

Finnish water mites (Acari: Hydrachnidia, Halacaroidea), the list and distribution

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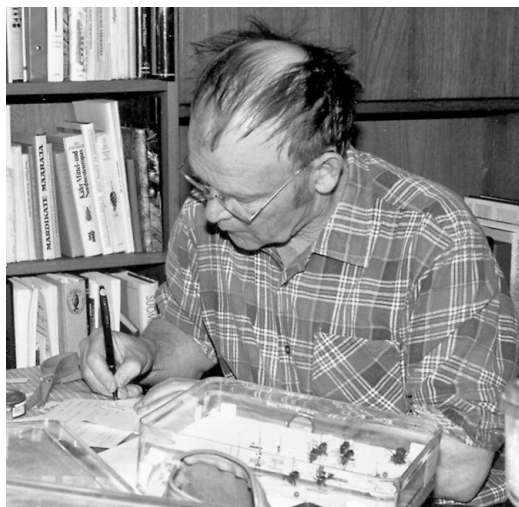
The species of Finnish water mites (Acari, Hydrachnidia and Halacaroidea) are listed, and their occurrence in the biogeographical provinces shown. The list is based on publications, on unpublished data known by the authors, and on a private collection (of Pauli Bagge). The list consists of 139 Hydrachnidia and 9 Halacaroidea species, which are mainly limnetic or lotic. Brackish waters and the family Halacaridae have remained little studied.

1. Introduction

Water mites are one of the most diversified groups of invertebrates in the freshwaters. For example the number of taxa may exceed 50 species in clean large lowland rivers of central Europe (Van der Hammen and Smit, 1996), but is lower in the northern streams (Bagge, 2001). The species and distribution of Finnish water mites have been of interest only by few researchers. The first studies have been done during expeditions of Ferdinand Koenike and Erik Nordenskiöld in the late of 19th century.

The species list was later completed, among others, by professor Kaarlo Mainio Levander, who has been mentioned as 'the father of Finnish limnology'. Viktor Ozolinš (1931) made a good summary of these early studies in his article of Finnish water mite fauna. Determination of small Acari species and especially the difficult larvae stages has also later been interest of a few biologists in Finland.

Two names can be mentioned, Lauri Paasivirta, who has studied bottom fauna especially in Karelia, and Pauli Bagge. The water mite studies of P. Bagge include study areas from Turku archipelago to Northern Lapland in a time scale of 40



Pauli Bagge. Prof. Bagge passed away 19.6.2009.

years, from 1960s to 2009. So his studies have been crucial to the knowledge of the abundance and determination of this arachnid group. This list of Finnish water mite fauna was completed just before the sudden death of Pauli Bagge and is therefore a valuable and important end of a life-time work. The list of earlier unpublished findings in P. Bagge's collection is as an appendix of this article.

2. Material and methods

The distributions are classified according to biogeographical provinces and are listed in the following order: Al, Ab, N, Ka, St, Ta, Sa, Kl, Oa, Tb, Sb, Kb, Om, Ok, Oba, Obb, Ks, LKoc, LKor, Le and Li. For example the marking Ok(g), Le(6) means that the species considered have been found in provinces Ok and Le, and g refers to Appendix 1 including unpublished data and 6 refers the publication no. 6 in the reference list.

During years many taxonomic and systematic changes have been done in this arachnid group. The nomenclature changes used in the publications of the referee list are mentioned in the list in parenthesis. The classification used is based on the recent publications and systematic presented in the literature (Smit & van der Hammen, 2000).

3. Results and discussion

The list of Table 1 includes 139 Hydrachnidia and 9 Halacaroida species, which are mainly limnetic or lotic acari. Only a few studies have been done in brackish waters and especially on Halacaridae. The most diverse genera were *Piona* (17 species) and *Arrenurus* (20 species), although in references the latter group has often not been determined to the species level.

The most common species (found in >10 provinces) were *Limnochaes aquatica*, *Hygrobates longipalpis*, *Limnesia maculata*, *Unionicola crassipes*, *Piona coccinea*, *Piona pusilla*, *P. rotundoides*, *P. varibilis*, *Hydrochreutes undulatus*, *Forelia liliacea*, *F. variegator*, *Mideopsis orbicularis* and *Arrenurus adnatus*. Some species were only found in southern Finland, e.g. *Limnesia fulgida* and *Krendowskia latissima*, and some only in Lapland,

e.g. *Teutonia subalpina*, *Sperchon squamosus*, *S. papillosus*, *Hygrobates norvegicus*, *Feltria minuta*, *Pionopsis lutescens* and *Pionacercus leuckarti*.

