

Freshwater Biological Association

FBA Translation (New Series) No. 105

Title: Keys to families of Cladocera and to subfamilies, genera, species and subspecies of Macrothricidae and Moinidae.

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Reference: Fauna SSSR, Crustacea 1 (3)

Original language: Russian

Date of publication of original: 1976

Translator: J.P. Harding

Date of publication of translation: 1977

Number of pages of translation: 14

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Freshwater Biological Association,
The Ferry House,
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SMIRNOV, N.N. Macrothricidae and Moinidae of the world's fauna.
Fauna SSSR, Crustacea 1 (3)

KEYS TO FAMILIES OF CLADOCERA AND TO SUBFAMILIES, GENERA,
 SPECIES AND SUBSPECIES OF MACROTHRICIDAE AND MOINIDAE.
 translated by J.P. Harding.

p 5 Key to families of Cladocera.

- 1(14) Carapace covering body and legs.
 2(5) Six pairs of legs of similar structure.
 3(4) Length considerably greater than height.
 Head distinct.
 1. SIDIDAE Baird, 1850.
- 4(3) Length not greater than height.
 Head not clearly delimited.
 2. HOLOPEDIDAE Sars, 1865.
- 5(2) Five pairs of legs, or six pairs differing in structure.
 6(13) Antennule not fused with the rostrum.
 7(12) One branch of antenna four-segmented, the other three-segmented.
 8(9) Antennule not mobile, short (in the female).
 3. DAFHNIIDAE Straus, 1820.
- 9(8) Antennule mobile, in the majority of cases long.
 10(11) Antennule placed on the anterior margin of the head.
 4. MACROTHRICIDAE Norman & Brady, 186
- 11(10) Antennule placed on the posterior margin of the head.
 5. MOINIDAE Goulden, 1967.
- 12(7) Both branches of the antenna three-segmented.
 6. CHYDORIDAE Stebbing, 1902.
- 13(6) Antennule fused with rostrum, forming a proboscis-like structure.
 7. BOSMINIDAE Sars, 1865.
- 14(1) Body and legs not covered by carapace.
 15(20) Head portion short.
 16(17) Caudal appendage very short.
 8. PODONIDAE Mordukhai-Boltovskoi, 1968.
- 17(16) Caudal process developed.
 18(19) Length of the caudal process little less than the length of the body.
 9. POLYPHEMIDAE Baird, 1845.
- 19(18) Length of the caudal process a little more than the length of the body.
 10. CERCOPAGIDAE Mordukhai-Boltovskoi, 1968.
- 20(15) Head portion long.
 11. LEPTODORIDAE Lilljeborg, 1861.

- p 42 Key to subfamilies of Macrothricidae.
- 1(2) Antennule two-segmented.
Postabdomen broad, its dorsal margin convex like a wide arch.
I. ILYOCRYPTINAE Smirnov, subf. n. (p 42)
- 2(1) Antennule of one segment.
Dorsal margin of postabdomen straight or convex.
- 3(4) Anal aperture opening in the middle part of the dorsal side of the postabdomen.
II. OPHRYOXINAE Smirnov, subf. n. (p59)
- 4(3) Anal aperture opening in the distal part of the dorsal side of the postabdomen.
- 5(6) Six pairs of legs.
Legs III-V with large exopodites.
III. ACANTHOLEBERINAE Smirnov, subf. n. (p 65)
- 6(5) Five pairs of legs.
All legs with small exopodites.
IV. MACROTHRICINAE Smirnov, subf. n. (p 68)

- p 44 Key to species of the genus Ilyocryptus.
- 1(12) Carapace smooth.
- 2(3) Anus opening in the distal part of the postabdomen.
1. I. acutifrons Sars, 1862
- 3(2) Anus opening in the middle part of the postabdomen.
- 4(11) Length of antennule less than 8 times its width.
- 5(10) Lateral bristles of the postanal part of the postabdomen long.
- 6(9) Antennule without denticles on the anterior side.
- 7(8) Preanal part of the postabdomen convex.
2. I. sordidus (Liévin, 1848)
- 8(7) Preanal part of the postabdomen almost straight.
3. I. silvaeducensis Romijn, 1919
- 9(6) Antennule with denticles on the anterior side (these denticles projecting slightly).
4. I. agilis Kurz, 1878
- 10(5) Lateral bristles on the postanal margin of the postabdomen short.
5. I. brevidentatus Ekman, 1905
- 11(4) Antennule slender, its length 8-10 times the width.
6. I. spinifer Herrick, 1882
- 12(1) Carapace with hollows or lateral outgrowths.
- 13(16) Carapace with hollows.

