

## NORTH AMERICAN APTERYGOGENEA.

BY HARALD SCHÖTT.

[With Plates xvi-xviii.]

By the kindness of Dr. H. W. Harkness and through the mediation of Dr. Gustav Eisen, I have received for determination a collection of Apterygogenea, belonging to the California Academy of Sciences, as well as a collection belonging to Dr. Eisen personally. The examinations have to me been very interesting as leading to the discovering of several forms new to the science and giving an opportunity to control and correct several details concerning the Californian Collembola the descriptions of which were published by me in the year 1891. The types of both the above collections are now in the California Academy of Sciences of San Francisco.

The collection contains specimens found in upper and Baja California, Arizona and the Pacific Coast of Mexico, all having been collected by Dr. Eisen and Frank H. Vaslit. In my examinations of the Thysanura, I have consulted the following works: *Il Sistema dei Tisanuri*, by B. GRASSI and G. ROVELLI (Estratta dal Naturalista Siciliano, An 1889-90), *Monograph of the Collembola and Thysanura*, by Sir JOHN LUBBOCK, London, 1873, *Synopsis of the Thysanura of Essex County, Mass.*, by A. S. PACKARD, JR. (in Fifth Annual Report of the Trustees of the Peabody Academy of Science for the year 1872), and *Campodeæ en Familie af Thysanurernes orden ved FR. MEINERT* (Naturhistorisk tidsskrift, Kjöbenhavn, 1865, p. 400).

In the collection the following genera and species are represented:

## COLLEMBOLA Lubbock.

## Family SMINTHURIDÆ Lubbock.

## Gen. I. SMINTHURUS Latreille.

**Sminthurus longicornis** n. sp.

*Bluish black. The terminal joint of the antennæ is annulated and double the length of the preceding. Tibial tenent hair wanting. The upper claw is enclosed by a chitinous covering and armed with a large tooth. The lower claw is lanceolate, one-toothed and provided with a thread-like appendage. The dental segment of the furcula are wanting tenent hairs. The mucrones are spoon-shaped and serrated only in one margin. Length 1 mm.*

This species is, by the shape of the mucrones, closely allied to *S. fuscus* Linn., but differs plainly by the articulation of the antennæ and in the want of tenent hairs on the caudal appendage.

*S. fuscus* Linn. has the terminal joint of the antennæ of the same length as the two preceding joints together, and has the two middle joints provided with large setæ. Our form, on the contrary, has the terminal joint of the antennæ evidently longer than the three preceding ones together, and the setæ on the middle joints replaced by scattered thin hairs. By these characteristics the species comes near *S. Eisenii* Schött, from which it differs by the shape of the mucronal segment and by its color.

Habitat. San Lazaro, Cape Region, Baja California. (Coll. Eisen and Vaslit.)

I will in this connection observe that the species of the above genus which, in my memoir on Californian Collembola, I have identified with *S. niger* Lbk., on a renewed examination has proved to be an independent species, to which I propose to give the name of *S. albipes*. The faulty determination was owing to my attaching too great weight

to the delineation of the animal, and by disregarding the difference that appears in the structure of the mucrones. These bear a great resemblance to those of *S. quadrilineatus* Tullb., from which, however, they differ in being flattened from the sides, and apparently serrulated. *S. niger* Lbk. has the mucro distinctly in the form of a channel, and serrated in both the margins.

#### Gen. II. PAPIRIUS Lubbock.

Of this genus I have in my materials also one individual, which has been found in Mexico by Dr. G. Eisen. On this single specimen I dare not, however, form a new species.

On a dirty white ground color there is on the back a large black spot with regular outlines.

#### Family ENTOMOBRYIDÆ Schött.

When, a few years ago, I was occupied with Collembola from California, I found a form, belonging to the family Entomobryidæ, which differed from all the others by the falcated mucronal segment. Until further I referred the form to a new genus *Drepanura*. Afterwards I have had an opportunity to study collections from Italy, Africa and America. In all of them I have found forms, among other characteristics also presenting the above mentioned. By the segmentation of the body they are all connected with the type of *Lepidocyrtus* Bourl., or *Entomobrya* Rond.

I therefore think that the greatest order is attained when (1) to the gen. *Lepidocyrtus* Bourl., all the forms are referred which have the mesonotum more or less projecting and the body clothed with scales, (2) to the gen. *Entomobrya* Rond., forms with the mesonotum not projecting and without scales, and finally (3) to the gen.

*Sira* Lbk. forms clothed with scales but with the mesonotum not projecting. In consequence of this, the two temporary genera *Drepanura* and *Pseudosira*, before proposed by me, are to be excluded from the system.

Gen. I. TOMOCERUS Nicolet.

**Tomocerus americanus** n. sp.

*The dental spines are 9-11, the two upper and the two lower of which are considerably longer than the others. The upper claw is provided with three or four teeth. The lower claw is lanceolate and provided with one tooth. Length 4 mm.*

As to the disposition of the dental spines of the caudal appendage, the above species is closely allied to *T. flavescens* Tullb. A pointed scale near the inner spine is also to be found. The number of the spines seems to vary considerably.

