

MILLIPEDS OF THE ORDER COLOBOGNATHA, WITH DESCRIPTIONS OF SIX NEW GENERA AND TYPE SPECIES, FROM ARIZONA AND CALIFORNIA

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INTRODUCTION

A special interest may be claimed for millipeds of the order Colobognatha as examples of interrupted or residual distribution, in widely separated regions which could not be reached by any method of transportation now at the disposal of these animals. The explanation for such facts of distribution is to be found by tracing back to former ages of the world when vegetation and surface conditions must have been widely different from those of the present time. The Colobognatha have greater environmental limitations than the members of most of the other orders, though the habits and living requirements are remarkably uniform through the whole class of millipeds.

From the general uniformity of habits at the present time it may be inferred that a similar uniformity existed in the past, and that the requirements for existence and survival have been much the same during the whole period of biological history of the group, or since their world-wide distribution was attained.

In comparison with most of the other millipeds, the Colobognatha are delicate, fragile, slow-moving creatures, unable to burrow in the soil or to withstand surface exposure. The legs and other appendages are very short and unspecialized, and restricted food habits are indicated by minute, rudimentary mouth parts.

The outstanding requirement for the existence of delicate humus animals is a continuous supply of moisture, not necessarily a regular supply, but one that is never completely interrupted, or the creatures at that place are exterminated. Thus the existence of humus fauna is an evidence of the moisture continuity of any locality, and may afford a better assurance regarding local conditions in the humus layer than is obtainable in any other way.¹

¹ Cook, O. F. Notes on the distribution of millipeds in southern Texas, etc. Proc. U. S. Nat. Mus., vol. 40, pp. 147-167, 1911.

Species that lack the protection of a well-chitinized exoskeleton are more definitely confined to areas where the humus layer in which they live remains moist at all times and so furnishes food and continuous protection. Such areas are most commonly found in the Tropics where the rainfall is usually more abundant than in temperate regions. The greater differences between summer and winter climate in the temperate regions doubtless may also be considered as limiting factors of distribution, though the soil conditions appear to be much more important.

Humus faunas may be limited by the nature of the soil, as well as by the need of continuous moisture. The drying of the surface does not endanger the existence of a humus fauna where the conditions are such that its creatures can take refuge in a moist subsoil, but clays or colloidal soils do not afford such protection and are not adapted to the needs of a humus fauna. If the soil cracks in drying, the humus animals may enter, and may seek deeper levels as the season advances, but when the rain comes and water fills the crevices, the soil dissolves into soft mud and creatures buried in it have little chance to escape. Whether for this cause or others still to be recognized, the rule seems to be that the colloidal soils have little in the way of humus faunas, and often no animal life, even under conditions that in other respects may appear quite favorable. While humus faunas exist in many regions of colloidal soils, it is found in such regions that the animals live in the humus blanket, and are confined to the places where the blanket is thick enough to hold its moisture through the dry season. Under such conditions the animals may be said to live in the humus rather than in the soil, except as the character of the soil may be modified under a humus blanket.

As with other cosmopolitan orders of millipeds, most of the species of Colobognatha are tropical, but the few that have been found in temperate regions have been recognized as distinct genera or even as distinct families, not represented in the Tropics. From the United States only five species of Colobognatha have been known and in recent years this number has not been increased; three of the species were described from the Eastern States and two from the Pacific slope. One of the eastern species has been reported from several localities and belongs to the genus *Polyzonium*, that occurs also in Europe. The other eastern species, representing two very distinct genera, *Brachygybe* and *Andrognathus*, apparently are rare and local, no two species being reported from the same place. With the addition of the new forms described here, the preponderance in Colobognatha must now go to the Western States, where eight genera

are represented from six separate districts. Only one genus in California is shared with the Eastern States.²

A genus *Hypozoneium*, closely related to *Polyzoneium*, was described in 1904 from Seattle, Wash. One of the new genera described on a later page was found by the writers in the fall of 1919, on Mount Tamalpais, near San Francisco, Calif. Three other genera were distinguished in a remarkable collection of millipeds from a small area in Plumas County, Calif., obtained in the winter of 1922-23, by H. S. Barber, of the Bureau of Entomology. Although this collection included only five species, four of them belonged to the Colobognatha. Three of the species had to be treated as distinct genera, while the fourth is referable to the genus *Brachycybe*, known also from the Eastern States. In October, 1924, another member of this order was collected in the Pinal Mountains of southern Arizona, the first specimen being secured by L. R. Lytton and others from the same locality by the writers. This animal belongs to a distinctly tropical family, Siphonophoridae, not previously known to exist in the United States.³

The species from Mount Tamalpais was found in loose stony soil under a layer of oak leaves on the western slope of the mountain not far from the redwood forest known as Muir Woods. Equable conditions are maintained in the coast districts by the breezes and fogs from the ocean. The survival of the redwood and giant sequoias in the coast belt of California show that climatic conditions have remained nearly the same for long periods, though the trees are reckoned as survivals of a former age of wider extension of forests, when the vegetation generally was more luxuriant if not more tropical in character. The forest fires and the periodical burnings of brushland and grasslands undoubtedly have been the chief restricting factor during the period of human occupation. Changes of climate have been alleged, but changes of vegetation may have been sufficient to localize such types as redwood trees and millipeds in the few places that have afforded continuous protection through the centuries.

Whether the humus fauna in California was derived from tropical America or from other land masses of the ancient world is hardly to be conjectured at present, but it is worthy of note that the nearest relatives of the milliped from Mount Tamalpais are in the Mediterranean region, not in other parts of America.