- 14(15) Postabdomen without an incursion to the dorsal margin, and without numerous fine denticles on the distal portion of the dorsal margin.
7. I. tuberculatus Brehm, 1913
- 15(14) Postabdomen with a distinct incursion to the dorsal margin, distal to this are many fine denticles.
8. I. verrucosus Daday, 1905
- 16(13) Carapace with lateral outgrowths.
9. I. cornutus Mordukhai-Boltovskoi & Chirkova, 1972

p 47 Key to subspecies of Ilyocryptus sordidus

- 1(6) Lateral surface of the postabdomen by the proximal preanal denticles smooth.
- 2(5) Lateral bristles of the postanal margin long.
- 3(4) Relative length of the preanal margin to the length of the postabdomen on average 0.52 (0.4-0.59).
2a I. sordidus sordidus (Lievin, 1848)
- 4(3) Relative length of the preanal margin to the length of the postabdomen on average 0.7 (0.68-0.78).
2b I. sordidus inaequalis (Romijn, 1919)
- 5(2) Lateral bristles on the postanal margin comparatively short.
2v I. sordidus sarsi (Stingelin, 1913)
- 6(1) By the proximal preanal teeth of the postabdomen there are denticles running obliquely on the postabdomen.
2g I. sordidus denticulatus Delachaux, 1919

p 59 Key to the genera of the subfamily Ophryoxinae

- 1(2) Antenna with setae 0-0-0-3/1-1-3 and spines 1-1-0-1/0-0-1.
2. Ophryoxus Sars, 1862 (p 59)
- 2(1) Antenna with bristles 0-0-0-3/0-0-3 and spines 0-1-0-1/0-0-1.
3. Parophryoxus Doolittle, 1909 (p 62)

- p 61 Key to subspecies of Ophryoxus gracilis
- 1(2) Spine on the postero-dorsal corner of the shell short.
1a. O. gracilis gracilis Sars, 1862
- 2(1) Postero-dorsal corner of shell drawn out into a long spine.
1b. O. gracilis spinifera Sars, 1890

- p 69 Key to genera of the subfamily Macrothricinae.
- 1(24) Carapace smooth.
- 2(23) Carapace plain.
Postabdomen with a claw.
- 3(20) Gut straight.
- 4(19) Bristles of the ventral margin of the carapace normal (not lanceolate).
- 5(16) Postabdomen with bow-shaped dorsal margin. (if broadly oval then without an excavation).
- 6(15) Postabdomen broad throughout its length.
Claw without basal spine.
- 7(14) Head shield unadorned.
- 8(9) Carapace with a dorsal keel which may extend to the ventral side.
8. Bunops Birge, 1893 (p 145)
- 9(8) Carapace without dorsal keel extending to the ventral side.
- 10(11) Antennule broadening distally.
5. Macrothrix Baird, 1843 (p 69)
- 11(10) Antennule not broadening distally.
- 12(13) Exopod of leg IV with 2-3 setae.
6. Echinisca Liévin, 1848 (p 103)
- 13(12) Exopod of leg IV with 5 setae.
7. Wlassicsia Daday, 1904 (p 140)
- 14(7) Head shield with a globular tubercle.
9. Onchobunops Fryer & Paggi, 1972 (p 146)
- 15(6) Postabdomen tapering wedge-like to the base of the claw, without denticles.
Claw with a basal spine.
10. Pseudomoina Sars, 1912 (p 151)
- 16(5) Postabdomen broadly oval with an excavation on the dorsal side.
- 17(18) Postabdomen with groups of anal denticles, and also at the proximal margin of the anal aperture a single large denticle.
11. Grimaldina Richard, 1892 (p 153)
- 18(17) Postabdomen without denticles.
Antennule short and wide.
12. Guernella Richard, 1892 (p 156)