Table 1 includes several new findings for provinces and four totally new species for Finland: *Pseudohydrphantus parvulus*, *Thyas pachystoma*, *Ljania bipapillata* and *Arrenurus zachariae*. In the list of European water mite fauna (<http://www.watermite.org/>) altogether 178 Hydrachnidia and 5 Halacaroida species are listed in the taiga area (23) including Finland. Water mites have been investigated by a few researches in Finland, and therefore more studies, especially in areas not mentioned in the distribution list, will certainly extend the distribution areas and increase the number of species.

For instance, in Fennoscandia altogether 40 *Arrenurus* species have been found, and in the Table 1 were listed only half of it (20 species). Especially small water bodies and brackish water areas are unrepresented in this data and need more investigations. Thus we challenge new acarologists to complete this distribution list of water mites and the knowledge of this group.

Acknowledgements. The Finnish Expert Group on Araneae (Ministry of the Environment) has supported the compilation of the list. Special thanks to Seppo Koponen (Zoological Museum, University of Turku) for helping to publish this list. The unpublished water mite list with literature data by Hans Silfverberg (Finnish Museum of Natural History, University of Helsinki) has been helpful in collecting the information.

This list consists the life's work of professor Pauli Bagge and it is published to the memory of a father and a great naturalist who was always enthusiastic to study the Finnish fauna and flora.

Table 1. List of water mites (Hydrachnoidea and Halacaroidea) in Finland. Species (with previously used names in the literature cited in parenthesis) and distribution based on biogeographical provinces. References in parentheses (publications 0–31, unpublished records a–u; see References and Appendix 1).

HYDRACHNOIDEA Leach, 1815

Hydrachnidae Leach, 1815

Hydrachna Mier, 1776

- | | | |
|---|--|--|
| 1 | <i>conjuncta</i> Koenike, 1895 | Tb(23, 28), Kb(10) |
| 2 | <i>cruenta</i> Müller, 1776
(<i>schneideri</i> Koenike, 1895) | Ta(p), Sa(10), Tb(7, 23, 28), Kb(10) |
| 3 | <i>geographica</i> Müller, 1776 | Al(22, 23), Tb(4, 7) |
| 4 | <i>globosa</i> De Geer, 1778 | N(22, 23), Sa(1, 5, 10), Tb(4), Sb(15, 23), Kb(10) |
| 5 | <i>uniscutata</i> Thor, 1897
(<i>globosa f. uniscutata</i> Thor, 1897) | Ta(p, r), Tb(k), Sb(5) |
| 6 | <i>processifera</i> Koenike, 1903 | Tb(4) |

EYLAIOIDEA Leach, 1815

Limnocharidae Grube, 1859

Limnocharis Latreille, 1796

- | | | |
|---|---|--|
| 7 | <i>aquatica</i> Linnaeus, 1758
(<i>holosericea</i> De Geer, 1778) | Ab(12a), N(18, 22, 23, 29), Ta(n, s, t), Sa(1, 5, 10), Tb(2, 3, 4, 30), Sb(5), Kb(2, 25), Oa(12), Tb(7), Li(6) |
|---|---|--|

Eylaidae Leach, 1815

Eylais Latreille, 1796

- | | | |
|----|--|---|
| 8 | <i>discreta</i> Koenike, 1897 | Sa(1, 10), Tb(4), Kb(10) |
| 9 | <i>extendens</i> Müller, 1776
(<i>soari</i> Piersig, 1899) | Ab(18, 23), N(21, 23, 29), Ta(n, p, q), Sa(10), Tb(3, 4, 7, 23, 28), Sb(15, 23), Kb(10), Ks(23) |
| 10 | <i>hamata</i> Koenike, 1897 | Tb(23, 28) |
| 11 | <i>infundibulifera</i> Koenike, 1897 | Sa(10), Tb(7, 23, 28), Kb(10), Le(6) |
| 12 | <i>koenikei</i> Halbert, 1903 | Sa(10) |
| 13 | <i>mutila</i> Koenike, 1897 | Ta(3), Sa(5, 10), Oa(16), Tb(3, 4, 7), Sb(3, 5), Kb(10) |
| 14 | <i>setosa</i> Koenike, 1897
(<i>triarcuata</i> Piersig, 1899) | Sa(10), Tb(7, 23, 28), Le(6) |
| 15 | <i>tantilla</i> Koenike, 1897
(<i>bisinuosa</i> Piersig, 1899)
(<i>rimosa</i> Piersig, 1899) | Tb(23, 28) |

