig. 8:*1*): posterior angle of valves with a big, rounded prominence; denticles of valves big, on part of dorsal edge, on posterior and ventral edges.

Male: supra-anal angle of postabdomen rounded, spermaduct opening in anal concavity (Fig. 8:*9*).

REMARKS. Considering their descriptions, 15 species and subspecies from all continents except Antarctica and Australia seem to belong to the *S.serrulatus* group. They mainly differ from each other in the shape of the head and posterior angle of the valves. However, according to my observations, there is a noticeable interpopulational variability of these characters in *S.serrulatus*, while their infrapopulational variability is slight. Hence, it cannot be excluded that all 15 names applied to representatives of this group are just synonyms.

The *S.latirostris* group.
Tab. 5. Fig. 10.

DIAGNOSIS. Both sexes***: internal and external sides of postabdominal claw (Fig. 10:*11,12*) with a row of fine setules; front of head rounded, without denticles (Fig. 10:*9*); insertion of antennules at base of rostrum; internal side of antennule (Fig. 10:*10*) with neither ridges nor denticles; rostrum either of

*** The male of *S.latirostris* is unknown, so I use only information about the male of *S.lusaticus*.

Table 4. Таблица 4.
The *Simocephalus serrulatus* group.
Группа видов *Simocephalus serrulatus*.

The original names are shown in brackets, type localities are underlined, in Material: ++ type material, + ordinary collections, - not seen.

Оригинальные названия даны в скобках, типовые местонахождения подчеркнуты, в разделе Материал: ++ типовой материал, + прочие коллекции, - не просмотрено.

Species and subspecies	Sources	Material	Geographical distribution
S.serrulatus serrulatus (Koch, 1841) (Daphnia serrulata)	Lilljeborg, 1900	+	Germany, Europe, Asia, Africa, S. America, N. America
Synonyms:			
(Daphnia intermedia Lievin, 1848)	Lievin, 1848; Lilljeborg, 1900		Poland
(Daphnia brandtii Fishcer, 1848)	Lilljeborg, 1900		Germany
S.serrulatus montenegrinus Wereschagin, 1912 (S.serrulatus var. montenegrinus)	Behning, 1941	++	Yugoslavia
S.serrulatus rotundifrons Brehm, 1933 (S.serrulatus var. rotundifrons)	Behning, 1941		Africa, Europe(?)
S.serrulatus mixta Grochmalicki, 1915 (S.serrulatus var. mixta)	Grochmalicki, 1915	-	Java
S.serrulatus pelagicus Brehm, 1959 (S.serrulatus var pelagicus)	Brehm, 1959	-	New Guinea
S.serrulatus productifrons Stingelin, 1904 (S.serrulatus var. productifrons)	Stingelin, 1904	-	Sumatra
S.serrulatus nudifrons Delachaux, 1912 (S.serrulatus var. nudifrons)	Behning, 1941	-	Peru
S.serrulatus armata Brehm, 1956	Brehm, 1956	-	Venezuela
S.capensis Sars, 1895	Sars, 1895	++	S. Africa, S. America(?)
S.americanus Birge, 1878	Birge, 1878	-	N. America
S.semiserratus Sars ~~[in litt.]~~	Sars, 1901	++	Brasil, Argentina
S.kerhervei Bergamin, 1931	Bergamin, 1939	-	Brasil
S.aguabrancai Bergamin, 1938	Bergamin, 1939	-	Brasil
S.inflatus Vavra, 1900	Vavra, 1900	-	Chile, S. America
S.surekhae Rane, 1982	Rane, 1982	-	India

a very big size and a complex shape (*S.latirostris*)(Fig. 10:*9*) or moderate (*S.lusaticus*); setules on internal side of posterior margin of valves very fine.

Female: ocellus short (Fig. 10:*9*); 2nd prominence of endite of 2nd trunk limb (Fig. 10:*8*) with a thin, two-jointed seta ca. 2 times shorter than basal joint of plumose seta of 1st prominence; 3rd prominence with a thin, two-jointed seta longer than basal joint of plumose seta of 1st prominence.

