

JAPANESE COLLEMBOLA. PART II.*

BY JUSTUS WATSON FOLSOM.

Received November 1, 1898. Presented by Samuel H. Scudder, November 23, 1898.

THE interesting collection upon which this paper is based was made by Prof. C. Ishikawa, of the Agricultural College at Komaba, Tokyo, and was most generously given me to study by Professor Packard, to whom my sincere thanks are due. All that has hitherto been published upon the Collembola of Japan is a short article by myself, in which three new species are described. The present paper deals with eleven species, of which six species and one variety are new. In accordance with the wishes of Professor Packard, a series of specimens has been given to the United States National Museum at Washington, D. C., and another to the Museum of Comparative Zoölogy at Cambridge, Mass.

My friend, Dr. C. Schäffer, of Hamburg, has materially assisted my studies by sending identified examples of European Collembola, as well as valuable notes. Mr. Samuel Henshaw has given me many useful suggestions, and freely permitted me to study the collection of the Cambridge Museum.

LIST OF JAPANESE SPECIES.

- | | |
|---|--|
| 1. <i>Aphorura inermis</i> Tull. | 7. <i>Cremastocephalus affinis</i> , n. sp. |
| 2. <i>Xenylla longicauda</i> Folsom. | 8. <i>Seira japonica</i> Folsom. |
| 3. <i>Achorutes communis</i> Folsom. | 9. <i>Tomocerus varius</i> , n. sp. |
| 4. <i>Achorutes gracilis</i> , n. sp. | 10. <i>Papirius denticulatus</i> , n. sp. |
| 5. <i>Isotoma nitida</i> , n. sp. | 11. <i>Sminthurus hortensis</i> Fitch. |
| 6. <i>Entomobrya straminea</i> , n. sp. | 12. <i>Sminthurus viridis</i> L. var. <i>annulatus</i> , n. var. |

* Part I. was published in Bull Essex Inst., Vol. XXIX., (1897) 1898.

FAM. APHORURIDÆ.

Genus APHORURA MacG.

Aphorura inermis Tull.

(Plate 1, Figs. 1-5.)

1869.	<i>Lipura inermis</i>	Tullberg, p. 18.
1868.	" <i>finetaria</i> (L.)	Lubbock, p. 303, Pl. 22, Figs. 27, 28.
1871.	" <i>inermis</i>	Tullberg, p. 154.
1872.	" "	" pp. 55, 56.
1873.	" <i>finetaria</i>	Lubbock, pp. 191-193, Pl. 46, Pl. 56, Figs. 24-26.
1873.	" "	Packard, pp. 28, 29.
1878.	" "	Parona, pp. 609, 610.
1890.	" "	Oudemans, p. 90.
1891.	" "	Uzel, p. 75.
1891.	" <i>inermis</i>	Schött, p. 24.
1893.	" "	" pp. 88, 89.
1893.	<i>Aphorura</i> ———	MacGillivray, p. 313.
1894.	<i>Lipura inermis</i>	Lönnberg, p. 165.
1894.	" "	Schött, p. 128.
1895.	" "	Reuter, p. 33.
1896.	" "	Schött, p. 187.
1896.	<i>Aphorura</i> "	Schäffer, pp. 161, 163, Taf. 2, Figs. 17-21.
1897.	<i>Lipura</i> "	Lie-Pettersen, p. 21.

White (Fig. 1) ; the contents of the stomach appear as a broad blackish stripe. Eyes absent. Postantennal organ (Figs. 2, 3) elongated, parallel-sided, of eight or nine elements. Pseudocelli of the head ten in number (Fig. 2), of which three lie behind the base of either antenna, and four occupy the posterior border of the head. Antennæ (Fig. 2) shorter than the head, of four segments, related in length as 4 : 5 : 6 : 7 ; antennal organ (Fig. 4) consisting of a dorso-lateral group of four chitinous, finger-like processes, accompanied by setæ, on the anterior part of the third segment. Body elongated, clothed with short bristles and tuberculated more finely than the head ; the number of pseudocelli on the dorsum of each successive segment is, respectively, 0, 4, 4, 6, 6, 6, 6, 4, 0. Legs stout, bristly ; superior claws (Fig. 5) stout, curving and tapering uniformly from a broad base, untoothed ; inferior claws slightly shorter, slender, gradually attenuating into a fine filament. Ventral tube present ; furcula absent. Length, 1.8 mm.