The variation is generally confined to the numbers 9-11. Characteristic is the disposition of the two flank spines in each end, considerably surpassing the others in length. The upper claw of the first pair of extremities often has four teeth, that of the other pair three. Also in this I have thought to find variation. Thus I have found several specimens on which all the pairs of extremities have had the upper claw armed with three teeth.

In my memoir on Californian Collembola I have mentioned a species of *Tomocerus* Lbk., which, on account of the limited materials I then had, I was not able to determine. A renewed study of my old preparation has shown that the species in question is identical with the one now described.

Habitat. San Francisco. (Coll. G. Eisen.)



## Gen. II. LEPIDOCYRTUS Bourlet.

**Lepidocyrtus Parckardi** n. sp.

(The specific name is given in honor of Professor A. S. Packard, Jr.)

*White with a bluish black delineation. The eyes are sixteen, eight on each side of the head. The terminal joint of the antennæ is longer than the preceding. The upper claw is strongly developed and provided with three teeth. The lower claw is lanceolate and unarmed. The furcula is long; the dentes are rapidly tapering, twice as long as the manubrium; the mucrones are long and thin, at the point provided with only one hook. Length 3.5 mm.*

The second joint of the *antennæ* is slightly longer than the third, which is about half as long as the terminal joint. The terminal segment of the *furcula* is very narrow, a little curved, and provided with only one tooth. The *body* is covered with hairs, now club-shaped, now pointed and bristly, or even simple and straight. The first sort of hairs are heaped between the several segments of the body and on the head, the second on the dentes of the *furcula*, the third everywhere on the animal, especially on the *antennæ* and extremities.

From the specimens at my disposal it cannot be positively concluded as to the real *color* of the animal. The ground color seems on alcoholic specimens to be pure white, and the delineation bluish black. The *antennæ* are now bronze-brown, now deep blue.

Habitat. Sierra Laguna, Baja California. (Coll. G. Eisen.)

**Lepidocyrtus fulvus** n. sp.

*Yellow. The eyes are sixteen, eight on each side of the head. The second and third joints of the antennæ are of about the same length, the terminal joint a fourth longer*

than the preceding. The upper claw is rather curved, in the middle provided with a notch, and near the point with a tooth. The lower claw, on the first pair of extremities is running out into three points, on the other pairs into two. The mucronal segment of the furcula is short, large, and furnished with one hook. Length 1.5 mm.

The upper claw, rather curved and nearly cuneate, is in the middle of the inner margin provided with a notch, and towards the point of the claw with an apparent tooth. The lower claw seems to be somewhat different on the several pairs of extremities. On the first it is at the point cut off obliquely on both sides of the middle line and runs out into three points, on the two posterior pairs the margin only directed towards the upper claw is cut off, and the claw, therefore, runs out into only two points. The tibial tenent hair is swollen. The furcula is rather short, and has the mucro large and not attached to the dentes with any neck, as is the case with all the other forms provided with only one hook. The scales are all elliptical; under the immersion-lens they seem to be provided with short ribs, close lying, and as to the place exactly corresponding to the depressions which are characteristic of the other species of the genus *Lepidocyrtus* Bourl. The scales, strange enough, do not appear before the animal has been treated with caustic alkali.

Alcoholic specimens are wax-colored, with rusty brown traverses on the posterior margins of the trunkal segments. The insect, when alive, is probably rusty brown all over. The antennæ are pale violet, the extremities yellow and the furcula colorless.

Habitat. Magdalena Island, Baja California. (Coll. G. Eisen.)

## Gen. III. CREMASTOCEPHALUS n. g.

(Derivatio κρέμασθαι and κεφαλή)

**Cremastocephalus trilobatus** n. sp.

The head is hanging down. The thorax is curved. The mesonotum covering the pronotum, but not projecting over the posterior part of the head. The fourth abdominal segment occupying the half of the body. The antennæ are nearly twice as long as the body, 4-jointed, with the basal joint strongly developed. The eyes are sixteen, eight on each side of the head. The tibial tenent hair is enlarged at the end. The upper claw is furnished with two teeth, extremely fine. The lower claw is obliquely cut off at the end. The dentes of the furcula are nearly of the same width all along. The mucro widely rectangular, running out into three large points, and furnished with a scale, hanging down in front. Scales wanting. Length 3 mm.

This genus, on a superficial inspection, seems to join characters derived from two genera before set up by me, the *Campylothorax* and *Trichorypha*. To the former it has some resemblance in the curved thorax and in the strongly developed basal joints of the antennæ; to the latter in the shape of the mucronal segment of the furcula. From *Campylothorax*, however, it may easily be distinguished by the following characters:

(1) The shape of the mesonotum. (2) The number and disposition of the eyes. (3) The shape of the mucronal segment, and (4) The absence of scales. From *Trichorypha* it is to be distinguished by (1) the curved thorax; (2) the disposition of the eyes, and (3) the absence of scales.