Parthenogenetic female (Fig. 10:*12*): posterior

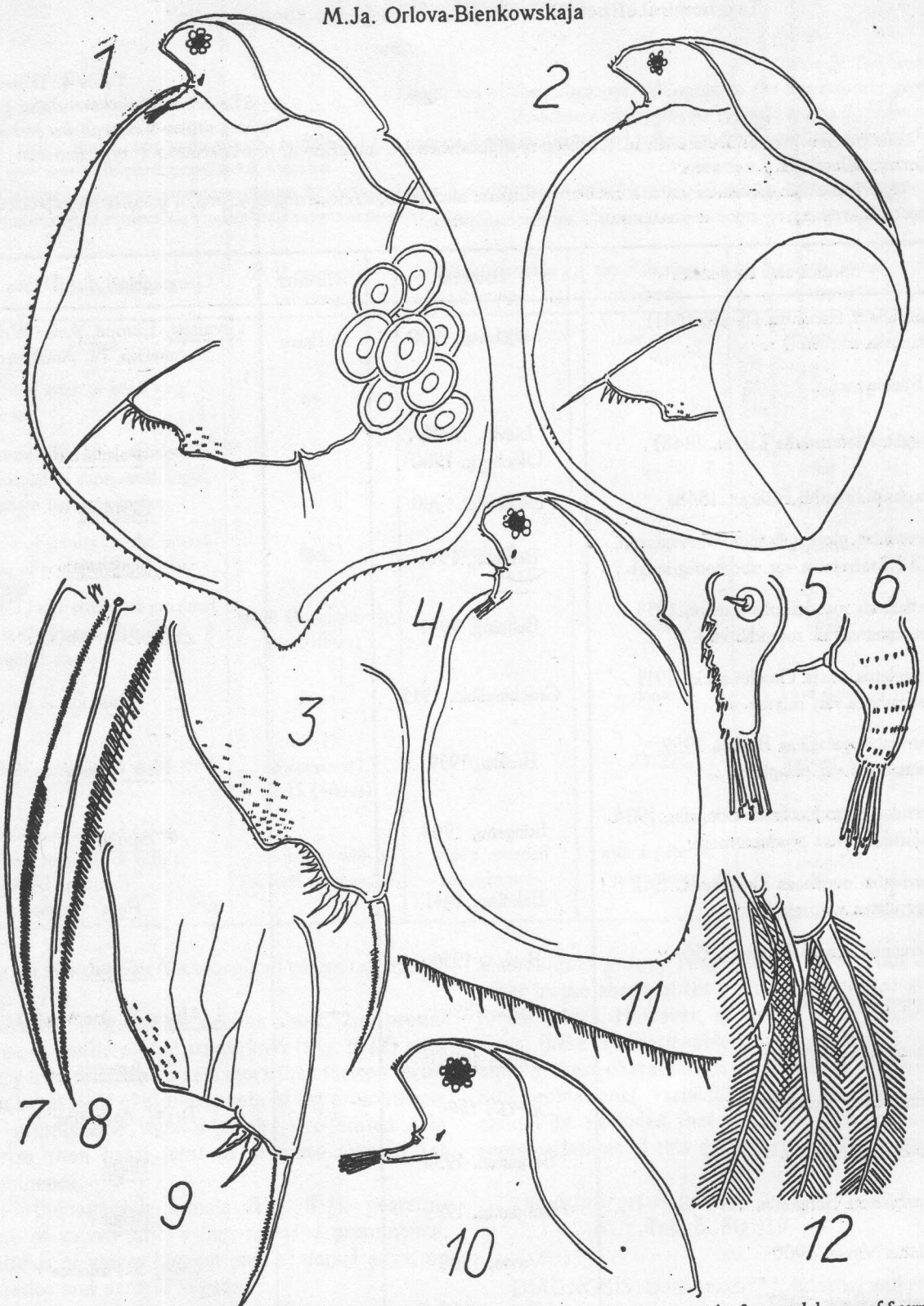

Fig. 8. The *S. serrulatus* group. *1,2* - females of *S.serrulatus*: *1* - parthenogenetic; *2* - gamogenetic; *3* - postabdomen of *S.serrularus* female; *4* - *S.capensis* male (type material); *5,6* - antennule of *S.serrulatus* female: *5* - ventral view, *6* - lateral view; *7,8* - sides of the postabdominal claw of *S.serrulaltus* female: *7* - external; *8* - internal; *9* - postabdomen of *S.capensis* male (type material); *10-12* - *S.serrulatus* female: *10* - head; *11* - setules of internal side of posterior margin of valve; *12* - endite of the 2nd trunk limb.