One hundred and forty-two specimens examined, which were collected at Komaba, Tokyo, October 9, 27, and November 14, 1894.

Except for the number of elements in the postantennal organs, the Japanese specimens agree perfectly with North American representatives of the species; the examples from Massachusetts which I used for comparison are of the same lot of which some had been sent to Dr. Schäffer, who pronounced them to be *A. inermis* Tull., and the equivalent of *Lipura fimetaria* (L.) Lubb. Packard's specimens of *L. fimetaria* in the Museum of Comparative Zoölogy are the same species; in fact, Packard himself wrote ('73, p. 24), "It appears that on comparison I can find no difference between European and American specimens of *Lipura fimetaria*." It is at least questionable, however, whether *L. fimetaria* (L.) Lubb. is the Linnæan species.

A. inermis is a widely distributed form, having been recorded from Sweden (Tullberg, Schött), Norway (Lie-Pettersen), Finland (Reuter), Germany (Schäffer), Bohemia (Uzel), Italy (Parona), England (Lubbock), Sumatra (Oudemans), and in North America from Massachusetts (Packard), California (Schött), and Florida (Lönnerberg, Schött).

FAM. PODURIDÆ.

Genus ACHORUTES Templ.

Achorutes communis Folsom.

1898. *Achorutes communis* Folsom, pp. 52, 53, Figs. 1-9.

One hundred and thirty specimens, of all sizes, from Komaba, Tokyo, differ from the types only by having longer and more slender anal spines, in many cases.

Achorutes gracilis, n. sp.

(Plate 1, Figs. 6-13.)

General color, indigo blue (Fig. 6); legs and furcula pale; sternum yellow; the disposition of the hypodermal pigment is shown in Figure 7. Head clothed with stiff setæ; eyes eight on either side (Fig. 8), upon black patches; postantennal organ (Fig. 9) of four elements. Antennæ subequal to the head in length, with long bristles and with segments related in length as 3 : 4 : 4 : 6. Body cylindrical-ovate in dorsal aspect (Fig. 6), and sparsely clothed with short reclinate setæ (Fig. 10). Legs stout, basally spotted with blue; superior claws (Fig. 11) uniformly ta-

pering and curving, unidentate one third from the apex; inferior claws half as long, lunate, acuminate; tenent hairs, two on the fore feet and three on the others. Dentes stout, slightly tapering, with stout reclinate satae and a few extra long bristles; mucrones a third as long as the dentes, in form as represented in Figure 12. Anal spines (Fig. 13) two, small and conical. Length, 1.5 mm.

Described from twenty-four types, from Yanaka, Tokyo, November 18, 1894.

This species closely approaches the European *A. purpurascens* Lubb., as well as *A. theelii* Tull. of Nova Zembla, both of which species I have received from Dr. Schäffer; from these *A. gracilis* is distinguished especially by the form of the mucrones, together with the coloration.

FAM. ENTOMOBRYIDÆ.

Genus ISOTOMA Burl.

Isotoma nitida, n. sp.

(Plate 1, Figs. 14-18.)

Bluish gray, with a slight greenish tinge; antennæ darker; sides mottled with pale spots; sternum pale. Head, body, and appendages clothed with short dense bristles (Fig. 14); genæ gibbous. Eyes (Figs. 15, 16) eight on either side, upon black patches; postantennal organ absent. Antennæ two fifths as long as the body, stout, with segments related in length as 2 : 4 : 4 : 5, and with the last three segments petiolate. Superior claws (Fig. 17) broad basally, slightly curved, untoothed, with two filiform pseudonychia; inferior claws broadly lanceolate, without teeth; tenent hairs absent. Furcula slender, exceeding the ventral tube, with segments related as 4 : 16 : 1; mucrones (Fig. 18) four-toothed. Length, 1.4 mm.

Described from seventy-two types, of which seven were collected at Komaba, Tokyo, November 16, 1894, and the remainder at Miyagi, Boshyu, November 9, 1895.

This species is, upon the whole, most nearly allied to *I. palustris* Müll., especially in the form of the mucrones (cf. Schött '93, Taf. 6, Fig. 5).

I find no species of *Isotoma*, except that now described, which possesses filiform pseudonychia.

