

THE LITHOBIOMORPHA OF WISCONSIN AND NEIGHBOURING STATES.

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This paper is based primarily upon collections made by the author in Nebraska, Iowa, Illinois, Wisconsin and Peninsular Michigan during a brief trip through these States in the early part of the summer of 1910. The excessive dryness of the season in this section of the country was very unfavourable for the collecting of chilopods and diplopods. The species reported from Indiana and Minnesota by Bollman have been included. Specimens of all but a few of the forms previously recorded from the States mentioned, as well as a number which are new, were obtained by the author. The new locality records give a clearer knowledge of the distribution of a number of species. The key to species of *Lithobius* is intended to include all those now known to occur within the region above indicated.

Family HENICOPIDÆ.

This family is represented in this region by but one species—*Lamyctes fulvicornis* Meinert.

Lamyctes fulvicornis Meinert.

The many specimens secured seemed to agree fully with the European form.

Localities.—Omaha, Neb.; Peoria, Ill.; Haugen, Eau Claire, Ashland, Marinette and Beloit, Wis.; Watersmeet, Powers and Menominee, Mich. Also reported from Winona, Minn.

Family LITHOBIIDÆ.

Of this family the genera *Lithobius* and *Bothropolys* are represented. Species conforming to *Monotarsobius*, as defined by Verhoeff, do not occur among those thus far known from the region.

Genus *Bothropolys* Wood.

But one species of this genus has been found within these States.

Bothropolys multidentatus (Newport).

One of the most abundant and widespread of the North American Lithobiomorpha.

Localities.—Franklin Grove and Peoria, Ill.; Ann Arbor, Mich. Also reported as occurring throughout Indiana, and at Ludington, Mich.

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Probably will be found within Wisconsin, where, however, the excessive abundance of *L. forficatus* doubtless militates against it.

Genus *Lithobius* Leach.

KEY TO SPECIES.

- a. Posterior angles of the 7th, 9th, 11th and 13th dorsal plates produced. (*Neolithobius*.)
 - b. Claw of the anal legs not armed at base.
 - c. Claw of the penult legs unarmed,
 - Articles of antennæ 30-40; prosternal teeth 5+5 to 7+7; spines of first legs 2, 2, 1-3, 3, 2; of penult legs 1, 3, 3, 2.....*L. mordax* Koch.
 - cc. Claw of the penult legs armed with one spine.
 - Articles of antennæ 31-36; prosternal teeth, 6+6 to 8+8; spines of first legs 1, 2, 1 to 2, 2, 1; of penult legs 1, 3, 3, 1-1, 3, 3, 2....*L. tyrannus* Bollman.
 - bb. Claw of the anal legs armed with one spine.
 - c. Claw of penult legs armed with one spine.
 - Articles of antennæ 31-32; prosternal teeth 2+2; spines of first legs 1, 1, 1; of the penult, 1, 3, 3, 1.....*L. juvenus* Bollman.
- aa. Posterior angles of the 9th, 11th and 13th dorsal plates produced. (*Lithobius* s. str.)
 - b. Claw of anal legs unarmed.
 - c. Claw of penult legs unarmed.
 - Prosternal teeth 3-3; articles of antennæ 20-21; spines of penult legs 1, 3, 3, 2; of anal 1, 3, 2, 0; claw of female gonopods entire....*L. sexdentatus* Kenyon.
 - cc. Claw of penult legs armed with one spine.
 - d. Articles of antennæ 20, or near that number.
 - Prosternal teeth 3+3; spines of first legs 2, 3, 2; of anal, 1, 3, 3, 1.....*L. howei* Bollman.
 - dd. Articles of antennæ 30 or above.
 - e. Coxal pores transverse; spines of first legs 2, 3, 2.....*L. forficatus* Linn.
 - ee. Coxal pores round; spines of first legs 1, 2, 1-2, 2, 1.....*L. celer* Bollman.