Рис. 8. Группа видов *S. serrulatus*. *1,2* - самки *S.serrulatus*: *1* - партеногенетическая; *2* -гамогенетическая; *3* - постабдомен самки *S.serrulatus*; *4* - самец *S.capensis* (из типового материала); *5,6* - антеннула самки *S.serrulatus*: *5* - снизу, *6* - сбоку; *7,8* - стороны постабдоменального коготка самки *S.serrulatus*: *7* - внешняя; *8* - внутренняя; *9* - постабдомен самца *S.capensis* (из типового материала); *10-12* - детали строения самки *S.serrulatus*: *10* - голова; *11* - сетулы внутренней стороны заднего края створок; *12* - эндит 2ой торакальной конечности.

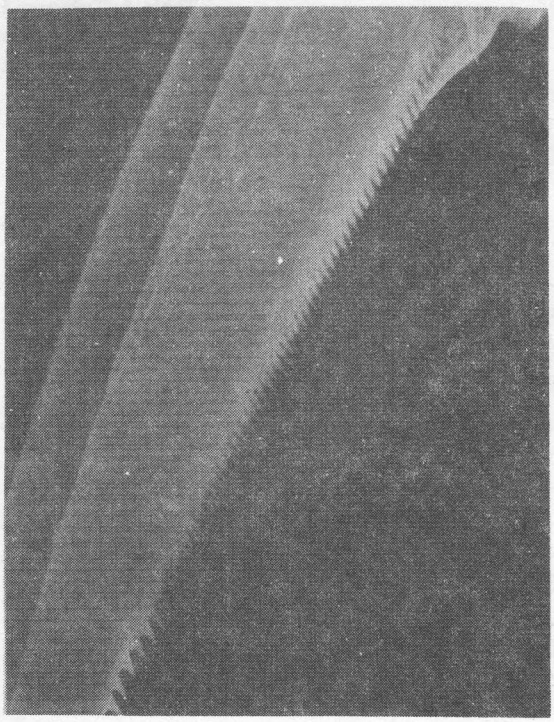

Fig. 9. *S. serrulatus*. Basal part of the external side of a female postabdominal claw.

Рис. 9. *S. serrulatus*. Базальная часть внешней стороны постабдоменального коготка самки.

angle of valves with a big, pointed prominence; denticles of valves very small, at tip of posterior prominence of valves.

Male: supra-anal angle of postabdomen rounded, spermaduct opening in anal concavity (Fig. 10:*5*).

REMARKS. The *S.latirostris* group comprises two species, i.e. *S.latirostris*, occurring in South America, Australia and Southeast Asia, and *S.lusaticus*, restricted to Europe and being a highly rare European species. I have no specimens of the latter at hand. However, according to the available descriptions [Behning, 1941; Flössner, 1972], it is close to *S.latirostris*, differing from it in the shape of the rostrum and the presence of prominences in the middle part of the valves.

S.rostratus and *S.daphniotes* (Tab. 6) have been described insufficiently. It is currently impossible to determine which species group these species belong to. If the types no longer exist, these two names ought to be regarded as *nomina dubia*. Unfortunately, I have got no information about further two species, *S.spinatus* and *S.gelidus*.