Genus ENTOMOBRYA Rond.

Entomobrya straminea, n. sp.

(Plate 2, Figs. 19-23.)

Pale straw yellow throughout. Head, body, and appendages densely clothed with barbellate bristles; the vertex and basal antennal segment bear also stout, clavate setæ (Figs. 19, 20). Eyes three on either side, black, arranged as in Figure 21. Antennæ almost half as long as the body, segments cylindrical, related in length nearly as 1 : 2 : 2 : 3. The body segments, measured along the median dorsal line, are related as 4 : 17 : 12 : 8 : 11 : 11 : 31 : 5 : 3; a cluster of clavate setæ arises from the anterior border of the mesonotum, and a similar dorsal cluster occurs upon each succeeding segment. Legs slender; superior claws (Fig. 22) almost straight, tapering to a sharp point, in lateral aspect showing a small tooth on the outer margin and two on the inner margin; one of the latter is comparatively small, situated near the middle, and overhung by the greatly developed second, or basal tooth; inferior claws over half as long as the others, straight, broadly linear, acuminate, bearing on the outer margin a broad, acute, hyaline lamella; a single stout but unknobbed tenent hair is present. Furcula with segments related as 28 : 49 : 3; mucrones (Fig. 23) broadly falcate, with a prominent erect tooth near the middle and surrounded by three or four stout barbellate bristles which project from the dentes. Length, 1.9 mm.

Seven types, from Komaba, Tokyo, November 16, 1894.

E. straminea agrees with *E. sexoculata* Schött ('96, pp. 180, 181, Pl. 17, Figs. 30-32) in the number of eyes, but differs in the formation of the claws and mucrones, as well as in other respects. It also bears much resemblance to *Sinella höfti* Schäffer ('96, pp. 192, 193, Taf. 4, Figs. 103-105). For reasons already urged by Schött ('91, p. 20, '96, p. 180), I follow that author in uniting the genus *Sinella* with *Entomobrya*.

Genus CREMASTOCEPHALUS Schött.

Cremastocephalus affinis, n. sp.

(Plate 2, Figs. 24-27.)

Color, chrome yellow; the lateral borders of segments two to six inclusive, the posterior borders of the last two abdominal segments and

the apex of each antennal segment are frequently dark purple; the antennæ, legs, and furcula are pale yellow. The head hangs down (Fig. 24), is elongated, and clothed with numerous proclinate bristles interspersed with extra long, slender, erect bristles; similar long bristles occur also on the body, antennæ, legs, and furcula. Eyes eight on either side (Fig. 25), arranged in two longitudinal rows, on black patches. Antennæ one fourth longer than the body, bristly, with segments cylindrical or slightly dilated and related to each other in length as 25 : 31 : 27 : 35. The body (Fig. 24) is elongate-cylindrical, clothed with reclinate bristles and scaleless; its segments, measured along the median dorsal line, are related as 2 : 12 : 8 : 6 : 7 : 2 : 34 : 4 : 4. The thorax curves downward; the mesonotum almost covers the prothorax and bears clavate bristles on its anterior border. Legs long, slender, and bristly; superior claws (Fig. 26) stout, but little curved, with a tooth on the inner margin, one third from the apex, and a second tooth near the base; inferior claws half as long as the others, broad, with acuminate apex, convex outer margin and a single tooth, borne upon an obtuse angle at the middle of the inner margin; a single tenent hair is present which gradually expands to a broad truncate apex. Furcula five eighths as long as the body and bristly; manubrium cylindrical, slightly shorter than the dentes; dentes gradually tapering, each bearing a large oval scale near the apex (Fig. 27); mucrones oblong, somewhat curved, with three terminal lobes, which are subequal, rounded, and surrounded by barbellate bristles projecting from the dentes. Length, 2 mm.

Described from seven types, collected at Komaba, Tokyo, October 25, 1894.

This curious form is closely related to the Mexican *Cremastocephalus trilobatus* Schött ('96, pp. 175-178, Plate 16, Figs. 20-23, Plate 17, Figs. 25, 26), which has hitherto been the only representative of its genus. The specific distinctness of the two species is evident when my figures are compared with those of Schött; the chief differences exist in coloration and the form of claws and mucrones; the dental scale is elliptical in *trilobatus*, but oval in the species now described. I may mention that, although Schött states that the upper claw of *trilobatus* is "provided with two teeth," there are three represented in his figure.

