PRELIMINARY LIST OF THE HYDRACARINA OF WISCONSIN

PART II

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Part I of the *Preliminary List of the Hydracarina of Wisconsin* (Marshall, 1931) recorded fourteen species belonging to seven genera of the red water mites, the super-family *Limnocharae.* The present paper treats in the same way a portion of the much larger super-family *Hygrobatae,* namely, seventeen species of nine genera belonging to four large families found in the state. Of these, one species is new. Notes on distribution and one or more drawings are given for each species. For complete characterizations of the species the student is referred to titles in the bibliography. A few outstanding features of each are noted, however, which, together with the drawings will, it is hoped, be sufficient in most cases to identify the species.

The water mites of this group are of medium size, variously and often brightly colored, the skin usually thin but sometimes heavily chitinized; the paired eyes of each side do not lie on capsules; the palpi are not chelate; the epimera are extensive and varied and more or less united; the legs usually end in claws which are double toothed; the genital plates are well developed and often placed apart from the epimera and sexual dimorphism is usually well marked.

For most of the extensive collections from Green Lake and the Trout Lake, Vilas County, region and for all of the collections from given depths the author is indebted to the courtesy of the Wisconsin Natural History Survey.

Lebertia porosa Thor

Pl. VII, fig. 1.

The epimera in the Lebertia are united into a shield which partly encloses the genital area. This cosmopolitan species is recognized by details of the palpi and epimeral plates and their relation to the genital plates.

The species is found throughout Europe and in northern Asia; in Canada, Alaska, Colorado, Montana, Wyoming, Illinois, Iowa, Michigan, Indiana and New York. In Wisconsin it has been found in Lake Winnebago, the Madison lakes, Drake Lake (Waupaca), Goose Pond (Adams Co.), in four lakes of Vilas County and in several collections from Green Lake at depths from the surface to a few meters.

Lebertia quinquemaculosa Mar.
Pl. VII, fig. 2-4.

Adults, which may attain a length of 2 mm., are usually recognized when alive by the presence of five red spots on the dorsal surface. The first epimera are narrow and the fourth forms a wide bay for the genital plates. The nymphs have ventral plates characteristic for the genus.

Specimens have been found in British Columbia and Indiana; in Wisconsin they have been taken in Mirror Lake (Delton), Deep and Parker lakes (Adams Co.) and in Green, Powers and Twin Lakes, all from shallow water.

Oxus connatus Mar.
Pl. VIII, fig. 9, 10.

In the genus Oxus the epimera are fused into a shield. In *O. connatus* this shield is not extensive and it only partly encloses the genital area and the body is relatively low.

Specimens have been found in Ontario. In Wisconsin they have been taken in Mirror Lake, Goose Pond (Adams Co.), Lake Mendota, Green Lake and several of the lakes of Vilas County.

Oxus elongatus Mar.
Pl. VIII, fig. 13, 14.

The epimeral shield is somewhat more extensive than in the last species and the body is higher.

The species has been found in Ontario and in Wisconsin in several of the lakes of Vilas County, near the surface and at depths of a few meters.

Oxus intermedius Mar.
Pl. VIII, fig. 11, 12.

The epimeral shield is extensive, extending to the dorsal side, and the body is elevated.

It has been taken in Minnesota, in the Madison lakes and in several of the lakes of Vilas County together with specimens of the last two species.

Frontipoda americana Mar.
Pl. VIII, fig. 15–17.

This species, the only one of the genus so far reported in North America, is common in shallow waters. It is green (occasionally red), with brown markings, and is readily recognized by the laterally compressed body and the great development of the epimeral shield which entirely encloses the genital area and extends over most of the dorsal surface, crowding the leg attachments well to the front.

The nymph is now known. It shows the epimeral shield in two parts and the typical genital area for the genus.

Specimens have been found in Maine, New York, Michigan, Indiana, Iowa, Minnesota and Louisiana. In Wisconsin they have been found in lakes and ponds near Cable, Madison and Eagle River; in Green, Fox, Mirror and Storr lakes; in Adams County and in thirteen lakes in Vilas County.

Atractides jordanensis Mar.
Pl. X, fig. 46, 47.