HYDRYPHANTOIDEA Piersig, 1896

Hydryphantidae Piersig, 1896

Hydryphantus Koch, 1841

- | | | |
|----|-------------------------------|--|
| 16 | <i>dispar</i> Schaub, 1888 | N(19, 22, 23), Sa(10), Tb(4) |
| 17 | <i>hellichi</i> Thon, 1899 | Tb(7) |
| 18 | <i>placationis</i> Thon, 1899 | Tb(23, 28) |
| 19 | <i>ruber</i> De Geer, 1778 | N(22, 23), Ta(p), Sa(u), Tb(4, 23, 28) |

Pseudohydryphantus Viets, 1926

- | | | |
|----|-----------------------------|--------------|
| 20 | <i>parvulus</i> Viets, 1907 | Ta(t), Tb(i) |
|----|-----------------------------|--------------|

Paniscus Koenike, 1896

- | | | |
|----|------------------------------------|------------|
| 21 | <i>torrenticolus</i> Piersig, 1898 | Tb(23, 28) |
|----|------------------------------------|------------|

Thyas Koch, 1836

- | | | |
|----|--|-----------------------|
| 22 | <i>barbigera</i> Viets, 1908
(<i>venusta</i> Koch, 1836) | N(22, 23), Tb(23, 28) |
| 23 | <i>pachystoma</i> Koenike, 1912 | Tb(k) |

Table 1, continued

Hydrodromidae Viets, 1936	
<i>Hydrodroma</i> Koch, 1837	
<i>(Diplodontus</i> Dugès, 1834)	
24 <i>despiciens</i> Müller, 1776	Ab(18, 23), N(19, 22, 23), Ta(2), Sa(1, 5, 10), Oa(12), Tb(2, 3, 4, 7, 23, 28, 30), Sb(5), Kb(10), Ok(g)
LEBERTIOIDEA Thor, 1900	
Lebertiidae Thor, 1900	
<i>Lebertia</i> Neuman, 1880	
25 <i>brigantina</i> Viets, 1933	Oa(12), Kb(25)
26 <i>dubia</i> Thor, 1899	N(18, 19, 22, 23), Kb(25)
<i>(tau-insignita</i> Lebert, 1879)	
27 <i>fimbriata</i> Thor, 1899	Kb(25)
28 <i>inaequalis</i> Koch, 1837	Kb(25), Lkor(31)
<i>(riabuschinskii</i> Thor, 1926)	
29 <i>insignis</i> Neuman, 1880	Tb(23, 28), Lkor(31)
30 <i>lineata</i> Thor, 1906	Lkor(31)
31 <i>oudemansi f. helvetica</i>	Kb(25)
Thor, 1906	
32 <i>porosa</i> Thor, 1900	N(13), Kb(11), Lkoc(6), Lkor(31)
Oxidae Oudemans, 1941	
<i>Oxus</i> Kramer, 1877	
33 <i>angustipositus</i> Viets, 1908	Kb(25)
34 <i>ovalis</i> Müller, 1776	N(22, 23), Tb(3, 7), Le(6), Li(6)
<i>(strigatus</i> Müller, 1776)	
35 <i>setosus</i> Koenike, 1898	Ta(n, s, t), Sa(1, 2, 5, 10), Tb(2, 4, 30), Sb(5), Kb(2, 10, 11, 25), Ok(g),
<i>(Frontipoda setosa</i> Thor, 1899) Lkoc(6), Le(0, 6), Li(6)	
<i>Frontipoda</i> Koenike, 1891	
36 <i>carpenteri</i> Halbert, 1911	Ta(t), Tb(i), Kb(25), Ok(g)
37 <i>musculus</i> Müller, 1776	N(22, 23, 29), Ta(p, t), Sa(1, 5, 10), Tb(3, 4, 7, 30), Kb(25), Ks(15, 23), Li(6)
Sperchontidae Thor, 1900	
<i>Sperchonopsis</i> Piersig, 1896	
38 <i>verrucosa</i> Protz, 1896	Oa(9), Tb(m), Sb(h), Om(17), Lkor(8, 31), Li(8)
<i>Sperchon</i> Kramer, 1877	
39 <i>brevirostris</i> Koenike, 1895	Lkor(8, 31), Li(8)
40 <i>clupeifer</i> Piersig, 1896	Tb(m), Oa(9), Om(17)
41 <i>glandulosus</i> Koenike, 1886	Oa(9), Lkor(8, 31), Li(8)
42 <i>setiger</i> Thor, 1898	Oa(9), Tb(j, m), Sb(h), Lkor(8)
43 <i>squamosus</i> Kramer, 1879	Lkor(8, 31)
44 <i>papillosus</i> Thor, 1901	Lkor(8)
Teutoniidae Koenike, 1910	
<i>Teutonia</i> Koenike, 1889	
45 <i>cometes</i> Koch, 1837	Sa(5, 10), Ta(n, s, t), Ok(g), LKor(d), Li(8)
46 <i>subalpina</i> Thor, 1897	Lkor(31)
Torrenticolidae Piersig, 1902	
<i>Torrenticola</i> Piersig, 1892	
47 <i>amplexa</i> Koenike, 1908	Ta(o), Oa(9), Tb(j), Sb(h), Om(17), Lkor(8)
HYGROBATOIDEA Koch, 1842	
Hygrobatidae Koch, 1842	
<i>Hygrobates</i> Koch, 1837	
48 <i>calliger</i> Piersig, 1896	Oa(9), Tb(j), Sb(h), Om(17), Lkor(8), Li(8)
49 <i>fluviatilis</i> Ström, 1768	N(13), Ta(n, s), Sa(5, 10), Oa(10, 12), Tb(4), Om(17), Lkor(8, 31), Li(8)