Genus SEIRA Lubb.

Seira japonica Folsom.

1898. *Seira japonica* Folsom, pp. 55, 56, Figs. 15-18.

Many of Dr. Ishikawa's specimens differ from my types by being larger, attaining a length of 3 mm. The antennal segments are more slender, are related to each other nearly as 3 : 5 : 4.5 : 6, and are purple throughout. Clavate hairs are few in number and the scales have disappeared. The second abdominal segment is usually yellow; the mesonotum is laterally bordered with blackish blue and occasionally each side of the head bears a stripe of that color. A single example is yellow throughout, excepting the antennæ, lateral borders of meso- and metanotum and the posterior border of the fifth abdominal segment, all of which are purple. In all other respects the specimens agree perfectly with the types, which are manifestly younger individuals.

Sixteen specimens, large and small, were taken at Komaba, Tokyo, October 27 and November 16, 1894. I omitted to mention in my previous paper that the types are dated June 24, 1897.

Genus TOMOCERUS Nic.

Tomocerus varius, n. sp.

(Plate 2, Figs. 28-30, Plate 3, Figs. 31, 32.)

Color with scales, plumbeous; without them, dull yellow. Eyes (Fig. 28) six on either side, on black patches. Antennæ almost as long as the body, with purple segments, related in length as 3 : 4 : 27 : 5. From under the anterior margin of the mesonotum project many stout stiff setæ (Fig. 29). Superior claws (Fig. 30) nearly straight, rather stout, with from two to five teeth which successively become more obscure toward the apex of each claw; in the few specimens at command, the fore claws bear two or three teeth, the mid claws from two to five, and the hind claws two; the right and left claws of the same pair of feet often differ in the number of teeth. The inferior claws are a little more than half as long as the others, broadly lanceolate and unidentate. A single tenent hair is present. Furcula seven tenths the length of the body, with segments related nearly as 3 : 4.5 : 1. The dental spines (Fig. 31)

are simple and vary in number from eight to ten ; the proximal spines are smallest and the two most distal are largest. Each mucro (Fig. 32) bears a single blunt tooth near the middle. Length, 2.5 mm.

Described from three types, collected at Komaba, Tokyo, November 16, 1894, and Oji, Tokyo, November 18, 1894. These had unfortunately dried and shrivelled.

This species is intermediate between *T. minutus* Tull. ('76, p. 32, Taf. 8, Figs. 9, 10) which has 2-3 teeth on the superior claws and 10-11 dental spines, and *T. arcticus* Schött ('93, pp. 43, 44, Taf. 3, Figs. 8, 9) which possesses 4-5 teeth and 7-8 spines.

FAM. SMINTHURIDÆ.

Genus PAPIRIUS Lubbock.

Papirius denticulatus, n. sp.

(Plate 3, Figs. 33-36.)

Pale chrome yellow, with purple markings (Fig. 33). Head sparsely clothed with stout, stiff setæ ; eyes upon black patches. Antennæ purple, three fourths as long as the body, with segments related nearly as 1 : 4 : 7 : 2 ; third segment with at least nine distal subsegments and dilated apex ; terminal segment lanceolate in outline, with the basal half composed of four subsegments. Legs yellow, banded with purple, with stout bristles ; superior claws (Fig. 34) slender, nearly straight, the outer margin unidentate one third from the apex, both inner margins bidentate ; inferior claws (Fig. 34) over half as long, with acute apex, almost parallel sides, long, knobbed, subapical hair, and two unequal, perpendicular teeth on the rounded basal portion of the inner margin ; the smaller tooth is occasionally absent ; a single, slender, unknobbed tenent hair is present. Abdomen elongate-ovate, sparsely clothed with short, stiff setæ, which become longer and numerous posteriorly. Coloration as shown in Figure 33 ; two broad paramedian stripes occur upon the anterior half of the dorsum ; several oblique wedge-shaped bands extend upward and backward from either side ; a median U-shaped mark is conspicuous on the posterior part of the dorsum. Furcula yellow, bristly, with segments related as 2 : 4 : 1 ; manubrium broadly oblong in dorsal aspect ; dentes slender, with long, stout, lateral bristles (Fig. 33) which become barbellate toward the apices of the dentes (Figs.