Key to groups and subgroups

1. Both sexes: postabdominal claw with a series of dentiform setules in their proximal or distal part. 3
- Both sexes: postabdominal claw without dentiform setules, with rows of fine setules. 2
2. Female: ocellus elongate; seta of 2nd prominence and of prominence of endite of 2nd trunk limb about 4 times, and of 3rd prominence more than 6 times, as short as basal joint of plumose seta of 1st prominence; parthenogenetic female: posterior angle of valves either regularly rounded or with a rounded prominence; male: supra-anal angle of postabdomen sharp, spermaduct opening at its top. ..... the *S.vetulus* group
- Females: ocellus short; seta of 2nd prominence of endite of 2nd trunk limb about 2 times as short, and seta of 3rd prominence longer basal joint of plumose seta of 1st prominence; parthenogenetic female: posterior angle of valves with a big, pointed prominence; male: supra-anal angle of postabdomen rounded, spermaduct opening in anal concavity. ..... the *S.latirostris* group
3. Both sexes: internal side of postabdominal claw with a row of dentiform setules, external side with a series of fine setules at base and a row of dentiform setules distally; front of head projecting and forming an angle with denticles; female: seta of 2nd prominence of endite of 2nd trunk limb 3 times, and seta of 3rd prominence slightly, shorter than basal joint of plumose seta of 1st prominence. ..... the *S.serrulatus* group
- Both sexes: internal side of postabdominal claw with a row of either fine or coarse setules, external side with a series of dentiform setules at base and a row of fine to coarse setules at distal part; front of head rounded or pointed, without denticles; female: seta of 2nd prominence of endite of 2nd trunk limb ca. 1.5 times shorter, and seta of 3rd prominence longer, than basal joint of plumose seta of 1st prominence. .... the *S.exspinosus* group 4
4. Parthenogenetic female: front of head pointed; dorsal edge of postabdomen proximal to supra-anal angle forming a big prominence. .... the *S.acutirostratus* subgroup
- Parthenogenetic female: front of head rounded; dorsal edge of postabdomen proximal to supra-anal angle different in shape 5
5. Parthenogenetic female: ventral edge of head very convex; dentiform setules in proximal part of external side of postabdominal claw sparse. ..... the *S.obtusatus* subgroup
- Parthenogenetic female: ventral edge of head not so very convex; dentiform setulae in proximal

Table 5. Таблица 5.
The *Simocephalus latirostris* group.
Группа видов *Simocephalus latirostris*.

The original names are shown in brackets, type localities are underlined, in «Material»: ++ type material, + ordinary collections, - not seen.

Оригинальные названия даны в скобках, типовые местонахождения подчеркнуты, в разделе Материал: ++ типовой материал, + прочие коллекции, - не просмотрено.

Species	Sources	Material	Geographical distribution
S.latirostris Stingelin, 1906	Stingelin, 1906	+	Paraguay, Australia, S.-E. Asia
S.lusaticus Herr, 1917	Behning, 1941	-	Germany, Middle and East Europe

Table 6. Таблица 6.
Species of unknown taxonomic position.
Виды неопределенного таксономического положения.

Species	Sources	Type locality
S.rostratus Herrick, 1884	Herrick, 1884	N. America
S.daphniotes Herrick, 1883	Herrick, 1884	N. America
S.spinatus Cosmovici ?	—	Romania
S.gelidus Brady, 1918	—	?

part of external side of postabdominal claw dense. 6

6. Parthenogenetic female: internal side of postabdominal claw and proximal part of external one with a row of fine setules; posterior angle of valves regularly rounded or with a rounded prominence. ..... the *S.exspinosus* subgroup

- Parthenogenetic female: internal side of postabdominal claw and proximal part of external one with a row of coarse setules; posterior angle of valves with a pointed prominence. .... the *S.iheringi* subgroup

Acknowledgements

I am indebted to Prof. N.N.Smirnov and Dr. N.M.Korovchinsky for their attention at all stages of this work; to A.O.Bienkowski for a number of valuable remarks on the manuscript; to Dr. L.A.Kutikova (Zoological Institute of the Russian Academy of Sciences, St.-Petersburg) and to Prof. M.E.Christiansen (Zoological Museum of the Oslo University, Norway), who submitted me type material under their care.