Table 1, continued

50	<i>foreli</i> Lebert, 1874	Ta(t), Sa(10), Lkor(8, 31), Le(6), Li(6, 8)
51	<i>longipalpis</i> Hermann, 1804 (<i>impressus</i> Neuman, 1880)	Ab(12a), N(19, 21, 22, 23), Ta(2), Sa(1, 5, 10), Oa(12, 16), Tb(2, 3, 4, 7, 30), Sb(5, 15, 23), Kb(2, 11, 25, 27), Ok(g), Oba(15, 23), Lkor(31), Le(00, 6)
52	<i>longiporus</i> Thor, 1898	Ta(n, p, s), Sa(10), Tb(i), Kb(25) Ok(g)
53	<i>nigromaculatus</i> Lebert, 1879	Ta(2, 14), Sa(2, 5, 10), Oa(12), Tb(2, 4), Kb(2, 11, 25, 26), Ok(g), Li(6, 8)
54	<i>norvegicus</i> Thor, 1897	Lkor(8)
55	<i>trigonicus</i> Koenike, 1895	Ta(n, p, s), Sa(10), Tb(4), Ok(g)
<i>Mesobates</i> Thor, 1901		
56	<i>forcipatus</i> Thor, 1901	Sa(5), Tb(i), Kb(10), Ok (g), Lkor(8)
<i>Atractides</i> Koch, 1842 (<i>Megapus</i> Neuman, 1880)		
57	<i>lacustris</i> Lundblad, 1925	Sa(10), Tb(4), Kb(10, 11)
58	<i>nodipalpis</i> Thor, 1899	Ta(p), Oa(9), Tb(j), Sb(h), Lkor(8, 31), Li(8)
59	<i>tener</i> Thor, 1899	Oa(9), Tb(m), Lkor(8, 31), Li(8)
Limnesiidae Thor, 1900		
<i>Limnesia</i> Koch, 1836		
60	<i>connata</i> Koenike, 1895	Ta(2, 14), Sa(5, 10), Tb(3, 7), Sb(5), Kb(2, 25)
61	<i>fulgida</i> Koch, 1836 (<i>histrionica</i> Bruzelius, 1854)	Ab(22, 23), N(18, 21, 23)
62	<i>koenikei</i> Piersig, 1894	Ta(2), Sa(2, 5, 10), Tb(2, 4, 30), Ok(g), Li(a)
63	<i>maculata</i> Müller, 1776 (<i>marmorata</i> Neuman, 1880)	N(22, 23), Ta(2), Sa(1, 2, 5, 10), Oa(12), Tb(2, 3, 4, 7, 23, 28, 30), Sb(5), Kb(2, 10, 25, 26), Ok(g), Ks(15, 23), LKoc(6), Le(6), Li(6)
64	<i>polonica</i> Schlechtel, 1910	Tb(4, 7), Sb(5)