Water mites of the genus Atractides (formerly Torrenticola) have hard and porous integuments and an unusual development of plates so that the body appears to lie in layers. This species shows a typical arrangement of the dorsal plates, one being very large with four small ones on its anterior border. The rostrum of the mouth region is short. Colors are bright and variegated.

Individuals are usually found in silt. They have been taken in small numbers in Jordan Lake and in the neighboring Goose Pond; in Razor Back Lake, Vilas Co., and in Green Lake at a depth of fifteen meters.

Atractides indistinctus Mar.
Pl. X, fig. 42-45.

This species is distinguished by the incomplete development of the four anterior dorsal plates and by the large rostrum, which with the ends of the first epimeral pair extend well forward beyond the body margin.

The male is now known. It is smaller than the female (0.575 mm. to the end of the rostrum) ; as usual in this sex, the united first pair of epimera do not reach to the genital area, as they do in the female, due to the greater development of the second and third pairs.

The nymph has likewise been found. The surface is finely ridged and the dorsal side shows the typical four conspicuous plates, the posterior one large and shield shaped.

Specimens have been found at moderate depths in Indiana and in Green and Winnebago lakes in Wisconsin.

Tyrrellia ovalis nov. spec.
Pl. VIII, fig. 18-21.

The body is oval; the largest individual found measures 0.95 mm. The surface is thickly beset with tiny thorns directed backward; the epimera and legs are porous. Colors are not known. The anterior dorsal surface shows two pairs of small irregularly oblong chitinized plates and a number of small hair plates. The epimera are heavy; in form they resemble those of Limnesia and all bear a few hairs; the fourth is broad and bears the articulation for the last leg well toward its inner posterior margin. The two elongated genital plates lying close to the epimera bear each three conspicuous acetabula, the two posterior ones close together; in the specimens found these resemble the plates of female Limnesia. The palpi resemble those of *T. circularis* and are likewise similar to those of certain species of the related genus; a small peg on a conspicuous papilla shows on the second segment, while the fourth bears a cluster of hairs on the inner side near the distal end. The legs are heavy and short, none of them being as long as the body; all are provided with many small bristles but no swimming hairs and they end in large weak claws. The third leg is slightly shorter than the others. The fifth segment of the fourth leg is bent, as in the related species.

The genus Tyrrellia was erected by Dr. Koenike to contain the one species, *T. circularis,* found near Ottowa. The author has examined this material which is deposited in the Department of Agriculture in Ottawa. Unfortunately the two slides containing the specimens are not in good condition, but Dr. Koenike's descriptions and figures are clear and detailed. The new species falls well within his characterization of the genus

except that in place of a single dorsal anterior plate there is present a pair of small plates. It is distinguished from the type species not only by this difference in the dorsal surface but also by its more elongated form and by the shape of the genital plates of the female. In the few recorded measurements individuals of the new species are smaller.

Three specimens of *T. ovalis* were found in Mendota Bay at Madison; it is inferred that they are females. Dr. R. W. Wolcott, in Ward & Whipple's *Fresh Water Biology* (p. 869) states that he found specimens of the genus in Michigan lakes; two species were present, one of which was apparently *T. circularis,* but further data are not given.

Limnesia cornuta Wol.
Pl. IX, fig. 22-24.

This rare species of the large genus Limnesia is recognized by the unusual chitinous meshwork of the body surface, the presence of a small posterior dorsal plate and the large, finely serrated antenniform bristles.

It is known for Ontario, Michigan and Tennessee. In Wisconsin it has been taken in Clear-Crooked Lake (Vilas Co.) and in Goose Pond (Adams Co.) at depths from the surface to six meters.

Limnesia maculata (Müll.)
Pl. VII, fig. 5.

Dr. R. Piersig (1905), commenting on Dr. Wolcott's detailed account of this species in North America (1903), designated it as a new variety, *L. americana,* basing his opinion on certain details of palpi, epimera and genital plates as shown in Wolcott's figures of a young female. The author, after examining a large number of specimens and comparing them with identified European material, does not find any constant or important differences existing between them which justifies the formation of a variety and consequently the name has been dropped. In respect only to color does there appear to be any appreciable difference. In European literature the species is described as almost always red; observations on living material here indicate that the entire body is only seldom entirely red, though red spots are common, and that green, yellow and blue predomi-

nate. These color varieties, however, have been reported for various parts of Europe.