The head is hanging down and the thorax curved, so that the form, as I said, on a superficial inspection, looks like a species of *Campylothorax*. The curvation of the body, however, is not produced by the angular mesonotum,

but the head and the thoracic segments have to each other a certain bend forward. The *pronotum* is quite concealed by the mesonotum, which, however, does not project over the posterior part of the head. The *mesonotum* is a little longer than the *metanotum*, which also is somewhat longer than the first abdominal segment. The *second abdominal segment* is nearly thrice as long as the third; the fourth occupies about half the body. The *ocelli* are sixteen in number, eight on each side of the head. Their disposition will appear from the drawing. The *antennæ* have the basal joints strongly developed and reach almost to the point of the mucrones, if the caudal appendage is stretched out. They are four-jointed, and have the basal and terminal joint of about the same length; the second joint is nearly twice as long as the third. The outer joint often fails. The *tibial tenent hair* is thick and enlarged at the end, but not ball-shaped. The *upper claw* is slightly curved and provided with two teeth, extremely small, which can be seen only under high magnifying power. The *furcula* is very characteristic. The manubrium is not quite as long as the dentes, which slightly taper towards the points. The mucronal segment being of the same width and somewhat bent inwards, runs out into three points. Before this segment there is hanging down an elliptical scale, which is put into an excavation in front at the point of the dentes. When examined by the aid of an immersion-lens the scale seems dotted and provided with a thick margin. Accordingly it has quite another texture than the skin scales which characterize several forms belonging to the family *Entomobryidæ*. The animal is thickly clothed with short hairs, above which, at the joints of the segments in general, and especially between the first two thoracic segments, tufts of club-shaped hairs are rising. These hairs, however, I

have observed in only one specimen. In the others they are probably broken off. On the body, and especially on the antennæ and extremities, there also are extremely fine long hairs, standing out at right angles. *Skin scales wanting.*

To judge from my materials, the color of the animal seems to be rather variable. I am going to describe two types.

(1) Ground color dirty yellowish white. Along the back a dark band runs, broken off at the joints, and increasing in strength on the great abdominal segment. On the thoracic segments the band has a rusty brown color, passing on the abdomen into nearly black. The antennæ are dark yellowish, and have a thin covering of dark violet color, increasing towards the ends of the joints, where it forms real rings. The two outer joints of the antennæ often are dark violet.

(2) Along the sides of the segments rather broad black borders are running, which appear most distinctly on the second and third thoracic segments and on the two first abdominal segments; then they dissolve in extended spots of the same color. Further inwards on the back, near the middle line of the body, there run two rusty brown lines of about the same width which are broken off at the joints of the segments and finish on the second abdominal segment. These lines also can be observed on the great abdominal segment, but there they run a little nearer to each other, are thin in the middle and increase in breadth towards the ends. They do not reach quite to the end of the segment. Two spots of the same color are to be seen on the fifth abdominal segment. The appendicular parts are yellowish. The bases of the antennæ are encircled by black rings. Such rings also are met with at the points of the three inner joints.

Habitat. San Miguel de Horcasitas, Sonora, and Tepic, Mexico. (Coll. Eisen and Vaslit.)

Gen. IV. ENTOMOBRYA Rondani.

**Entomobrya cæca** n. sp.

*White. The eyes are wanting. The antennæ have the third joint pear-shaped, about half as long as the terminal joint. The upper claw is provided with three teeth, the two inner of which are very strong. The lower claw is running out into two diverging points. The mucro is provided with one hook. Length 1 mm.*

The *upper claw* is formed in the same manner as in the forms which have before constituted the genus *Sinella* Brook. The *lower claw* is unarmed on the inner margin, furnished on the sides with longitudinal ridges, and has an appendix hanging downwards which consists of an extremely thin chitinous lamel, running out into a point. The claw, therefore, seems to be two-pointed. On the *tibia* a tenent hair, swollen at the end, can be observed.

The *hairs* of the two specimens which I have at my disposal are very scarce. Groups of club-shaped setæ are, however, to be seen on the posterior part of the head and between the forward thoracic segments.

Habitat. San Francisco, California. (Coll. G. Eisen.)

**Entomobrya binocolata** n. sp.

*White. The eyes are two, one on each side of the head. The terminal joint of the antennæ is nearly twice as long as the third. The upper claw is provided with three teeth, of which the two interior are very strong, and are placed beside each other. The lower claw is lanceolate and unarmed. The mucro is provided with two hooks. Length 1.5 mm.*

Easily to be distinguished from preceding species by the number of the eyes. The *antennæ* have the two middle



joints of about the same length and the terminal joint nearly twice as long as the preceding. The *upper claw* has three teeth, the two interior of which are very large. At the first glance we can distinguish only two teeth, owing to the circumstance that the two interior are placed beside each other. By the aid of a strong microscope and with different focusing of the tube, it can, however, easily be observed that the bases of the two teeth are parallel and situated on each side of the claw, and that their respective points diverge, so that they are angular to each other. On a preparation, the lower tooth, with a precise regulation of the tube, seems to be very strongly developed, while the upper one seems to be much smaller. The difference is owing to the inferior tooth appearing in its whole extent from the side, while the upper one appears only in part and from above. The *lower claw* is lanceolate and without any teeth. There is a *tibial tenent hair*, but with no swelling at the point. As to the form of the *caudal appendage*, there is a complete coincidence with the preceding species.