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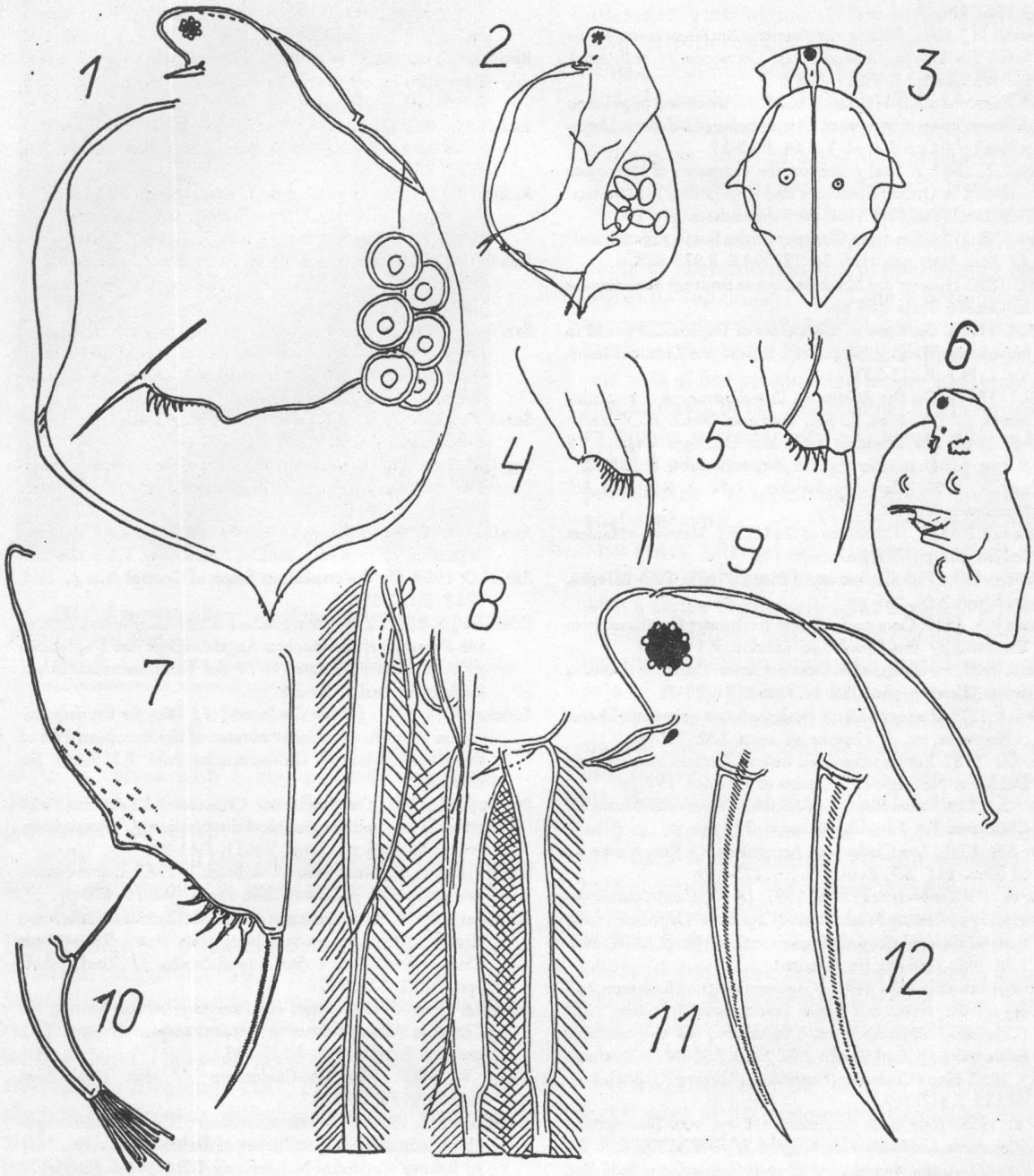

Fig. 10. The *S. latirostris* group. *1-3* - parthenogenetic females: *1* - *S.latirostris*; *2* - *S.lusaticus*; *3* - the same, ventral view (*2,3* - after Behning [1941]); *4* - postabdomen of *S.lusaticus* female; *5* - postabdomen of *S.lusaticus* male; *6* - *S.lusaticus* male (*4,5,6* - after Flossner, 1972); *7-12* - *S.latirostris* female: *7* - postabdomen; *8* - endite of the 2nd trunk limb; *9* - head; *10* - antennule; *11,12* - sides of the postabdominal claw: *11* - external; *12* - internal.

Рис. 10. Группа видов *S. latirostris*. *1-3* - партеногенетические самки: *1* - *S.latirostris*; *2* - *S.lusaticus*; *3* - то же, вид снизу (*2,3* - по [Behning, 1941]); *4* - постабдомен самки *S.lusaticus*; *5* - постабдомен самца *S.lusaticus*; *6* - самец *S.lusaticus* (*4,5,6* - по [Flössner, 1972]); *7-12* - детали строения самки *S.latirostris*: *7* - постабдомен; *8* - эндит 2ой торакальной конечности; *9* - голова; *10* - антеннула; *11,12* - стороны постабдоменального коготка: *11* - внешняя; *12* - внутренняя.

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