Re-examination of material shows that *L. elliptica* Mar. (1924), described from one young female taken in Alaska, is a synonym for *L. maculata* and that the name must be dropped.

The species *L. maculata* is one of the largest, individuals sometimes measuring 2 mm. It is recognized by the small size of the palpi and correlated with this the small size of the maxillary shield which bears them, as well as by the form of the first epimera, the inner borders of which tend to approach each other for a greater part of their length.

The species has been found all over Europe, in Turkestan, northern Asia and northern Africa. In North America it is known for British Columbia, Ontario, Alaska, New York, Michigan, Iowa and Montana. In Wisconsin it has been found in Spooner and Green lakes, Goose Pond (Adams Co.), pools near East Winona and in Trout Lake and twenty smaller lakes in its vicinity. It appears to be commoner in northern waters and at some distance below the surface, since the greater number of individuals have been found at depths from two to twenty-nine meters.

Limnesia paucispina Wol.
Pl. IX, fig. 25-27.

Mites of this fairly common species are small, measuring less than 1 mm. Colors are pale browns, sometimes with reds or blue and orange. Spines and swimming hairs on the legs are scarce; the maxillary shield has straight sides; and the palpi are distinctive, being large and stout with a long spine on the second segment resting on a very short papilla.

Dr. Wolcott erected the species from the examination of a single preserved female. The male is now known. The relative size and position of the three acetabula of the genital plates in both sexes have been found to be variable, as in other species of the genus.

This species is known for Michigan and Ohio; in Wisconsin it has been found in small numbers in Green, Lauderdale and Buffalo Lakes; in pools near Wisconsin Dells and Green Bay; in the Yahara River and pools near Madison; and in several lakes in Vilas County at depths from the surface to 7.5 meters. (One record for 29 meters may be accidental.)

Limnesia fulgida Koch

Pl. IX, fig. 31-33.

American forms of this species have been referred to as variety *wolcotti,* a name given by Dr. Piersig (1905) in reviewing Dr. Wolcott's description of the species in North America (1903), since he found certain small differences in details of the genital plates and palpi. The author is now of the opinion that the creation of a new variety was not justified.

This species and the following, *L. undulata,* both common in the Old World, are very closely related; their separation is difficult and has given rise to much confusion in the literature. The author, after the examination of hundreds of North American Limnesia and the study of identified European specimens has come to the conclusion that the two species intergrade and are not clearly separated. The same condition has been found true for two other common American species, *Arrhenurus megalurus* and *A. marshallae,* as already reported. There appears to be, in these Limnesia, individual, sex and age variations; perhaps the particular environment affects the individual in some cases, and crossing may occur. Results of this study indicate that, in general, the two species are separated chiefly on the basis of certain small, more or less constant difference in color, palpi and genital plates, especially those of the male; that the decision as to which of the two species a given individual is assigned to rests largely on the judgment of the investigator in balancing these small and sometimes variable characters. Both species are common, large, and frequently found together.

As interpreted by the author, *L. fulgida* (formally *L. histrionica*) is brightly colored, sometimes entirely red (as usually given in European literature); the palpi are large and the stout second segment has two rows of bristles and a moderately large, sometimes conical process provided with a peg, often set obliquely; and on the male genital plates the small hair papillae are numerous and conspicuous and closely follow the outer margins of the large acetabula.

This cosmopolitan species is found in nearly all shallow waters in the state and probably throughout eastern United States and Canada.

Limnesia undulata (Műll.)
Pl. IX, fig. 28-30.

The species is closely related to *L. fulgida,* as stated under the description of the latter species, and is distinguished from it with difficulty. In general it is duller in color and never entirely red; the palpi, relative to the legs, are larger and stouter, although the fifth segment is slimmer, its second segment shows fewer spines and its process with a peg is longer and slimmer; and on the male genital plates the fine hair papillae are not usually so numerous nor conspicuous nor placed as irregularly as in *L. fulgida.*

This large species appear to be somewhat more widely distributed in the United States and Canada than the related species. It is found, usually abundantly, in all shallow waters of Wisconsin.