- bb. Claw of the anal legs armed with one spine.
 - c. Claw of the penult legs armed with one spine.
 Spines of first legs 1, 3, 2; of penult, 1, 3, 3, 1; of anal, 1, 3, 2, 1; length, 8-11 mm. . . . *L. politus* McNeil.
- cc. Claw of penult legs armed with two spines.
 Spines of first legs 1, 3, 1-2, 3, 1; of penult, 1, 3, 3, 2; of anal, 1, 3, 2, 0. *L. numius*, sp. nov.
- bbb. Claw of anal legs armed with two spines.
 - c. Claw of penult legs armed with two spines.
 Prosternal teeth 3 + 3; articles of antennæ 20; spines of penult legs 1, 3, 3, 2; of anal, 1, 3, 2, 1; coxal pores round, 3, 4, 5, 3. *L. bius*, sp. nov.
- aaa. Posterior angles of none of the dorsal plates produced. (Metalithobius aut.)
 - b. Claw of anal legs unarmed.
 - c. Claw of penult legs armed with two spines.
 - d. Claw of gonopods of female entire.
 - e. Articles of antennæ 20-23; prosternal teeth 2 + 2 to 4 + 4.
 - f. Spines of penult legs 1, 3, 3, 1; of anal, 1, 3, 2, 0; anal legs of male with 3rd and 4th joints produced mesad into conspicuous lobes, the corresponding joints in female also usually bearing lobes. *L. bilabiatu*s Wood.
 - ff. Spines of penult legs 1, 3, 3, 2; of anal, 1, 3, 3, 1; 3rd and 4th joints of anal legs not thus produced into lobes, the 5th joint in some males with a small keel at distal end dorsad. *L. jowensis* Meinert.
 - ce. Articles of antennæ 24-29; prosternal teeth 5 + 5 to 6 + 6. *L. prouidens* Bollman.
 - dd. Claw of gonopods of female tripartite.
 - e. Length, 9-11 mm. *L. pullus* Bollman.
 - ee. Length, 15 mm. or above.

- f. Articles of antennæ 23-32; spines of first legs, 2, 3, 2; of penult legs 1, 3, 3, 2..... *L. holzingeri* Bollman.
- ff. Articles of antennæ 20; spines of first legs 1, 3, 2; of penult legs 1, 3, 3, 1..... *L. minnesotæ* Bollman.
- bb. Claw of anal legs armed with one spine.
- c. Articles of antennæ 20.
Spines of first legs 1, 3, 1; ocelli, 18-25; length, 10-12 mm..... *L. trilobus* Bollman.
- cc. Articles of antennæ 25-32.
- d. Spines of first legs 0, 0, 1..... *L. exiguus* Meinert.
- dd. Spines of first legs 0, 1, 1-1, 2, 1. *L. tivius* Chamberlin.
- bbb. Claw of anal legs armed with three spines.
- c. Claw of penult legs armed with two spines.
Articles of antennæ 20-31; spines of first legs 2, 3, 2; of penult legs 1, 3, 3, 1; of anal legs 1, 3, 3, 1-1, 3, 3, 2; length, 6-9 mm..... *L. cardinalis* Bollman.

1. *Lithobius mordax* Koch.

A species abundant in the south and south-east.

Localities.—Tama, Iowa (common); Wisconsin (one young male, probably this species); Nebraska (Kenyon). Also reported from Winona, Minn. In 1887 Bollman reported the form from Indiana, but the following year eliminated it from the State list, referring the specimens which he had to the following species:

2. *Lithobius tyrannus* Bollman.

Localities.—Reported as common in Indiana at Bloomington, La Fayette, Greencastle, Salem, New Providence.

3. *Lithobius juvenis* Bollman.

Locality.—Bloomington, Indiana.

4. *Lithobius howei* Bollman.

Localities.—Reported from Ft. Snelling and Winona, Minn., and from Bloomington, Kokoma and Dublin, Indiana.

Lithobius forficatus (Linnaeus).

The most common chilopod in the northern sections of the United States. It is exceptionally abundant throughout Wisconsin.

Localities.—Peoria, East Peoria, Franklin Grove, Dwight and Sterling, Ill.; Mongona, Boone, DeWitt, Marshalltown, Tama and Ogden, Iowa; Kimball's, Fond du Lac, Marinette, Eau Claire, Haugen, Devil's Lake, Janesville, Ashland and Beloit, Wisconsin; Ann Arbor, Watersmeet, Powers and Menominee, Michigan. Also reported from Winona, Minn. (common), and from Lawrenceburgh, Greencastle, Connersville, Westfield and Bloomington, Indiana (common in northern section).

6. *Lithobius celer* Bollman.

Localities.—A specimen from Michigan and one from Wisconsin are referred provisionally to this species. There is considerable doubt as to their position. Both are not fully-grown males.

7. *Lithobius numius*, sp. nov.

Angles of the 9th, 11th and 13th dorsal plates produced, those of the 7th plate also slightly extended.

Antennæ with 20 articles.

Prosternal teeth 2 + 2.

Last two pairs of coxæ laterally armed, last three pairs dorsally armed.

Spines of the first legs 1, 3, 1-2, 3, 1; spines of the penult legs 1, 3, 3, 2, the claw armed with two spines; spines of anal legs 1, 3, 2, 0, the claw armed with one spine.

Coxal pores round, 3, 5, 5, 5.

Gonopods of female with the claw tripartite or almost bipartite through the pronounced reduction or almost obliteration of one tooth; spines 2 + 2.