- 19(4) Setae of the ventral margin of the carapace broadened, lancet-like.
13. Lathonura Lilljeborg, 1853 (p 158)
- 20(3) Gut with loop.
- 21(22) Carapace with a dorsal tooth.
The four-segmented branch of the antenna with three setae.
14. Drepanothrix Sars, 1862 (p 162)
- 22(21) Carapace without a dorsal tooth.
Four-segmented branch of antenna with four setae.
15. Streblocerus Sars, 1862 (p 166)
- 23(2) Carapace densely covered with bristles.
Postabdomen without claw.
16. Neothrix Gurney, 1927 (p 171)
- 24(1) Carapace with numerous teat-like projection bearing setae at their tips.
17. Cactus Smirnov, gen. n. (p 173)

[TRANSLATOR'S NOTE: The following genera have only one species described:-

14(7)	<u>Onchobunops</u>	(<u>O. tuberculatus</u> p. 148)
15(6)	<u>Pseudomoina</u>	(<u>P. lemnae</u> (King 1853) p. 151)
17(18)	<u>Grimaldina</u>	(<u>G. brazzai</u> Richard p. 155)
18(17)	<u>Guernella</u>	(<u>G. raphalis</u> Richard p. 156)
21(22)	<u>Drepanothrix</u>	(<u>D. dentata</u> Sars p. 163)
23(2)	<u>Neothrix</u>	(<u>N. armata</u> Gurney p. 171)
24(1)	<u>Cactus</u>	(<u>C. cactus</u> (Vavra 1900) p. 173)]

p 70 Key to species of the genus Macrothrix (females)

- 1(32) Carapace smooth (without lateral outgrowths).
- 2(31) Dorsal margin bow-shaped (without a tooth).
- 3(28) Margin of the head runs into the margin of the carapace making a common arc with it.
- 4(11) Dorsal margin of the carapace serrated.
- 5(6) Dorsal serrations conspicuous.
1. M. laticornis (Fischer, 1851)
- 6(5) Dorsal margin of carapace finely serrated.
- 7(10) Dorsal margin of the postabdomen with a slight hollow at the proximal edge of the anal aperture.
- 8(9) Dorsal margin of head and carapace with fine denticles here and there.
2. M. spinosa King, 1853
- 9(8) Fine denticles along the whole length of the dorsal margin of the head and carapace.
3. M. goeldi Richard, 1897
- 10(7) Dorsal margin of postabdomen evenly convex.
4. M. tobaensis Johnson, 1956
- 11(4) Dorsal margin of carapace not serrated.
- 12(27) Head and carapace smooth.
- 13(24) Postero-dorsal part of shell angular.
Head may be clearly marked off from shell.
- 14(19) Margin of antennule even.

- 15(18) Claw distinctly larger than the anal denticles.
If the head is marked off then the fold separating it is single,
not double or triple.
- 16(17) Postero-ventral part of shell rounded.
The head may be marked off by an excavation on the dorsal side.
5. M. hirsuticornis Norman &
Brady, 1867
- 17(16) Postero-ventral corner of shell angular.
6. M. albuferae Arevalo, 1916
- 18(15) Claw only a little greater than the anal denticles.
Head separated dorsally by double or triple folds.
7. M. montana Birge, 1904
- 19(14) Margin of antennule wavy.
- 20(23) Distal segment of the seta natatoria long.
- 21(22) Length of the distal segment of the seta natatoria less than
1.5 times greater than the proximal.
8. M. inflata Daday, 1902
- 22(21) Length of the distal segment of the seta natatoria more than
1.5 times greater than the proximal.
9. M. longiseta Smirnov, sp.n.
- 23(20) Distal segment of the seta natatoria very short.
14. M. breviseta Smirnov, sp.n.
- 24(13) Outline oval, posterior margin of shell broadly oval.
Head with dorsal margin not separated from body.
- 25(26) Aesthetascs of equal length.
Preanal margin of postabdomen with transverse rows of bristles.
10. M. dadayi Behning, 1941
- 26(25) Aesthetascs varying in length.
Preanal margin of postabdomen with bristles changing into short
spinules in the direction of the setae natatoriae.
11. M. oviformis Ekman, 1900
- 27(12) Head and shell covered with fine bristles.
12. M. hystrix Gurney, 1927
- 28(3) Posterior edge of the head projects dorsally as a tooth.
- 29(30) Ocellus nearer to the base of the antennule than to the eye.
13. M. odontocephala Daday, 1902
- 30(29) Ocellus nearer to the eye than to the base of the antennule.
Antenna with spines 0-2-1-1/0-0-1.
19. M. grönlandica Lilljeborg, 1900
- 31(2) Dorsal side of the carapace with a tooth.
15. M. camjatae Harding, 1955
- 32(1) Carapace with lateral outgrowths.
- 33(34) Lateral outgrowth of carapace depressed.
16. M. bialatus Motas & Orghidan, 1948
- 34(33) Lateral outgrowth outstanding.
- 35(36) Outgrowth behind head.
17. M. cornuta Daday, 1904
- 36(35) Outgrowth behind the middle of the shell.
18. M. pennigera Shen, Sung & Chen, 1964