35, 36); mucrones (Fig. 35) oblong-lanceolate, serrate upon both edges. Length, 2 mm.

Three types, from Komaba, Tokyo, November 16, 1894.

P. denticulatus most nearly approaches the North American *P. marmoratus* Pack. ('73, p. 42), of which I have examined the types and with which I am inclined to regard *P. maculosus* Schött ('91, pp. 14, 15, Taf. 3, Figs. 1-3) as synonymous.

Genus SMINTHURUS Latr.

Sminthurus hortensis Fitch.

(Plate 3, Figs. 37-40.)

1863.	<i>Smynthurus hortensis</i>	Fitch, pp. 668-673, Figs.
1841.	— — —	Harris, p. 125.
1842.	— — —	" "
1844.	<i>Smynthurus</i> sp.	" Fig.
1969.	" [cucumeris]	" p. 362.
1871.	<i>Sminthurus pruinosus</i>	Tullberg, p. 145.
1872.	" "	" p. 31, Taf. 3, Figs. 13, 14.
1873.	<i>Smynthurus quadrisignatus</i>	Packard, p. 44.
1876.	<i>Sminthurus lineatus</i>	Reuter, p. 83.
1891.	<i>Smynthurus hortensis</i>	MacGillivray, p. 271.
1891.	" <i>frontalis</i>	Uzel, p. 37, Taf. 1, Fig. 3, Taf. 2, Figs. 3-5.
1893.	<i>Sminthurus pruinosus</i>	Schött, pp. 28, 29, Taf. 2, Figs. 13-16.
1895.	" "	Reuter, pp. 10-12.
1897.	" "	Schäffer, p. 26.
1897.	<i>Smynthurus albamaculata</i>	Harvey, pp. 124-126, Figs. 1-5.
1898.	<i>Sminthurus pruinosus</i>	Scherbakow, p. 60.

General color dark purple, spotted with pale yellow; antennæ, legs, and furcula paler purple. Head densely clothed with short proclinate setæ. Eyes (Fig. 37) upon large black patches, broadly surrounded with pale yellow; vertex yellow; genæ with several circular yellow spots. Antennæ over half as long as the body, with segments related as 2 : 4 : 17 : 15; terminal segment composed of seven subsegments: the apical two thirds of the terminal segment (Fig. 38) consists of six subsegments, of which five are subglobose, while the last is elongate-conical and itself represents three subsegments, which however are not distinct as such. Legs bristly; segments darker apically; superior claws (Fig. 39) tapering, slightly curved, unidentate near the middle of the inner edge; inferior claws three fifths as long, entire, apex acuminate,

outer margin straight, inner margin roundly dilated near the base; tenent hairs two or three, clavate. Coloration rather variable; dorsum marked anteriorly with transverse rows of pale yellow circular spots (Fig. 37); sides of abdomen with many regular rows of minute, circular, yellow spots; sternum posteriorly yellow; body well clothed with bristles, which are short and reclinate, except upon the posterior segments, where they become longer and more numerous. Furcula long and stout; dentes scarcely tapering; mucrones (Fig. 40) almost one third as long as the dentes, oblong-lanceolate, with rounded apex. Length, 1.2 mm.

Two specimens with no locality given.

The Japanese examples agree satisfactorily with North American representatives of *S. hortensis*; in fact, I found some of our specimens which match them quite closely in coloration. A study of Packard's types leaves no doubt that *quadrisignatus* Pack. is a synonym of *hortensis* Fitch. Professor Harvey kindly sent me numerous specimens of his *albamaculata*, which also prove to be *hortensis*; he regards the last antennal segment as being composed of nine subsegments, evidently considering the last subsegment as three. The identity of the European *pruinus* Tull. with the American *hortensis* was called to my attention by Dr. Schäffer, to whom I had sent examples of our species, and he has since sent me ten South American specimens of the same form.

S. hortensis has been found in various parts of Europe: in Sweden (Tullberg), Finland (Reuter), Russia (Scherbakow), and Bohemia (Uzel). In the United States it is recorded from New York (Fitch), Maine (Packard, Harvey), Massachusetts (Harris), and Ohio (MacGillivray). Finally, it is reported from subantarctic America (Schäffer).