As the scales are more or less completely fallen off, the *color* of alcoholic specimens is pure white.

Habitat. Berkeley, California. (Coll. G. Eisen.)

### **Entomobrya curviseta** Brook.

*Dirty white, marked with brown spots. The eyes are four, two on each side of the head. The terminal joint of the antennæ is longer than the third. The upper claw has three teeth, the two interior of which are very strong and placed beside each other. The lower claw is lanceolate and unarmed. The mucro is provided with two hooks. Length 2 mm.*

Syn. 1882, *Sinella curviseta* Brook, Linn. Soc. Journ. Zool., vol. xvi, p. 541.



For reasons mentioned in my "Beitr. Z. Kenntn. Cal. Coll.," p. 20, I think that the above form is to be referred to the genus *Entomobrya* Rond., and I am confirmed in my opinion by my having found in the materials now at my disposal two species of the above genus, the one of which is characterized by three ocelli, the other by one on each side of the head. The plumiform setæ, characteristic of the genus *Sinella* Brook, which are hanging down on the sides of the mucronal segment, though less developed, are to be seen on all the species belonging to the genus *Entomobrya* Rond. The other characteristics of *Sinella*, the shape of the upper claw and the absence of swelling on the tibial tenent hair, seem to me to be insufficient as foundation for a separate genus.

Of this very interesting type I have a specimen from Sebastopol, California (coll. G. Eisen). Before only known from Finland (Reuter) and England (Brook).

***Entomobrya sexoculata* n. sp.**

*Violet.* The eyes are six, three on each side of the head. The three outer joints of the antennæ are of about the same length. The upper claw is provided with three teeth. The lower claw is lanceolate and unarmed. The mucro is provided with two hooks. Length 1.5 mm.

Well characterized by the number and arrangement of the eyes. They are three on each side of the head and are as appears from the figure. Of the teeth of the large claw two are placed close to each other, but they do not exceed the uncoupled tooth in size. A tibial tenent hair directed upwards is to be seen. The caudal appendage is very long and has the dentes one-fourth longer than the manubrium. The mucro has two developed hooks and a small spine directed backwards.

The body is richly clothed with hairs. The color of

this species resembles much that of *E. myrmecophila* Reut. On the white-yellow ground-color blue-violet spots are closely spread. The antennæ are bluish, the extremities and furcula colorless.

Habitat. Berkeley and Alameda, California; Sonora, Mexico. (Coll. G. Eisen.)

**Entomobrya atrocincta** n. sp.

*Honey yellow. On the head an anchor-like spot and two brownish lines going through the eye-patches. The second thoracic segment inclosed by a dark margin. The posterior of the third thoracic and the first abdominal segment black-brown. The eyes are sixteen, eight on each side of the head. The three outer joints of the antennæ are of the same length. The upper claw provided with two small teeth. The lower claw is lanceolate and unarmed. The mucro is provided with two hooks. Length 1.25 mm.*

The terminal joint of the antennæ is generally wholly blue-violet. The dark transverse sharply contrasts with the waxen ground-color. The animal is very richly clothed with alternately club-shaped and pointed hairs. The body seems to me to be somewhat thinner than that of the European species of the above genus.

In my materials there are many individuals without any distinct delineation. They sometimes are quite yellow, sometimes provided with a pale dark delineation on the head and on the anterior segments of the body. These are, no doubt, young animals. It is possible that Packard has before described this species under the name of *Degeeria perpulchra*, of which he says: "This exquisitely pretty form may be at once known by its small size, the black band around the head or on front and side of thorax and the honey yellow abdomen." In that case he has had a young specimen before him.

Habitat. Hanford, California. (Coll. G. Eisen.)

**Entomobrya multifasciata** Tullberg.

*White yellow. Dark transverse bands on the posterior margins of all the truncal segments; an apparent transverse with irregular outlines on the fourth abdominal segment. The eyes are sixteen, eight on each side of the head. The three outer joints of the antennæ are of the same length. The upper claw is provided with three teeth. The lower claw is lanceolate and unarmed. The mucro is provided with two hooks. Length 1.5 mm.*

Of this species, already known from California, about thirty individuals were found by Dr. G. Eisen, at Berkeley, California.

From this place also is to be found in great number a variety that is characterized by the posterior of the third abdominal segment being almost totally dark, and by the transverse of the fourth increasing considerably in size.

**Entomobrya triangularis** n. sp.

*White. Round the head through the eye patches there is a faintly marked dark ribbon. The pronotum is bluish, the mesonotum included by a broad border of same color. The first, third and sixth abdominal segments are dark. On the sides of the fourth abdominal segment there are two triangular dark spots, the points of which meet in the median line of the back. The eyes? The three outer joints of the antennæ are of the same length. The basal joints are encircled by dark rings. Towards the points the middle joints are also covered with a bluish color; the terminal joint is wholly blue. The upper claw has two teeth. The lower claw is lanceolate and unarmed. The mucro has two hooks and a spine, directed backwards. Length 1.75 mm.*

This species bears a great resemblance to *E. spectabilis* Reut. It has a similar formation of the terminal

segment of the caudal appendage, and partly the same coloring.