p 80 Key to subspecies of Macrothrix hirsuticornis

- 1(2) Rostrum rounded.
Head separated, but not by a tooth-like projection of the hind margin of the head shield.
Antennule comparatively much curved.
5a. M. hirsuticornis hirsuticornis Norman & Brady, 1861
- 2(1) Rostrum pointed.
Head separated by a tooth-like projection from the posterior dorsal margin of the head shield.
Antennule comparatively little curved.
5b. M. hirsuticornis arctica Sars, 1890

p 104 Key to species of Echinisca (females).

- 1(42) Antennule long.
- 2(3) Segments (the second and third) of the four-segmented branch of the antenna with groups of large spines.
21. E. pectinata Smirnov sp.n.
- 3(2) Segments of the four-segmented branch of the antenna without groups of large spines.
- 4(5) The preanal margin of the postabdomen with denticles in groups of 2-3, these groups are distributed mainly in the proximal part and increase in size proximally.
20. E. timmsi Smirnov sp.n.
- 5(4) Preanal margin of the postabdomen with denticles not in groups or without denticles.
- 6(30) Dorsal side even, (without a hump).
- 7(23) Dorsal margin of head and carapace in a continuous arc.
- 8(22) Head shield seen from the side smooth.
- 9(19) Ventral margin of the head even.
- 10(18) Convex and concave margins of claw smooth.
- 11(31) Antennule with spinules.
- 12(15) Postabdomen with denticles on the preanal margin.
- 13(14) Denticles present on both preanal and postanal margins.
6. E. shadini (Muchamadiev, 1963)
- 14(13) Large denticles on the preanal margin, not on the postanal margin.
7. E. burstalis (Smith, 1909)
- 15(12) Postabdomen without denticles on the preanal margin.
- 16(17) With a few tufts of bristles on the anal margin.
8. E. odiosa (Gurney, 1907)
- 17(16) With a few large denticles on the anal margin.
9. E. gauthieri Smirnov sp.n.

- 18(10) Claw with distinct spinules on concave and convex margins.
10. E. magna (Daday, 1902)
- 19(9) Ventral margin of head with a conspicuous protuberance.
- 20(21) Ventral protuberance blunt.
11. E. capensis Sars, 1916
- 21(20) Ventral protuberance pointed.
13. E. sibirica (Daday, 1902)
- 22(8) Posterior part of the head shield with a step (seen from side).
14. E. hardingi (Petkovski, 1973)
- 23(7) Head separated from body by a distinct indentation.
- 24(29) Postabdomen armed with denticles.
- 25(26) Anal aperture without flaps.
15. E. orbicularis (Brehm, 1930)
- 26(25) Anal aperture with flaps.
- 27(28) Antennule with spinules beginning at the proximal third.
16. E. sumatrensis (Brehm, 1933)
- 28(27) Antennule with spinules beginning in the middle.
17. E. madagascarensis (Brehm, 1933)
- 29(24) Postabdomen armed with bristles.
18. E. paulensis (Sars, 1900)
- 30(6) Dorsal side with a hump.
19. E. gibbera Daday, 1905
- 31(11) Antennule without spinules.
- 32(39) Postabdomen with denticles.
- 33(34) Anterior margin of head slightly concave.
1. E. rosea Liévin, 1848
- 34(33) Anterior margin of head not concave.
- 35(38) Distal segment of seta natatoria short.
- 36(37) The most powerful seta of the antenna with spinules.
2. E. triserialis (Brady, 1886)
- 37(36) This seta with insignificant setules.
12. E. carinata Smirnov sp.n.
- 38(35) Distal segment of seta natatoria long.
3. E. schauinslandi (Sars, 1904)
- 39(32) Postabdomen without denticles.
- 40(41) Aesthetascs uniform in length.
Powerful seta of antenna without spinules.
Antennule with rows of bristles.
4. E. tripectinata (Weisig, 1934)
- 41(40) Aesthetascs varying in length.
Strong seta of antenna with spinules.
5. E. palearis (Harding, 1955)
- 42(1) Antennule very short.
22. E. brevicornis Shen, Tai & Chiang, 1966