Limnesiopsis anomala (Koen.)
Pl. VII, fig. 6-8.

This species, the only one known for the genus, closely resembles the large Limnesia but is never so abundant. It is readily recognized by the presence of the numerous small acetabula on the genital plates.

The nymph is now known; its genital plate closely resembles that found in Limnesia larvae.

The species was first described by Dr. Koenike who took it for an unusual Limnesia; it is still regarded by some authors as forming only a subgenus. The original material came from Ontario; this has been examined by the author as well as material since taken from Lake Simcoe, near Toronto. It has also been found in New York and Michigan. In Wisconsin it has been found in Green, Winnebago, Pewaukee, Waukesha and the Madison lakes and in thirteen bodies of water in Vilas County, usually near the surface.

Hygrobates longipalpis (Herm.)
Pl. X, fig. 38-41.

Details of the anterior epimeral group and the structure of the palpi distinguish this genus from Megapus which it closely resembles; all of these mites are of moderate size, usually one millimeter or less in length. Characteristic of this species is the well developed process on the second palpal segment, the shape of the fourth epimera and the position of the acetabula

on the genital plates of the female. Adults when alive are usually recognized by their bright brown color on which are conspicuous irregular white branched streaks and sometimes red spots.

The species *H. ruber* (Marshall, 1926) has been found on re-examination of the material to be a young *H. longipalpis;* hence the name, being a synonym, must be dropped.

The species is common in Europe and has also been found in Asia Minor and northern Africa. It was first reported for the New World by Dr. Koenike who recognized it in material from British Columbia which the author has also examined. It has since been found in Ontario, Wyoming, Montana, Iowa, Illinois, Michigan, Indiana, Ohio, Tennessee and New York. In Wisconsin it has been taken from Winnebago, Green, Spooner, Pewaukee, Lauderdale, Nashota and Twin Lakes (Kenosha Co.), the Madison lakes and from ten lakes in Vilas County, at depths from the surface to ten meters.

Megapus parviscutus (Mar.)
Pl. X, fig. 34-37.

Members of the genus Megapus (formerly Atractides) are distinguished from Hygrobates by the more complete separation of the first pair of epimera from the capitulum and by differences in the palpi and first pair of legs. This species shows less modification of the ends of the last two segments of the first pair of legs than do most species of the genus.

Re-examination of material now shows that *M. (Atractides) orthopes* (Marshall, 1915) is the male of *M. parviscutus* and the former name becomes invalid in consequence. The status of the species *M. phenopleces* described by the author in the same paper from one female found in Lake Spooner is in doubt and will await the study of more material.

The species *M. parviscutus* has been found in Indiana, Illinois and Michigan. In Wisconsin it has been found in shallow water, usually in southern counties, the localities as follows: lakes Lauderdale, Como, Delavan, Twin, Green, Mirror, Nashota, Nagowicka, Buffalo and Spooner, Goose Pond (Adams Co.) and pools near Minocqua.

ROCKFORD COLLEGE,
SEPTEMBER 1, 1931.

Bibliography

Titles are confined to papers having authors' descriptions of the species cited and to general papers describing cosmopolitan species.

Koenike, F. 1895. Nordamerikanische Hydrachniden. *Abh. Naturwiss. Ver. Bremen* 13 (2) : 167-226, pl. 1-3.

Marshall, R. 1914. Some New American Water Mites. *Trans. Wis. Acad.* 47 (2) : 1300-1304, pl. 92-93.

1915. American Species of the Genus Atractides (Megapus). *Trans. Am. Micr. Soc.* 44 (3) : 185-188, pl. 6.

1926. Water Mites of the Okoboji Region. *Univ. Iowa Studies Nat. Hist.* 11 (3) : 28-35, pl. 1-4.

1929. The Water Mites of Lake Wawasee. *Proc. Indiana Acad. Sci.* 38 : 315-320, fig. 1-18.

1929. Canadian Hydracarina. *Univ. Toronto Studies, Biol. Series* 33 : 57-93, pl. 1-7.

1930. The Water Mites of the Jordan Lake Region. *Trans. Wis. Acad.* 25 : 245-253, pl. 5-6.

1931. Preliminary List of the Hydracarina of Wisconsin. *Trans. Wis. Acad.* 26 : 311-319, pl. 7-8.

Piersig, R. 1905. (Review). *Zool. Centralbl.* 12 : 197-198.