Having had at my disposal only one individual, which I have wished to spare from dissection, I cannot give any account of the number and disposition of the eyes.

Habitat. San Francisco, California. (Coll. G. Eisen).

Gen. V. TEMPLETONIA Lubbock.

**Templetonia quadrioculata** n. sp.

*White.* The eyes are four, two on each side of the head. The terminal joint of the antennæ is not annulated. Length 1.5 mm.

The type of this genus, *T. nitida* (Temple), is to be recognized by two eyes, one on each side of the head. In our species, however, the eyes are four. They are nearly of the same size and are placed transversely close by each other. The terminal joint of the antennæ is not annulated, therefore this characteristic must exit out of the diagnosis of the genus.

As to the other characteristics, the shape of the claw-joints, of the extremities and of the terminal segment of the caudal appendage, there is a complete coincidence between the two species. The color of alcoholic specimens is pure white, as the scales are more or less completely fallen off.

Habitat. Berkeley, California. (Coll. G. Eisen.)

Gen. VI. ISOTOMA (Bourlet).

In conformity with the opinion about the systematization of the genus *Isotoma* Bourl., which I have introduced in my memoir Zur Systematik und Verbreitung palæarctischer Collembola, the variety of *T. viridis* Bourlet, which I have already before had an opportunity to note from California, ought to change the name *aquatilis* Lbk., for *riparia* Nic.

**Isotoma palustris Müller var. balteata Reuter.**

*Dirty white-yellow, with dark transverses on all the truncal segments. The eyes are sixteen, eight on each side of the head. The antennæ are twice as long as the head, and have the three outer joints all of the same length. The third abdominal segment is about as long as the fourth. The upper claw is unarmed. The lower claw is provided with a little tooth, directed upwards. The mucro is provided with four hooks, three of which are placed in a row one after another and the fourth on the outside of the segment. The body is densely clothed with short and simple hairs. Length 1.25 mm.*

Syn. 1893, *Isotoma palustris* Müller var. *balteata* Reut., Zur Syst. u. Verbr. palæarct. Coll., p. 66.

Of this well marked variety, which has been found before only in Finland, my material contains twenty individuals, found by Dr. G. Eisen in the vicinity of Lake Chabot, near Oakland, California.

**Isotoma fimetaria (Linn.) Tullberg.**

*White. Eyes are wanting. The terminal joint of the antennæ is about twice as long as the preceding one. The third abdominal segment is shorter than the fourth. The claws are unarmed. The mucro is provided with two hooks. Length 1 mm.*

From other species with short caudal appendage *I. fimetaria* (Linn.) Tullb. differs in the *absence of eyes* and in its *pure white color*.

I am much inclined to think that Packard, when describing *I. nivalis*, has had before him the above species. The author signifies it as "a species combining some of the characters of *Lipura*, *Achorutes* and *Isotoma*."

Habitat. San Francisco. (Coll. G. Eisen.)

**Isotoma lacustris** Schött.

*Dark violet. The eyes are sixteen, eight on each side of the head. The antennæ are not longer than the head, and have the three outer joints of nearly the same length. The third abdominal segment is shorter than the fourth. The claws are unarmed. The caudal appendage reaches the ventral tube. The dentes are all over of the same breadth. The mucro is formed out of thin chitinous lamels, and provided with two hooks. Length 2 mm.*

Syn. 1893, *Isotoma littoralis* Schött, Zur Syst. u. Verbr. palæarct. Coll., p. 75.

I have changed the name of the above species because Monier, in his valuable paper, \*Acaricus et Insectes marines des côtes du Boulonnais, has already before made use of the specific name *littoralis* for an *Isotoma* described by him.

*I. lacustris* Schött has a special interest, because of its near relation to *I. crassicauda* Tullb. Having before in my memoir Zur Syst. und Verbr. palæarct. Coll., put forth the distinguishing marks of the two species, I will, however, give some detail figures illustrating the fact stated.

Habitat. The vicinity of Lake Chabot, near Oakland, California. (Coll. G. Eisen.)