A further undescribed species has been found in Australia.

p 122 Key to subspecies of Echinisca capensis

- 1(2) Distal margin of postabdomen sloping.
 11a. E. capensis capensis Sars, 1916
- 2(1) Distal margin of postabdomen rectangular.
 11b. E. capensis monodi (Gauthier, 1930)

p 142 Key to species of Wlassicsia

- 1(2) Postero-dorsal corner of shell convex.
 1. W. pannonica Daday, 1904
- 2(1) Postero-dorsal corner of shell indented.
 2. W. kinistinensis Birge, 1910

p 146 Key to species of Bunops

- 1(2) Dorsal margin of shell serrated.
 1. B. serricaudata (Daday, 1888)
- 2(1) Dorsal margin of shell smooth.
 2. B. scutifrons Birge, 1893

p 158 Key to species of Lathonura

- 1(2) Hind margin of shell even.
 1. L. rectirostris (Müller, 1785)
- 2(1) Hind margin of shell projecting.
 2. L. lacustris (Leydig, 1860)

p 166 Key to species of Streblocerus

- 1(2) Postabdomen with a serrated preanal margin.
1. S. serric^audatus (Fischer, 1849)
- 2(1) Postabdomen without denticles on the preanal margin, but bearing some transverse rows of bristles.
2. S. pygmaeus Sars, 1901

p 187 Key to genera of the family Moinidae

- 1(2) Distal segment of the four-segmented branch of the antenna (exopod) with four setae.
Ocellus present.
1. Moinodaphnia Herrick, 1887 (p 187)
- 2(1) Distal segments of branches of antenna with three setae.
Ocellus absent, (except in one species M. reticulata).
2. Moina Baird, 1850 (p 189)

[TRANSLATOR'S NOTE: Only one species of Moinodaphnia i.e. M. macleayi (King 1853) p. 187]

p 190 Key to species of Moina (females)

- 1(2) Laterally compressed.
Dorsal keel present.
Ocellus present.
18. M. reticulata (Daday, 1905)
- 2(1) Globular.
Neither dorsal keel nor ocellus present.
- 3(32) Postabdomen with a bifurcate distal denticle.
- 4(31) Ventral margin of shell evenly arched.
- 5(28) Leg I with a seta on the anterior side of the penultimate segment.
- 6(25) Seta of the outer side of the penultimate segment of leg I feathered, with fine setules, not serrated nor with coarse setules.
(The male has the sensory seta of the antennule proximal to the middle.)
- 7(24) Antennule comparatively broad.
- 8(23) Head small.
- 9(10) Claw with a basal comb of coarse denticles.
Head with a hollow.
Setae of the posterior margin of the shell of various lengths, in groups.
Length up to 1.6 mm.
Ephippium with one egg.
1. M. brachiata (Jurine, 1820)
- 10(9) Without this combination of characters.

- 11(16) Setae of the hind margin of the shell in groups.
- 12(15) Ehippium with one egg.
- 13(14) Ehippium with polygons.
- 14(13) Ehippium with strongly raised tubercles.
3. M. weismanni Richard, 1895
- 15(12) Ehippium with two eggs.
4. M. australiensis Sars, 1896
- 16(11) Setae of hind margin of shell not in groups.
- 17(20) Ehippium with two eggs.
- 18(19) Ehippium with polygons.
5. M. belli Gurney, 1904
- 19(18) Ehippium with tubercles.
6. M. wierzejskii Richard, 1895
- 20(17) Ehippium with one egg.
- 21(22) Four-segmented branch of antenna with a row of denticles ranging along the whole length of each segment.
7. M. affinis Birge, 1893
- 22(21) Four-segmented branch of antenna with denticles occupying the proximal part of each segment.
8. M. hartwigi Weltner, 1898
- 23(8) Head relatively very large and broad.
Length up to 1.4 mm.
Ehippium with two eggs.
9. M. brachycephala Goulden, 1968
- 24(7) Antennule slender (ratio of length to breadth about 20)
Ehippium with two eggs, with polygons.
10. M. tenuicornis Sars, 1896
- 25(6) Leg 1 with a serrated or brush-like seta on the anterior margin of penultimate segment.
(In the male the sensory seta of the antennule is in the middle of its length.)
- 26(27) Seta of the penultimate segment of the first leg serrated.
11. M. macrocopa (Straus, 1820)
- 27(26) Seta of penultimate segment of leg I brush-like.
12. M. lipini Smirnov, sp.n.
- 28(5) Leg I without a seta on the anterior side of the penultimate segment.
- 29(30) Up to 9 feathered denticles on the postabdomen.
Length up to 1.8 mm.
Ehippium with one egg.
13. M. mongolica Daday, 1901
- 30(29) Up to 6 feathered denticles on the postabdomen.
Length up to 0.7 mm.
14. M. minuta Hansen, 1899
- 31(4) Ventral margin of shell with posterior half wavy.
Short setae on the hind margin of the shell evenly distributed.
15. M. flexuosa Sars, 1897
- 32(3) Postabdomen without distal bifurcate denticle.