65	<i>undulata</i> Müller, 1781 (<i>pardina</i> Neuman, 1880)	N(19, 22, 23), Ta(2), Sa(5, 10), Oa(12), Tb(2, 3, 4, 7, 23, 28, 30), Sb(5), Ok(g), LKoc(6), Li(6)
Unionicolidae Oudemans, 1909		
<i>Unionicola</i> Haldeman, 1842		
66	<i>aculeata</i> Koenike, 1890	Ta(s), Tb(l), Oa(12), Kb(10, 11)
67	<i>crassipes</i> Müller, 1776	N(18, 19, 20, 21, 22, 23, 29), Sa(1, 5, 10), Ta(n, p, q, s, t), Oa(12, 16), Tb(3, 4, 7, 23, 28), Sb(5, 15, 23), Kb(10, 11, 25, 26), Ok(g), Ks(15, 23), Lkor(d), Le(6), Li(6)
68	<i>figuralis</i> Koch, 1836	Sa(10), Ok(g)
69	<i>gracilipalpis</i> Viets, 1908	Ta(3, n), Sa(10), Tb(3, 4, 7)
70	<i>intermedia</i> Koenike, 1882	Tb(23, 28), Om(23)
71	<i>minor</i> Soar, 1900	Ta(n, p, q, s, t), Sa(5, 10), Oa(12, 16), Tb(4, 7), Sb(5), Kb(9, 11), Ok(g), Le(6), Li(b)
72	<i>parvavora</i> Lundblad, 1920	Ta(t), Tb(3, 7), Sb(5)
73	<i>ypsilophora</i> Bonz, 1783	N(22, 23), Tb(23, 28, l)
<i>Neumania</i> Lebert, 1879 (<i>Cochleophorus</i> Piersig, 1894)		
74	<i>callosa</i> Koenike, 1895	Ta(q, s, t), Sa(5, 10), Tb(2, 3, 4, 7, 30), Kb(2, 10, 11, 25, 26), Ok(g), LKoc(6)
75	<i>limosa</i> Koch, 1839 (<i>deltoides</i> Piersig, 1894)	Ta(q, s, t), Sa(2, 5, 10), Oa(12), Tb(2, 3, 4, 7), Sb(5), Ok(g)
76	<i>spinipes</i> Müller, 1776	Ab(22, 23), N(21, 22, 23), Sa(1, 5), Tb(3, 7)
77	<i>vernalis</i> Müller, 1776 (<i>Atax spinipes</i> Müller, 1776)	N(18, 23, 29), Ta(s, t), Sa(10), Tb(4, 23, 27), Ks(15, 23)
Feltriidae Viets, 1926		
<i>Feltria</i> Koenike, 1892		
78	<i>minuta</i> Koenike, 1892	Lkor(31), Li(8)
<i>Huitfeldtia</i> Thor, 1989		
79	<i>rectipes</i> Thor, 1898	Sa(1, 5), Oa(16), Tb(2, 3, 7), LKoc(6)