## Family LIPURIDÆ Lubbock.

Mr. MacGillivray, in his valuable memoir on North American Thysanura, proposes to alter several of the names now commonly used for the genera of the family *Lipuridæ*. I have no objection to abandoning the generic terms *Anura* Gerv. and *Lipura* Burm., both being, as the author justly observes, "preoccupied in Mammalogy." (Gray gave, in 1838, the name of *Anoura* to a

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\*Extrait de la Revue Biologique du Nord de la France. Lille, 1890, p. 32.



cheiropter, and, in 1840, it was also applied to a form of ophiuridea. *Lipura* was, in 1811, used by Illiger to denote a genus of pachyderms, and, in 1819, the nearly related name of *Lipurus* was given to a marsupial.) But I cannot well understand why the generic term *Anurophorus* Nic. should be abandoned. The reasons given by Tullberg for retaining it (Sv. Pod., p. 55) seem to me quite satisfactory. It is true that the *Anurophorus laricis* of Nicolet was, in 1842, placed by Bourlet in the genus *Adicranus*, and that Gervais, in 1844, placed it in the genus *Lipura*; but as we know with certainty to which form Nicolet applied the name, and that he used it as early as 1841, I think we are not only entitled, but also, on account of its undoubted precedence, obliged to retain it. Nor can I agree with the author when he retains in the genus *Achorutes* Templ. only the forms that want anal spines, proposing a new genus *Schoturus* for those of its forms that have such appendages. It seems as if this alteration would easily create some confusion.

From the well defined genus *Anurida* Laboulb., the author excludes the species *granaria*, regarding it as the type of a new genus only on account of its having *no ocelli*. But if this were a sufficient reason for such an arrangement, the consequence would be the exclusion of *Sminthurus cæcus* Tullb. from the genus *Sminthurus* Latr., and of *Isotoma fimetaria* (Linn.) Tullb. from the genus *Isotoma* Bourl.

#### Gen. ACHORUTES Templeton.

##### *Achorutes viaticus* Tullberg.

*Bluish black. The extremities are biunguiculate. The dentes furculæ are thin and twice or thrice as long as the mucrones, which are digitiform. The anal spines are only a little longer than the papillæ on which they are fixed. Length 1-2 mm.*



Of this species, already before known from California, I have in my materials about thirty individuals from San Francisco (coll. G. Eisen).

**Achorutes armatus** Tullberg.

*Brownish purple. The extremities are biunguiculate. The dentes furculæ are thick and twice as long as the mucrones, which have the form of a hook. The anal spines are extremely long. Length 1 mm.*

Twenty-four specimens from Berkeley and four specimens met with in the neighborhood of Lake Chabot, California (coll. G. Eisen).

Gen. LIPURA Burmeister.

**Lipura inermis** Tullberg.

*White. The elevations of the postantennal organ are 14. The eyelike points on the basis of the antennæ are 2.*

Of this species, which I have before had occasion to note down from California, several specimens have been found by Dr. G. Eisen near Lake Chabot.

I will in this connection observe that Dr. Einar Lönnberg has found specimens of the above form and of *Anurida Tullbergi* Schött on the shore of a lake near the railway station Clarcona, Orange County, as well as some hundred individuals of *Anurida maritima* Laboulb. along the seashore at Key West, Florida.

T H Y S A N U R A Lubbock.

Family CAMPODEADEÆ Lubbock.

Gen. I. CAMPODEA Westwood.

**Campodea staphylinus** Westwood.

Of this form I have in my materials only one specimen, which, unfortunately, is incomplete.

Habitat. San Francisco, California. (Coll. G. Eisen.)

## Family MACHILIDÆ Grassi.

It is a rather difficult task to try to identify alcoholic specimens belonging to this family. According to Grassi and Rovelli, the following characteristics constitute the species within the only genus of the family:

1. The length of the antennæ and of the median cercus.
2. The thoracic hump, more or less apparent.
3. The eyes.
4. The color of the body.
5. The shape of the scales.

As the color is dependent on the scales, which generally more or less fall off, when the insects are laid in spirits of wine, and, moreover, as individuals preserved are rarely found without the antennæ and caudal appendages broken off, the difficulty of easy identification will be understood.

I also have considered it more proper to leave a few *Machilides* as indeterminable.

## Gen. I. MACHILIS Latreille.

**Machilis aurantiacus** n. sp.

*The head is small. The eye patches are somewhat more broad than long, and are contiguous to one another, with three-fourths of the inner margin; on the front margin they are pinched out. The labial palpi are four-jointed, and have the two middle joints of about the same length. The maxillary palpi are seven-jointed, and have a small process on each of the two inner joints. The antennæ are not annulated. The cerci are very stiff and dazzling white in color. The color of the animal is orange-tawny. The cuticula is smooth, with bottle-like figures. Length 7 mm.*

The antennæ being injured in all the specimens, their length cannot be exactly decided. To judge from their

size and tapering, they seem to be longer than the body. The basal joint of the antennæ is rather large and about thrice as long as the following, nearly ball-shaped joint. Of the annular small joints then following, the inner are somewhat longer than the following, all of which are of about the same length. The color of the antennæ is brownish black. The *maxillary palpi* are flame yellow, and thickly beset with small black setæ. The *extremities* are also provided with short large setæ, which, by their dark brown, almost black color, make a sharp contrast with the light ground color of the animal. This is citrine, and on each tergite are running 8-10 orange colored transverse lines. The joints between the several segments are light yellow. The thoracic tergites are lighter than the abdominal ones. The *median cercus* is not exactly as long as the body. I cannot determine the length of the lateral cerci, because they are hurt in all my specimens. Probably they are much smaller than the median one, for they are much thinner than this.