- 33(34) Postabdomen with a distal single-tipped unfeathered denticle.
Ephippium with two eggs. 16. M. hutchinsoni Brehm, 1937
- 34(33) Postabdomen without a distal unfeathered denticle. 17. M. eugeniae Olivier, 1954

p 191 Key to species of Moina (males)

- 1(28) Genuiculate kink and sensory setule proximal to the middle of the antennule.
- 2(17) Genuiculate kink and sensory ^esetule not farther than one quarter of the length of the antennule from its base.
- 3(14) Genuiculate kink and sensory setule at the proximal end of the antennule.
- 4(5) Antennule with hooklets in a position short of the end.
9. M. brachycephala
- 5(4) Antennule without hooklets in this position.
- 6(13) Base of antennule plain.
- 7(8) Claw with a little comb of basal spinules.
10. M. tenuicornisⁱ
- 8(7) Claw without a comb of basal spinules.
- 9(12) Distal denticle of postabdomen bifurcate.
- 10(11) Lateral margins of the head hang over the bases of the antennules.
3. M. wierzejski
- 11(10) Lateral margin of head not hanging over base of antennule.
4. M. australiensis
- 12(9) Distal denticle of postabdomen with a single tip.
16. M. hutchinsoni
- 13(6) Tubercles present on base of antennule.
7. M. affinis
- 14(3) Genuiculate kink and sensory seta about one quarter of the length of the antennule from its base.
- 15(16) Both sensory setae on the genuiculate kink of the antennule.
15. M. flexuosa
3. M. weismanni
- 16(15) One sensory seta on the kink, the other at the base of the antennule.
17. M. eugeniae
- 17(2) Genuiculate kink of antennule and its sensory seta one third of the length of the antennule from its base.
- 18(21) Claw with a comb of coarse teeth.
- 19(20) Length 0.8-1.1 mm.
1. M. brachiata

- 20(19) Length 0.4 mm.
14. M. minuta
- 21(18) Claw without coarse teeth.
- 22(27) Both sensory setae close to the position of the kink of the antennule.
- 23(26) Length 0.5-0.7 mm.
- 24(25) Leg I with exopod.
18. M. reticulata
- 25(24) Leg I without exopod.
2. M. micrura
- 26(23) Length 0.83-1.1 mm.
12. M. mongolica
- 27(22) A sensory seta in the position of the kink and another in the middle of the length of the antennule.
5. M. belli
- 28(1) Antennule with the geniculate kink in the middle, here also is the position of the sensory setae.
11. M. macrocopa
12. M. lipini

p 195 Key to sub-species of Moina micrura

- 1(2) Claw with an even row of bristles.
2a. Moina micrura micrura Kurz, 1874
- 2(1) Proximal bristles of the claw distinctly larger and forming a separate comb.
- 3(4) Dorsal side of the postabdomen with comparatively long bristles. Bristles of the base of the antenna short.
2b. M. micrura ciliata Daday, 1905
- 4(3) Dorsal side of the postabdomen with short bristles. Bristles of the base of the antenna long.
2v. M. micrura dubia Guerne & Richard, 1892

p 215 Key to sub-species of Moina macrocopa

- 1(2) Bristles of the hind margin of the shell of even length and not in groups.
11a. M. macrocopa macrocopa (Straus, 1820)
- 2(1) Bristles of the hind margin of the shell of various lengths, in groups.
11b. M. macrocopa americana Goulden, 1968

Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.