Length, 11 mm.

Locality.—Haugen, Wisconsin.

8. *Lithobius bius* sp. nov.

Angles of the 9th, 11th and 13th dorsal plates produced.

Antennæ with 20 articles.

Prosternal teeth 3 + 3.

Last three pairs of coxæ laterally armed; last four pairs armed dorsally.

Spines of first legs 1, 3, 2; of penult legs 1, 3, 3, 2, the claw armed with two spines; spines of the anal legs 1, 3, 2, 1, the claw armed with two spines.

Coxal pores small, round, 3, 4, 5, 3.

Length, 13 mm.

Locality.—Saunders, Michigan.

9. *Lithobius sexdentatus* Kenyon.

Locality.—Sioux Co., Nebraska (Kenyon).

10. *Lithobius politus* McNeil.

Localities.—Peoria, Ill. Previously reported from Ludington, Mich., and from Bloomington and Dublin, Indiana.

11. *Lithobius cardinalis* Bollman.

Localities.—Reported from Bloomington, Westfield, Salem and New Providence, Indiana.

12. *Lithobius bilabiatus* Wood.

Syn. *L. tuber* Bollman, Proc. U. S. N. M., 1887.

L. malterris Kenyon, CANADIAN ENTOMOLOGIST, 1893.

Localities.—Grand Island, Neb.; DeWitt and Tama, Iowa; Rock Island and East Peoria, Ill.; Devil's Lake, Wisconsin. Also reported from Winona, Minn., and from Bloomington, Indiana.

13. *Lithobius jowensis* Meinert.

Syn. *L. bilabiatus* Bollman, Proc. U. S. N. M., 1887.

L. bruneri Kenyon, CANAD. ENT., 1893.

A very common species throughout the region.

Localities.—Omaha and Fremont, Nebraska; Mongona, Boone and DeWitt, Iowa; Rock Is., Franklin Grove, Sterling, Peoria and East Peoria, Ill.; Watersmeet, Saunders and Menominee, Michigan; Haugen, Marinette and Beloit, Wisconsin. Reported also from Ludington, Mich., and from Bloomington, LaFayette, Richmond, Greencastle, Salem, New Providence and Wyandotte, Indiana.

14. *Lithobius proridens* Bollman.

Localities.—Reported from Bloomington, LaFayette, Richmond, Brookville, Salem, New Providence and Wyandotte, Indiana.

15. *Lithobius pullus* Bollman.

? Syn. *L. dorsospinorum* Kenyon, CANAD. ENT., 1893.

Localities.—Dwight, Ill. Also reported from Nebraska and from Bloomington, Indiana.

16. *Lithobius holzingeri* Bollman.

Localities.—Devil's Lake, Wisconsin. Also reported from Winona, Minn. (common).

17. *Lithobius minnesotæ* Bollman.

Localities.—Haugen, Wisconsin. Reported from Ft. Snelling, Minn.

18. *Lithobius trilobus* Bollman.

Localities.—Reported from Bloomington and Salem, Indiana.

19. *Lithobius exiguus* Meinert.

Localities.—Columbus, Neb.; Mongona, Boone, Marshalltown, Iowa; Peoria, Dwight, Sterling, Ill.; Janesville and Beloit, Wisconsin.

20. *Lithobius tivius* Chamberlin.

Localities.—Fremont and Omaha, Nebraska.

The specimens present slight differences from typical *tivius*, but probably represent the same species.

HABITS OF *SMERINTHUS GEMINATUS* SAY, AND *S. CERISYI* KIRBY.

I have sometimes taken the above two species here, night after night, in about equal numbers, "playing" over water. The habit is a peculiar one, which I have not noticed in any other species. I sometimes find them singly, and sometimes five or six together, flying to and fro, close to the water at open places between the willows, in a creek which runs through my place, generally at places where the banks have been worn down by stock crossing. Their motion is not regular, as in the *Hepialidæ*, but varied and meandering, usually over an area of about 20 feet square or less. So close do they fly to the water, that in striking at them with the net I often splash in mud and water. Though they generally vary their flight a few feet if a net is thrown close to them, they are not easily driven away unless actually struck at and missed, and not always then. The flight lasts about half or three-quarters of an hour, commencing in late dusk, and lasting for some time. Often I have to use a lantern to see to catch them. If a light is shown too close to them, they just move away a few feet, as they do from the net. All I have caught in this manner have been males, but their behaviour has not suggested an assemblage to females. Nor do they seem to be drinking, as I very rarely see one dip. Mr. G. O. Day, of Duncans, B. C., tells me that his son mentions having noticed the habit in *cerisyi*. F. H. WOLLEY DOD, Millarville, Alberta.