Table 1, continued

Pionidae Thor, 1900	
<i>Piona</i> Koch, 1842	
(Nesaea Koch, 1836, <i>Curvipes</i> Koenike, 1891)	
80	<i>alpicola</i> Neuman, 1880 Oa(16)
81	<i>ambigua</i> Piersig, 1894 Ta(t), Sa(5, 10), Tb(4), Li(6)
82	<i>brehmi</i> Walter, 1910 Ta(2), Sa(10), Oa(12), Tb(2, 3, 7), Le(6), Li(6)
83	<i>carnea</i> Koch, 1836 N(23, 29), Sa(1, 5), Tb(3, 7, 23, 28), LKor(31), Le(6) (<i>C. carneus</i> Koch, 1836)
84	<i>coccinea</i> Koch, 1836 N(22, 23), Ta(2), Sa(1, 2, 3, 5, 10), Oa(12, 16), Tb(2, 3, 7, 23, 28), Sb(5), (<i>C. nodatus</i> , Müller, 1776) Kb(2, 25, 26), Ok(g), LKoc(6), Le(6), Li(6)
85	<i>conglobata</i> (Koch, 1836) N(22, 23), Sa(5, 10), Tb(4, 7), Sb(5), Li(6) (<i>C. conglobatus</i> , Koch, 1836)
86	<i>dentipes</i> Lundblad, 1962 Ta(t), Tb(3, 4)
87	<i>discrepans</i> Koenike, 1895 Ta(n), Sa(5), Tb(4, 7), Sb(5), Li(a)
88	<i>disparilis</i> Koenige, 1895 Ta(q, t), Sa(5, 10), Tb(7), Sb(5), Kb(10, 11), Ok(g), Lkoc(6)
89	<i>gyrophora</i> Lundblad, 1924 Ta(3), Tb(3, 7), Sb(3, 5)
90	<i>longipalpis</i> Krendowsky, 1878 N(21, 22, 23, 29), Ta(n, q, r, s), Sa(1, 5, 10), Oa(12, 16), Tb(3, 4, 7, 23, 28, (<i>C. longicornis</i> , Krendowsky, 1878) 30), Sb(5, 15, 23), Kb(10, 25), Lkor(d), Li(b) (<i>N. coccinea</i> Bruzelius, 1854)
91	<i>nodata</i> (Müller, 1776) N(22, 23, 28, 23), Ta(p, t), Sa(1, 5, 10), Oa(16), Tb(3, 4, 7, 23, 28), (<i>C. fuscatus</i> Thor, 1902) Sb(15, 23), Lkor(d) (<i>N. fuscata</i> Bruzelius, 1854) (<i>P. fuscata</i> Piersig, 1901)
92	<i>paucipora</i> (Thor, 1897) Ta(p, q, s, t), Sa(2, 10), Oa(16), Tb(3, 7), Sb(5), Kb(2, 11, 25, 26), Ok(g), Lkoc(6)
93	<i>pusilla</i> Neuman, 1875 N(18, 21, 22, 23), Ta(p, q, s, t), Sa(1, 2, 5, 10), Oa(12, 16), Tb(2, 3, 4, 7, 30), (<i>rotunda</i> Kramer, 1879) Sb(5, 15, 23), Kb(2, 10, 11, 25, 26), Ok(g), LKoc(6), Le(6), Li(6, 8)
94	<i>rotundoides</i> Thor, 1897 Ta(n, p, q, t), Sa(1, 5, 10), Oa(12, 16), Tb(3, 4, 7), Sb(5), Kb(10, 11), Ok(g), LKor(d), Le(6), Li(6)
95	<i>stjördalensis</i> Thor, 1897 Ta(n, p, s), Sa(5, 10), Oa(12), Tb(3, 4, 7), Kb(10), Ok(g), LKoc(6), Li(6)
96	<i>variabilis</i> Koch, 1836 N(19, 20, 22, 23, 29), Ta(n, t), Sa(1, 5, 10), Sb(5), Oa(12, 16), Tb(3, 4, 7, 23, (<i>C. rufus</i> Piersig, 1897) 28), Sb(5, 15, 23), Ok(g), LKoc(6), Le(6) (<i>N. rufa</i> Koch, 1835) (<i>N. variabilis</i> Koch, 1835) (<i>P. rufa</i> Piersig, 1901)
<i>Hydrochoreutes</i> Koch, 1837	
97	<i>krameri</i> Piersig, 1896 N(22, 23), Ta(p, q, r, t), Sa(1, 5, 10), Oa(12, 16), Tb(3, 4, 7, 23, 28), Kb(25), Ok(g), LKoc(6), Li(a)
98	<i>ungulatus</i> Koch, 1836 Ab(18, 23), N(21, 23), Ta(q, t), Sa(5, 10), Oa(16), Tb(3, 4, 7, 23, 28), Sb(5), Kb(25), Le(6), Li(6)
Tiphynae Oudemans, 1941	
<i>Tiphys</i> Koch, 1836	
99	<i>lapponicus</i> Neuman, 1880 Ta(q, t), Sa(5, 10), Oa(16), Tb(3, 4, 7), Ok(g), LKor (d), Le(6), Li(6)
100	<i>ornatus</i> Koch, 1836 Sb(5)
101	<i>scaurus</i> Koenike, 1892 Sa(10), Kb(25)
<i>Pionopsis</i> Piersig, 1894	
102	<i>lutescens</i> Hermann, 1804 Li(6)
<i>Pionacercus</i> Piersig, 1894	
103	<i>leuckarti</i> Piersig, 1894 Le(c), Li(6)
104	<i>uncinatus</i> Koenike, 1885 Tb(23, 28), Kb(25), Li(6)
105	<i>vatrax</i> Koenike, 1837 Le(6)