Soar and Williamson. 1927. British Hydracarina, Vol. II. The Ray Society, No. 112. London.

Thor, S. 1906. Lebertia-Studien. *Zool. Anz.* 29 : 761-780, fig. 32-46, 49.

Wolcott, R. W. 1903. The North American Species of Limnesia. *Trans. Am. Micr. Soc.* 24 : 85-107, pl. 12-13.

1905. A Review of the Genera of the Water Mites. *Trans. Am. Micr. Soc.* 26 : 161-242, pl. 18-27.

PLATE VII.

1. *Lebertia porosa*, ventral plates.
2. *Lebertia quinquemaculosa*, palpus.
3. *Lebertia quinquemaculosa*, ventral surface.
4. *Lebertia quinquemaculosa*, nymph, ventral plates.
5. *Limnesia maculata*, ventral plates, female.
6. *Limnesiopsis anomala*, ventral plates, female.
7. *Limnesiopsis anomala*, genital plates, male.
8. *Limnesiopsis anomala*, genital plates, nymph.

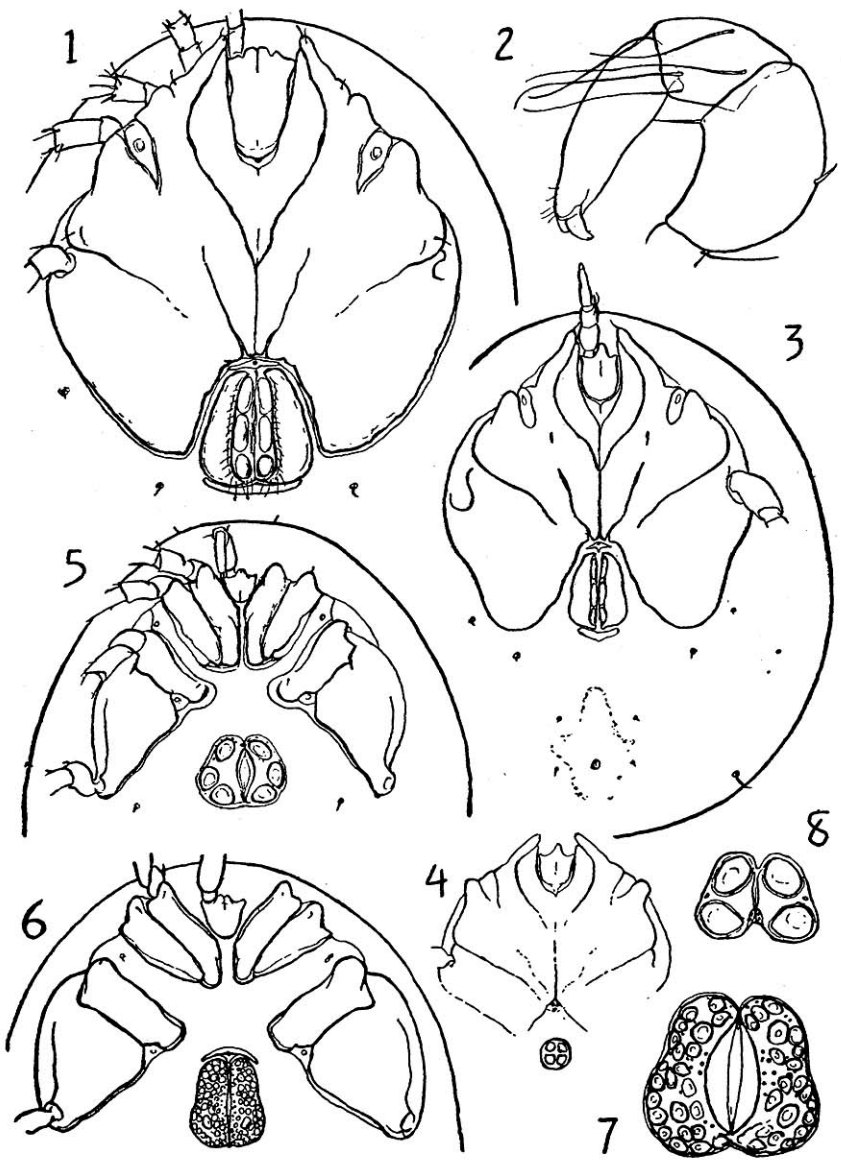
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PLATE VIII.