Sminthurus viridis Linn., var. *annulatus*, n. var.

(Plate 3, Figs. 41-43.)

1758.	<i>Podura viridis</i>	Linnæus, p. 608.
1762.	" "	Geoffroy, p. 607.
1781.	" "	Schrank.
1793.	" "	Fabricius, p. 65.
1804.	<i>Smynthurus viridis</i>	Latreille, p. 82.
1806.	" "	" p. 166.
1835.	" "	Lacordaire et Boisduval, p. 115.
1835.	" "	Templeton, p. 97, Pl. 12, Fig. 7.
1839.	" "	Burmeister, p. 451.
1841.	" "	Nicolet, p. 82, Pl. 9, Fig. 9.
1842.	" "	Bourlet.

1842.	<i>Sminthurus viridis</i>	Lucas, p. 567.
1844.	" "	Gervais, p. 401.
1868.	" "	Lubbock, pp. 295, 296, Pl. 21, Figs. 1-3.
1871.	<i>Sminthurus</i> " vars. <i>cine-</i> } <i>reoviridis, nigromaculata</i> }	Tullberg, pp. 144, 145.
1872.	<i>Sminthurus viridis</i>	Tullberg, p. 30, Taf. 2., Figs. 16-20, Taf. 3, Figs. 1-5.
1873.	<i>Sminthurus</i> "	Lubbock, pp. 100, 101, Pl. 1, Pl. 55, Figs. 1-4.
1876.	<i>Sminthurus</i> "	Reuter, p. 79.
1876.	" "	Tullberg, p. 30.
1883.	<i>Sminthurus</i> "	Tömösváry, pp. 37, 38.
1888.	" "	Dalla Torre, p. 149.
1891.	<i>Sminthurus viridis</i> var. <i>tri-</i> } <i>punctatus</i> }	Reuter, p. 227.
1891.	<i>Sminthurus viridis</i> ,	Uzel, pp. 34, 35.
1893.	" " vars. <i>spe-</i> } <i>ciosus, dorsorittatus</i> }	Schött, pp. 22-24, Taf. 1, Figs. 1-5.
1895.	<i>Sminthurus viridis</i> ,	Parona, p. 696.
1895.	" " var. } <i>infuscatus</i> }	Reuter, pp. 9-10.
1896.	<i>Sminthurus viridis</i> , var. } <i>multipunctata</i> }	Schäffer, pp. 209, 210, Taf. 4, Figs. 122, 123.
1897.	<i>Sminthurus viridis</i>	Poppe und Schäffer, p. 271.
1897.	" "	Lie-Pettersen, p. 8.
1898.	" " var. } <i>lineata</i> }	Scherbakow, pp. 60, 65.

Pale yellow, spotted with blackish purple (Fig. 41); most of the spots are approximately ring-like, being polygonal with pale centres; one individual is pale yellow throughout, except for faint purple spots on the posterior part of the abdomen. Head densely clothed with proclinate bristles. Eyes upon black patches. Antennæ three fifths as long as the body, yellow basally, purplish apically, with segments related as 1:4:6:13; terminal segment composed of about seventeen subsegments. Body clothed with long reclinate bristles, numerous upon the anal tubercle. A median dorsal purple streak occurs on the anterior half of the body. Legs pale yellow, with long setæ. Superior claws (Fig. 42) stout, broad, slightly curved, mucronate at apex and unidentate on the inside, two fifths from the apex; inferior claws over half as long, broadly triangular, with a subapical hair and a single tooth upon the inner, rounded margin; tenent hair single, slender, and unknobbed. Furcula pale yellow with long setæ; mucrones (Fig. 43) elliptical, with entire margins. Length, 2 mm.

Described from two types, found at Komaba, Tokyo, November 16, 1894.

Upon comparing the Japanese variety with several examples of *S. viridis* L. var. *cinereoviridis* Tull., which Dr. Schäffer gave me, I find but few structural differences; the European variety has more slender mucrones and is clothed with longer bristles.