Table 1, continued

<i>Forelia</i> Haller, 1882	
106 <i>brevipes</i> Neuman, 1880	Sa(5)
107 <i>curvipalpis</i> Viets, 1930 (<i>longipalpis</i> Maglio, 1924)	Ta(q), Sa(5, 10), Oa(12), Tb(4), Sb(5), Li(6)
108 <i>liliacea</i> Müller, 1776	Ta(2, 14), Sa(1, 2, 5, 10), Oa(12, 16), Tb(2, 3, 4, 7, 23, 28, 30), Sb(5), Kb(2, 10, 11, 25, 26), Ok(g), Lkoc(6), Le(6), Li(6)
109 <i>variegator</i> Koch, 1837 (<i>parmata</i> Koenike, 1895)	N(22, 23), Ta(q, s, t), Sa(10), Oa(12), Tb(3, 7), Sb(5), Kb(25), Ok(g), Le(6), Li(b)
Aturidae, Thor 1900	
<i>Aturus</i> Kramer, 1875	
110 <i>scaber</i> Kramer, 1875	Oa(9), Tb(j), Sb(h)
<i>Brachypoda</i> Lebert, 1879 (<i>Axona</i> Kramer, 1875)	
111 <i>versicolor</i> Müller, 1776	N(18, 21, 22, 23, 29), Ta(14), Sa(5, 10), Oa(12), Tb(3, 4, 7, 30), Kb(25), LKoc(6), Le(6), Li(6)
<i>Ljania</i> Thor, 1898	
112 <i>bipapillata</i> Thor, 1898	Tb(j), Sb(h)
<i>Neobrachypoda</i> Koenike, 1914	
113 <i>ekmani</i> Walter, 1911	Sa(2, 10), Tb(j), Kb(2, 25), Le(0, 6), Li(6)
ARRENUROIDEA Thor, 1900	
Acalyptonotidae Walter, 1911	
<i>Acalyptonototus</i> Walter, 1911	
114 <i>violaceus</i> Walter, 1911	Ta(2, 14), Sa(10), Tb(2, 4), Kb(2, 10, 11, 25), Le(6), Li(6)
Mideidae Thor, 1911	
<i>Midea</i> Bruzelius, 1854	
115 <i>orbiculata</i> Müller, 1776	Ta(14), Sa(10), Oa(16), Tb(3, 4, 7), Kb(25)
Mideopsidae Koenike, 1910	
<i>Mideopsis</i> Neuman, 1880	
116 <i>crassipes</i> Soar, 1904	Ta(q, t), Sa(10), Tb(i), Kb(11)
117 <i>orbicularis</i> Müller, 1776	N(22, 23), Ta(2), Sa(1, 2, 5, 10), Oa(12, 16), Tb(2, 3, 4, 7, 30), Sb(5), Kb(2, 25, 26), Ok(g), Lkoc(f), Li(6)
Arrenuridae Thor, 1900	
<i>Arrenurus</i> Walter, 1911	
118 <i>adnatus</i> Koenike, 1905 (<i>stjördalensis</i> auct. nec. Thor, 1899)	Ta(s, t), Sa(1, 5, 10), Oa(16), Tb(2, 3, 4, 7, 30), Kb(11), Ok(g), Le(6), Li(6)
119 <i>albator</i> Müller, 1776	Ta(q, s, t), Sa(1, 5, 10), Tb(3, 4, 7, 30), Sb(5), Kb(25, 26), Ok(g), Li(6)
120 <i>bicuspidator</i> Berlese, 1885 (<i>bituberosus</i> Piersig, 1894)	Ta(q), N(22, 23), Sa(1, 10, 23, 28), Tb(4, 7)
121 <i>biscissus</i> Lebert, 1879	Ta(t), Sa(10), Oa(12), Tb(i, j, k),
122 <i>buccinator</i> Müller, 1776	Ta(t), Oa(16), Tb(3, 7)
123 <i>coronator</i> Thor, 1899	LKoc(6)
124 <i>crassicaudatus</i> Kramer, 1875	Ta(p, s, t), Sa(5, 10), Oa(12), Tb(3, 4, 7), Sb(5) Ok(g),
125 <i>forpicatus</i> Neuman, 1880	Ab(18, 23), N(22, 23, 29), Ta(p, t), Sa(10), Tb(3, 7)
126 <i>globator</i> Müller, 1776	N(18, 22, 23, 29), Ta(p, t), Sa(1, 5, 10), Tb(7, 23, 27)
127 <i>neumani</i> Piersig, 1895 (<i>emarginator</i> Koch, 1837)	N(18, 22, 23, 29), Ta(p, q), Sa(1, 5, 10), Tb(3, 4, 7, 23, 28), Sb(15, 23)
128 <i>membranator</i> Thor, 1901	Tb(m), Kb(25)
129 <i>nobilis</i> Neuman, 1880	Ta(2), Sa(5, 10), Oa(12), Tb(2, 4, 29), Kb(2, 11, 25, 26), Ok(g), LKoc(6), Le(6), Li(6)
130 <i>pustulator</i> Müller, 1776	Ab(18, 23), N(22, 23, 29), Sa(1, 5, 10), Tb(3, 7, 23, 28), Ok(g)
131 <i>robustus</i> Koenike, 1894	Sa(1, 5)