Habitat. Sierra Nevada and Monterey, California. (Coll. Miss Alice Eastwood.)

#### Family LEPISMATIDÆ Burmeister.

##### Gen. LEPISMA Linné.

Before entering on a detailed description of species, I will point out a characteristic not before taken notice of, which seems to me to be very useful for the distinction of the species. It is met with on *the cuticula*, which is easily laid bare by dissection or boiling in caustic alkali. The cuticula then appears under the microscope either quite smooth or ornated with a network of chitinous ribs. In both cases it is lightly strewn with small, elevated anchor-like figures, which are connected with the fastening of the scales.

With respect to the number and disposition of the back hairs, the two following species are to be referred to the group:

LOPOTHRICHI Grassi and Rovelli.

**Lepisma rubro-violacea** n. sp.

*The head has the form of a hat. The body is elongate, backwards gradually tapering. The labial palpi are three-jointed. The maxillary palpi are five-jointed. The antennæ are indistinctly annulated with reddish brown and white. The telson is subtriangular and furnished with two chitinous hooks. The cerci are distinctly annulated with brown and white. The head is yellowish white, and in front regularly colored reddish violet. The thoracic tergites are yellowish white. The abdominal tergites are reddish violet. The cuticula is smooth, with anchor-like figures. The scales are brown. Length 10-12 mm.*

The head is formed rather like a round crown of a hat, and, when deprived of scales, yellowish white. On the anterior margin of the upper side there are to be observed some reddish violet spots, regularly disposed, and with outlines rather indistinct. Under the microscope these spots closely appear to correspond to areas thickly strewed with small papillary elevations. After being boiled in caustic alkali, these elevations look like small rings. Along the posterior margin of the head there is a brownish black border, discernible by the eye. The antennæ, grayish brown in color, are furnished with light rings, extremely fine, which, towards the points of the organs, become more and more separated from one another. Not having at my disposal any individual with the antennæ perfectly preserved, I cannot exactly determine their length. Approximately, I consider them to be of the size of the body.

The maxillary palpi are five-jointed. The two inner

joints are thicker than the others; the third is somewhat longer than each of the following ones. Their color is pale brownish violet.

The *labial palpi* are three-jointed, and have the basal joint somewhat longer than the following one. The terminal joint is thicker than the others and irregularly triangular in form. They are uncolored.

The *thoracic tergites* are shield-shaped and broader than the abdominal tergites. Their ground-color is yellowish white, and they are covered with dark brown scales, which in alcoholic specimens remain only on the sides of the tergites. On the *abdomen* almost all the scales are fallen off, exposing a reddish violet ground-color. In several specimens acute-angled areas, surrounded by light lines, can be observed on the abdominal tergites. When the animal is looked upon from above, the *telson* seems to be widely triangular with the point slightly produced. When cut off, it appears to be such as the drawing shows. The chitinous hooks, mentioned in the diagnosis, which in entire specimens are difficult to discern, appear most distinctly on the segment, when cut off. The *cerci* are distinctly annulated with reddish brown and white. At the bases of the organs the rings are smaller and increase in extent towards the points. The joints towards the points of the antennæ become longer and swollen. For the same reason that was mentioned concerning the antennæ, I cannot decide the length of the cerci. Probably they are longer than the body. The *extremities* are annulated with yellow and brown. The *cuticular figures* are anchor-like and lie scattered on a bottom quite plain. The *scales* are brown, and, therefore, the insect when alive probably bears this color. The drawing belonging to this description represents alcoholic individuals. I have thought fit to give a colored

drawing of such a specimen, since in most cases there are only materials conserved to be had for examination. On the anterior margin of the head four tufts of fine upright hairs can be observed. On the body the hairs are more or less fallen off. In order to form an opinion of their disposition you may with success resort to dissection or boiling in caustic alkali. Then the ring-shaped elevations from which the hairs of the animal arise can be observed on the bare cuticula. On the lower margin of the *thoracic tergits* two rows of such elevations, directed obliquely outwards and downwards, can be observed. Each row consists of about ten elevations. Besides, there are at the lateral margins of the segments ten similar rows transversely disposed, each consisting of 3-4 elevations. Each row is accompanied by a cuneate reddish brown spot. On the lower margins of the abdominal segments four rows of elevations obliquely disposed are to be found. The inner ones seem to consist of 10-12 elevations, the outer ones of 8-10. The terminal abdominal tergite is furnished with long, fine hairs on both sides of the median cercus.

The above species is richly represented in the Californian collection and seems to be very common. Perhaps it is already described. However, as I have not been able to identify it with any species before described, I have considered it to be new to the science.

Habitat. Sierra Laguna, San José del Cabo, Baja California; Tucson, Arizona; Guaymas and San Miguel de Horcasitas, Sonora, Mexico. (Coll. G. Eisen.)