9. *Oxus connatus*, ventral view.
10. *Oxus connatus*, lateral view.
11. *Oxus intermedius*, ventral view.
12. *Oxus intermedius*, dorsal view.
13. *Oxus elongatus*, ventral view.
14. *Oxus elongatus*, palpus.
15. *Frontipoda americana*, dorsal view.
16. *Frontipoda americana*, nymph, ventral view.
17. *Frontipoda americana*, lateral view.
18. *Tyrrellia ovalis*, ventral view.
19. *Tyrrellia ovalis*, right palpus.
20. *Tyrrellia ovalis*, dorsal view.
21. *Tyrrellia ovalis*, leg I, left.

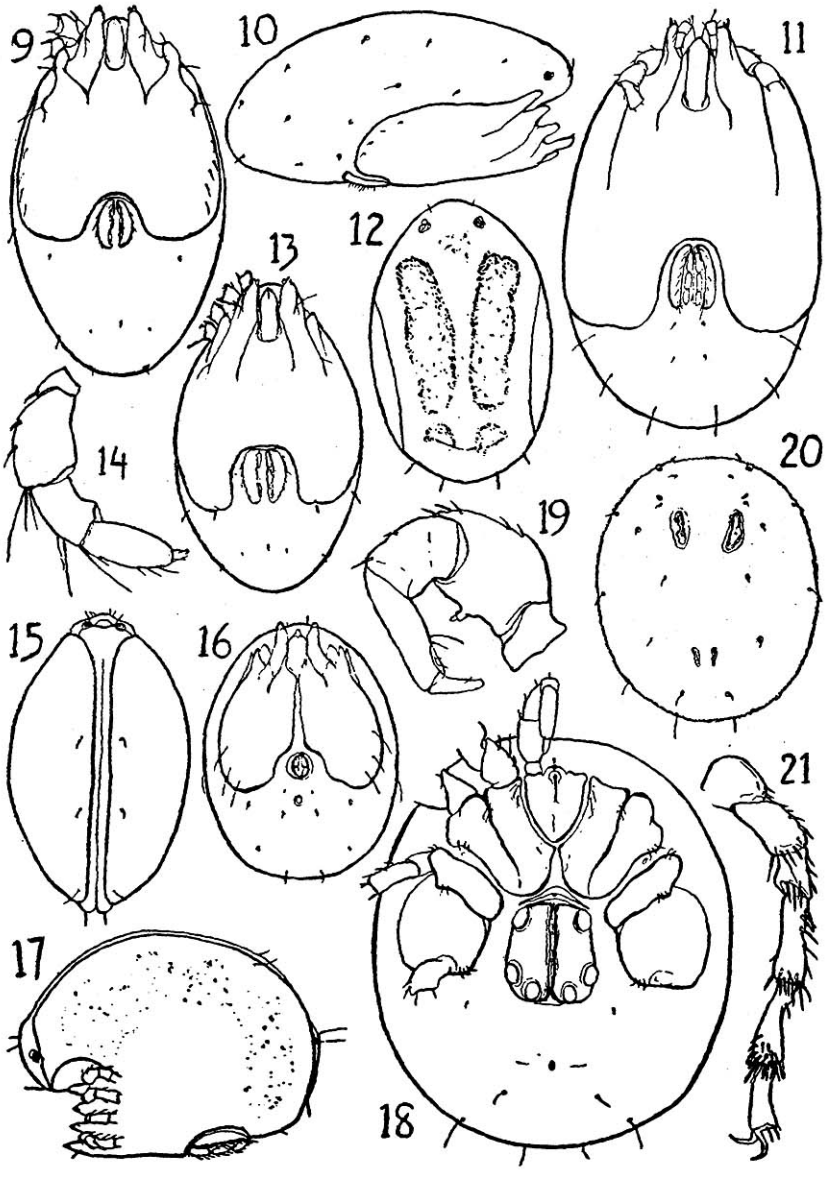
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PLATE IX.