Table 1, continued

132 <i>securiformis</i> Piersig, 1894	Ta(t), Sa(5), Oa(16), Tb(3, 7), Kb(25), Ok(g), LKoc(6), Li(6)
133 <i>subarcticus</i> Lundblad, 1917	Lkoc(f)
134 <i>tubulator</i> Mier, 1776	Tb(3, 23, 27)
135 <i>tricuspidator</i> Müller, 1776 (<i>maximus</i> Piersig, 1895)	Ab(18, 23), N(22, 23, 29), Sa(10), Tb(4)
136 <i>zachariae</i> Koenike, 1896	Ta(t)
137 <i>wereschtschagini</i> Sokolow, 1926	Sa(1, 5), LKor(6)
Krendowskiidae Viets, 1929	
<i>Krendowskia</i> Viets, 1929	
138 <i>latissima</i> Piersig, 1895	N(13)
Momonidae Viets, 1926	
<i>Momonia</i> Halbert, 1906	
139 <i>karelica</i> Sokolow, 1926	Ta(3), Tb(3, 7)
HALACAROIDEA	
HALACARIDAE Murray, 1877	
Rhambognathinae Viets, 1927	
<i>Rhambognathus</i> Trouessart, 1888	
(Aletes Lohmann, 1889, nec. <i>Rafinesque</i> , 1815)	
1 <i>seahami</i> Hodge, 1860	N(21, 27)
Halacarinae, Murray, 1877	
<i>Halacarus</i> Gosse, 1855	
2 <i>basteri</i> Johnston, 1836 (<i>spinifer</i> Lohmann, 1889)	N(21, 27)
Porohalacarinae Viets, 1933	
<i>Porohalacarus</i> Thor, 1922	
3 <i>alpinus</i> Thor, 1910	Ta(24)
4 <i>hydrachnoides</i> Lohmann, 1889	Ta(24)
<i>Lobohalacarus</i> Viets, 1939	
5 <i>weberi</i> Rominj & Viets, 1924	Ta(24)
Limnohalacarinae Viets, 1939	
<i>Limnohalacarus</i> Walter, 1917	
6 <i>wackeri</i> Walter, 1914	Ta(24)
<i>Soldadellonyx</i> Walter, 1917	
7 <i>chappuisi</i> Walter, 1914	Ta(24)
8 <i>monardi</i> Walter, 1914	Ta(24), Lkor(31)
Porolohmannellinae Viets, 1933	
<i>Porolohmannella</i> Viets, 1933	
9 <i>violacea</i> Kramer, 1879	Ta(24)

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Appendix 1. Unpublished collecting localities and dates. Determined by P. Bagge, if not other informed.

-
- a Li; Utsjoki, Kevojärvi, summer 1989, Risto Heikkinen and P. Bagge leg.
 - b Li; Utsjoki, Vuoskujärvi, summer 1989, E. Koskenniemi leg.
 - c Le; Enontekiö, Kilpisjärvi and surrounding ponds, july 2000, P. Bagge leg.
 - d LKor; Sodankylä, Sompio- and Seitajärvi, summer 1960, M. Hirvenoja leg.
 - e LKor; Sodankylä, Vuotos and Keivitsa, 1990, leg. R. Paavola
 - f LKoc; Muonio, Särkijärvi and Särkilompolo, july 1996, P. Bagge and M. Lehtovuori leg.
 - g Ok; Kuhmo, Lentua, Ontojärvi and Änätti, 1984–85, L. Kantola, leg.
 - h Sb; Tervo, Huuhtajankoski, Äyskoski, 1987–88, P. Bagge leg.
 - i Tb; Konnevesi, Southern Konnevesi, 1983–1999, P. Bagge and A.M. Bagge (1999) leg. and det.
 - j Tb; Rapids of Niinivesi and Rautalampi watersystems, 1984–2000, P. Bagge and M. Lehtovuori leg.
 - k Tb; Tourujoki water system and Jyväskylä, 1985–2000, leg. P. Bagge
 - l Tb; Tourujoki watersystem, bivalve material 1999–2007, Mari Saarinen leg., P. Bagge and A. M. Bagge det.
 - m Tb; Jyväskylä, Ruoke, Majajoki, 1982, Arja Palom i leg.
 - n Ta; Korpilahti and Jämsä, Päijänne, P. Bagge leg.
 - o Ta; Muurame, Muuratjoki, summer 1982, A. Palomäki leg.
 - p Ta; Muurame, Muuratjärvi, Raudanjärvi, 1978–2000, P. Bagge leg.
 - q Ta; Mänttä, Southern Keurusselkä, july 1980–1984, P. Bagge leg.
 - r Ta; Kuorevesi, Kotkan- and Paalisenselkä, summer 1977, P. Bagge leg.
 - s Ta; Kangasala, Längelmävesi, 1976–1996, P. Bagge leg.
 - t Ta; Iitti, Konnivesi, 1985–1995, P. Bagge
 - u Sa; Leivonmäki, Kiviharju, june 1974, P. Bagge leg.
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