S. viridis is extremely variable in coloration and the present variety is the ninth to receive a name. The species ranges throughout Europe, having been recorded from Sweden (Tullberg), Norway (Lie-Pettersen), Finland (Reuter), Russia (Scherbakow), Nova Zembla (Tullberg), France (Bourlet, Geoffroy), Switzerland (Nicolet), Germany (Reuter, Schäffer), Bohemia (Uzel), Tyrol (Dalla Torre), Hungary (Tömösváry), Italy (Parona), England (Lubbock,) and Ireland (Templeton). Outside of Europe, it is known from Tunis (Parona), Siberia (Reuter), and South America (Parona).

LITERATURE CITED.

- BOURLET. 1842. Mémoire sur les Podurelles. Mém. Soc. Agric., etc. Nord. 78 pp., 1 Pl.
- BURMEISTER, H. 1839. Handbuch der Entomologie, Bd. 2. Berlin, pp. 443-458.
- DALLA TORRE, K. W. v. 1888. Die Thysanuren Tirols. Zeits. Ferd. Tirol Vorarl., Folge 3, Heft 32, pp. 145-160.
- FABRICIUS, J. C. 1793. Entomologia systematica, Tom. 2, pp. 63-68.
- FITCH, A. 1863. Eighth Report on the noxious and other insects of the State of New York, pp. 668-675.
- FOLSOM, J. W. 1898. Japanese Collembola. Bull. Essex Inst., Vol. 29 (1897), pp. 51-57, 1 Pl.
- GEOFFROY. 1764. Histoire abrégée des insectes, Tom. 1, pp. 605-614, Pl. 20.
- GERVAIS, P. 1844. In Walckenaer, Histoire naturelle des insectes aptères, Tom. 3, pp. 377-456, Pl. 50-52.
- HARRIS, T. W. 1841. A Report on the insects of Massachusetts injurious to vegetation. Cambridge, p. 125.
- HARRIS, T. W. 1842. A Treatise on some of the insects of New England which are injurious to vegetation. Cambridge, p. 125.
- HARRIS, T. W. 1844. Cucumber skippers. Mass. Ploughman, Vol. 3, No. 42.
- HARRIS, T. W. 1869. Entomological correspondence of Thaddeus William Harris, M. D., ed. by Samuel H. Scudder. Boston Soc. Nat. Hist., Occas. Papers, p. 362.
- HARVEY, F. L. 1897. Twelfth Ann. Rep. Maine Agric. Exp. Station (1896), pp. 124-126, 1 Pl.
- LACORDAIRE ET BOISDUVAL. 1835. Faune entomologique des environs de Paris. Paris, Tom. 1.
- LATREILLE, P. A. 1804. Histoire naturelle, générale et particulière, des Crustacés et des Insectes. Paris, Tom. 8, pp. 57-82, Pl. 78.
- LATREILLE, P. A. 1806. Genera Crustaceorum et Insectorum. Paris, Tom. 1, pp. 164-167.
- LIE-PETTERSEN, O. J. 1897. Norges Collembola. Bergens mus. aarb., 24 pp., 2 Pls.
- LINNÆUS, C. 1758. Systema naturæ. Ed. 10. Holmiæ, pp. 608, 609.
- LÖNNBERG, E. 1894. Florida Aphoruridæ. Can. Ent., Vol. 26, pp. 165, 166.
- LUBBOCK, J. 1868. Notes on the Thysanura, Part 3. Trans. Linn. Soc., Vol. 26, Pt. 1, pp. 295-304, Pl. 21, 22.
- LUBBOCK, J. 1873. Monograph of the Collembola and Thysanura. London, 255 pp., 78 Pls.
- LUCAS, H. 1842. Histoire naturelle des animaux articulés, annelides, crustacés, arachnides, myriapodes et insectes. Paris, pp. 553-568.
- MACGILLIVRAY, A. D. 1891. A Catalogue of the Thysanoura of North America. Can. Ent., Vol. 23, pp. 267-276.
- MACGILLIVRAY, A. D. 1893. North American Thysanura. — IV. Can. Ent., Vol. 25, pp. 313-318.



Folsom, Justus Watson. 1898. "Japanese Collembola. Part II." *Proceedings of the American Academy of Arts and Sciences* 34, 261–274.

View This Item Online: <https://www.biodiversitylibrary.org/item/35730>

Permalink: <https://www.biodiversitylibrary.org/partpdf/245216>

Holding Institution

MBLWHOI Library

Sponsored by

MBLWHOI Library

Copyright & Reuse

Copyright Status: NOT_IN_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.