22. *Limnesia cornuta,* dorsal view.
23. *Limnesia cornuta,* ventral plates, male.
24. *Limnesia cornuta,* hair plate and chitinous meshwork, (after Wolcott).
25. *Limnesia paucispina,* end of leg IV.
26. *Limnesia paucispina,* ventral view, male.
27. *Limnesia paucispina,* palpus.
28. *Limnesia undulata,* left palpus.
29. *Limnesia undulata,* genital plates, male.
30. *Limnesia undulata,* genital plates, nymph.
31. *Limnesia fulgida,* genital plates, male.
32. *Limnesia fulgida,* left palpus.
33. *Limnesia fulgida,* ventral plates, female.

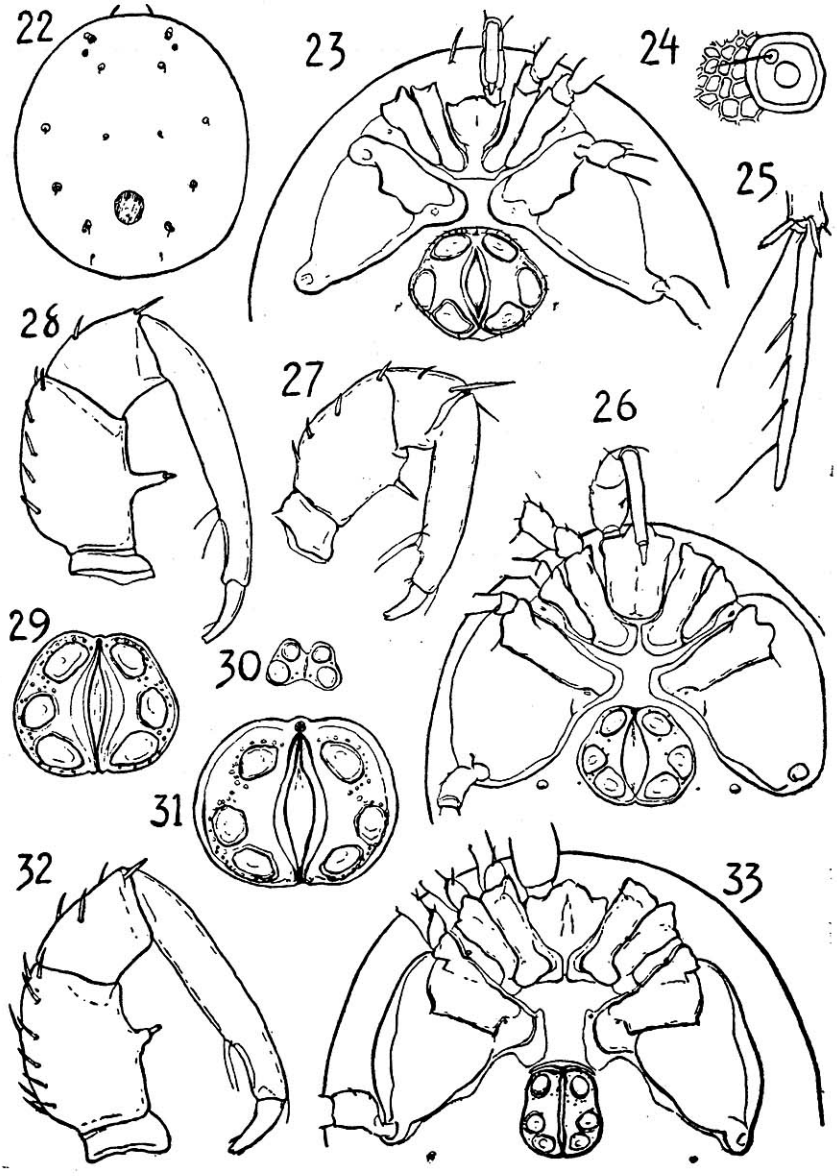
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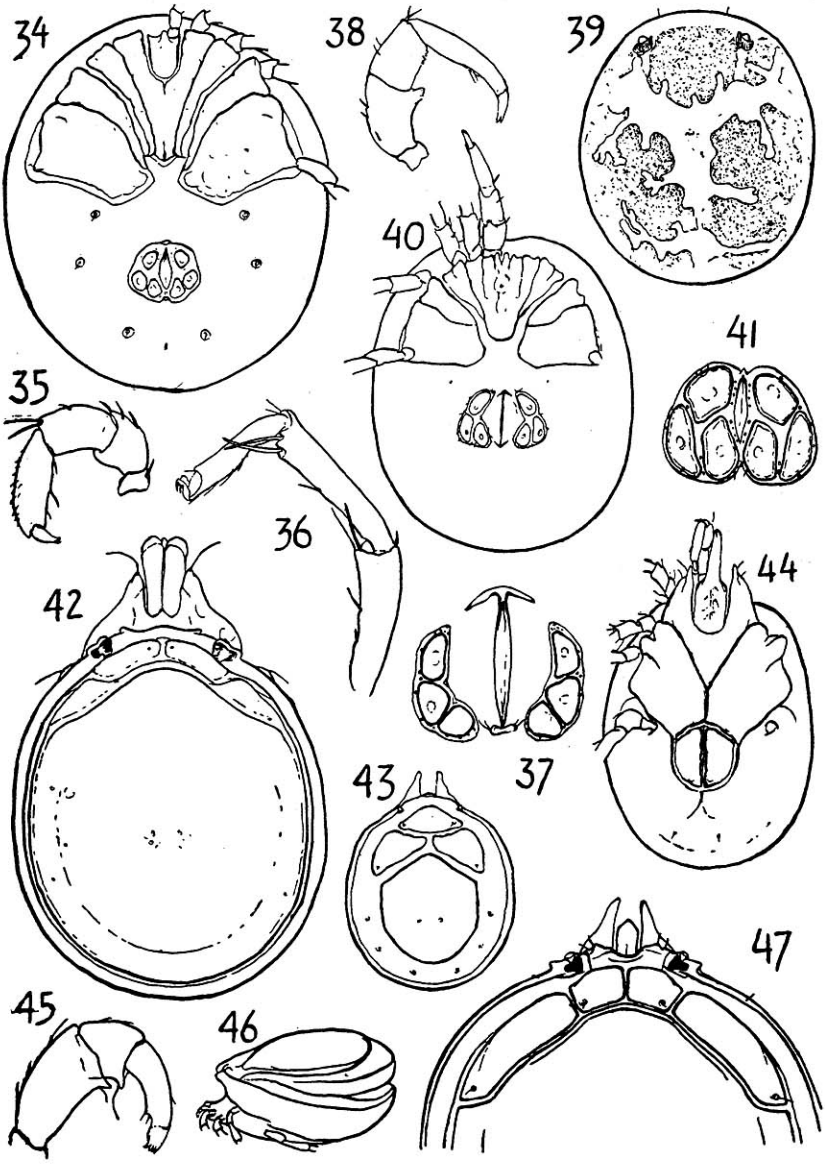
PLATE X.

34. *Megapus parviscutus*, ventral view, male.
35. *Megapus parviscutus*, palpus.
36. *Megapus parviscutus*, end of leg I.
37. *Megapus parviscutus*, genital plates, female.
38. *Hygrobates longipalpis*, palpus.
39. *Hygrobates longipalpis*, dorsal view.
40. *Hygrobates longipalpis*, genital plates, female.
41. *Hygrobates longipalpis*, genital plates, male.
42. *Atractides indistinctus*, dorsal view.
43. *Atractides indistinctus*, nymph, dorsal view.
44. *Atractides indistinctus*, ventral view, male.
45. *Atractides indistinctus*, palpus.
46. *Atractides jordanensis*, lateral view.
47. *Atractides jordanensis*, anterior dorsal region.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