**Lepisma reticulata** n. sp.

*The body is elongate, gradually tapering backwards. The labial palpi are 3-jointed. The maxillary palpi are 5-jointed. The antennæ are indistinctly annulated with brown and white. The telson is short, indistinctly trian-*



gular. The cerci are distinctly annulated with reddish brown and white. The ground-color is yellow. The scales are brown, alternately light and dark; the dark ones arranged at the posterior margins of the tergites in groups, symmetrically hanging down. The cuticula is furnished with a network of chitinous bars. Within the meshes the anchor-like cuticular figures are to be seen.

The examination of this species has been of particular interest to me, because the scales have remained quite unhurt. The head, rounded in front, is on the upper side closely covered with dark brown scales. The antennæ resemble those of the preceding species. The points are broken off, owing to which their length cannot be decided. The maxillary palpi are 5-jointed, with the terminal joint thin and leg-formed. The labial palpi are 3-jointed, with the terminal joint very much swollen. At the basal joint a thin triangular chitinous scale is to be distinguished. The shield-shaped thoracic tergites are about equal in size and decorated with short light yellow striæ, regularly arranged. The first and third tergites are at the posterior margin furnished with two, the second with three incisions. On both sides of these the dark scales are heaped downwards forming appendages, the two lateral of which are rounded, the intermediate (one or more) abruptly cut off. In at least eight abdominal tergites such incisions also can be traced. Instead of giving a detailed description of these and their number in each tergite I refer to the drawing. The telson is short and very distinctly annulated with reddish brown and white. At the bases of the organs the rings are of small extent and lie rather closely. Further out the alternating colors extend over a great number of small segments (4-5), and in the middle of the white rings a very fine dark ring can be traced. The length of cerci cannot be de-



cided. The *extremities* are alternately colored light and dark. The *cuticula* is covered with a network of rather thick chitinous bars, the disposition of which is represented in the adjoined drawing. Within the meshes there are figures of the same appearance as in the preceding species. The groups of *hairs* on the particular tergites are disposed like the rows of elevations of the preceding species and seem to consist of chitinous bars, bifid at the end and hairs, of which some are feather-like and others naked. The number of hairs in each group seems to be nine.

As to the integument of hairs it must be added that groups of fine setæ are hanging down from the posterior margin of the telson, and that the cerci are richly covered with hairs. Unfortunately I have had only two individuals of this species at my disposal and one of them has been given up to the dissecting needle.

Habitat. San Francisco, California. (Coll. G. Eisen.)

## EXPLANATION OF THE FIGURES.

## PLATE I.

*Sminthurus longicornis* n. sp.

Fig. 1. Antenna.

2. Claw of the first pair of extremities.

*Sminthurus albipes* n. sp.

3. Mucro.

4. Claw of the first pair of extremities.

*Sminthurus niger* Lbk.

5. Mucro.

*Tomocerus americanus* n. sp.

6. Dentes furculæ.

7. Claw of the first pair of extremities.

*Lepidocyrtus fulvus* n. sp.

8. Claw of the third pair of extremities.

9. Claw of the first pair of extremities.

10. Mucro.

11. *Lepidocyrtus Packardi* n. sp.

12. Mucro.

13. Claw.

*Entomobrya cæca* n. sp.

14. Antennæ.

15. Claw of the first pair of extremities.

16. Mucro.

*Entomobrya bioculata* n. sp.

17. Ocellus and antenna.

18. Mucro.

19. Claw of the first pair of extremities.

20. *Creastocephalus trilobatus* n. sp.

21. Claw of the first pair of extremities.

22. Mucro.

23. Ocelli.

24. Ocelli of *Campylthorax longicornis* Schött.

## PLATE II.

Fig. 25, 26. Hairs of *Creastocephalus trilobatus* n. sp.*Entomobrya euroiseta* Brook.

27. Ocelli and antenna.

28. Mucro.

29. Claw of the first pair of extremities.

*Entomobrya sexoculata* n. sp.

30. Ocelli.

31. Mucro.

32. Claw of the first pair of extremities.

see p. 576.

*Templetonia quadrioculata* n. sp.

- Fig. 33. Ocelli and antenna.  
 34. Claw of the first pair of extremities.  
 35. *Entomobrya atrocincta* n. sp.  
 36. *Entomobrya triangularis* n. sp.  
     *Isotoma palustris* Müll. var. *balteata* Reut.  
 37. Mucro.  
     *Isotoma lacustris* Schött.  
 38. Mucro.  
 39. Claw of the first pair of extremities.  
     *Isotoma crassicauda* Tullb.  
 40. Mucro.  
 41. Claw of the first pair of extremities.  
     *Machilis aurantiacus* n. sp.  
 42. Head.  
 43. Maxillary palpus.  
 44. Cuticular figure.

## PLATE III.

- Fig. 45. *Lepisma rubro-violacea* n. sp.  
 46. Cuticular figure.  
 47. Head.  
 48. Telson.  
 49. First and second thoracic tergites.  
 50. First abdominal tergite.  
 51. Hair.  
 52. *Lepisma reticulata* n. sp.  
 53. Base of antenna.  
 54. Labial palpus.  
 55. Maxillary palpus.  
 56. Cuticula.  
 57. Hairs and bifid spine.