A southern origin or alliance may be claimed for the milliped from Arizona, which belongs to a family widely distributed in the Tropics

² An additional genus, *Gosodesmus* Chamberlin, related to *Brachycybe*, was described in 1922 from southern California. Its characters are given at the end of this paper.

³ Another member of this family was found still farther north in California, in November, 1926, while the paper was awaiting publication, so that two new genera of Siphonophoridae are included.

but not known previously in the United States. The location might appear most unlikely for the survival of a tropical type—an elevated, exposed place where in cold periods the ground probably freezes to a depth of several inches. The vegetation is sparse, with scattered small junipers, shrubby oaks, and bushes. Probably the most essential feature of the environment is the very coarse, open soil formed of decomposing granite. The creatures were found under stones with clean surfaces underneath. In no case were millipeds found under stones where the surfaces were coated with dark colloidal material, which also discolors the gravel and doubtless represents a different condition of the soil. The place was in a divide a few miles from Miami, in the direction of Superior.

Though surrounded by very broken country, the spot was nearly level and with no through drainage or flooding of the surface. It seems that the humus faunas of colloidal regions are limited to spots where a humus blanket has accumulated above the soil, or where the surface is not flooded even in heavy rains. Thus the restriction of the new tropical milliped to the very small area in which it was found could be considered as a special and rather striking illustration of a general relation that had been observed in the study of the humus fauna.

From the distribution of the humus fauna it may be possible to throw light on the question of the natural conditions in the southwestern area before the period of human activity, or even further back. There can be little doubt that the surface conditions have been greatly changed during the human period, and the archeological indications of extensive and long-standing human occupation in this region are accumulating. Whatever the causes of the changed conditions, wider and more continuous distribution of the humus fauna in former times is hardly to be doubted.

CHARACTERS OF THE COLOBOGNATHA

The Colobognatha, as the name indicates, are millipeds with a restricted development of the mouth parts and other cephalic organs, except that the antennae are relatively large. The mouth parts especially are reduced or much less developed than in the other orders, and have been described as suctorial rather than manducatory, after the analogy of insects. The labral region of the head in most of the genera is narrow or is produced into a sharp beak. A remarkably divergent genus described in this paper has the head broadened below instead of narrowed.

The structure of the segments is primitive rather than specialized, with as wide a diversity of form as in any other order of millipeds. The segments of most of the genera are definitely flattened, in con-

trast with other long-bodied millipeds. But a few of the genera are rather short-bodied, and the broad lateral expansions, or carinae of the segments, are similar to those of some members of the order *Merocheta*.

The skeleton is weakly chitinized and the segmental sclerites are distinct or not so much fused as in most of the other orders. In all of the *Colobognatha* the pedigerous laminae are free and the pleurae also may be free from the tergites or united by a lateral suture. A median suture appears in one of the suborders and is doubtless to be considered as a primitive character. Median sutures are found in several other orders, notably the *Monocheta*, *Merocheta*, and *Anocheta*, suggesting a fusion of two primitive sclerites to form the dorsal scutes of millipeds.

The *Colobognatha* differ from all other millipeds in having eight pairs of normally formed legs in front of the two pairs of specialized copulatory legs of the males. Also the copulatory legs, or gonopods, are much less specialized than in other orders and have the joints and claws distinct, as in the ambulatory legs. The posterior pair of gonopods is the more specialized and does not have the same position as the more specialized gonopods in the other orders, which are located on the seventh segment of the body. Where only one pair of legs is modified for copulatory purposes, as in the order *Merocheta*, they are the anterior legs of the seventh segment. In all of the orders where both pairs of legs on the seventh segment are modified, the specialization of the anterior pair is always much greater than that of the posterior pair.

But in the *Colobognatha* the more specialized posterior gonopods have been developed from the anterior pair of legs, not of the seventh segment, but of the eighth segment, where no similar modification occurs in any of the other orders. With this positional difference added to the structural differences, it is plain that the gonopods of the *Colobognatha* are not really homologous with those of the other orders of millipeds, but go back as a separate line of development to a remote ancestral stage when the appendages and segments of the body were unspecialized.

The different position of the gonopods affords an explanation of the fact that the *Colobognatha* have eight pairs of legs in front of the gonopods while other orders have only seven pairs. Before the different attachment of the gonopods was recognized it was customary to describe the *Colobognatha* as having an additional pair of legs on some of the anterior segments which in other orders are footless or are provided with only one pair. Some orders have no legs on segment 3 and some have two pairs of legs on segment 5, but in the *Colobognatha* each of the first 5 segments has a single pair of legs, while the subsequent segments have 2 pairs. Thus the

attachment of legs in the order Colobognatha is the same as the order Anocheta, a large group of millipeds traditionally referred to the genus *Spirobolus*.

As a further consequence of the different position of the gonopods in the Colobognatha, it follows that an uneven number of pairs of unmodified legs will be found on the posterior part of the body, behind the gonopods, supposing that each of the segments has two pairs, except the last two segments, which are footless. The posterior pair of segment 8 renders the number uneven.

Pocock, writing in the *Biologia Centrali Americana*, reports an even number of post-copulatory legs in a species of *Platydesmus*, and on that account was unwilling to admit a different position for the gonopods. While Pocock undoubtedly was a very careful observer, accurate counting of the large numbers of legs on specimens of Colobognatha is not easy. The ventral plates are not united to the pleurae and the attachment of the legs to a particular segment often is difficult to determine. Since it is more feasible to count the legs accurately on photographs than on the specimens, photographs are submitted as evidence of the actual occurrence of uneven numbers of post-copulatory legs.

In addition to accidental abnormalities of the legs, there is a further possibility, as recognized by Pocock, that the last of the leg-bearing segments might have only one pair. This would be another way of explaining an even number of pairs behind the gonopods, but should not be taken for granted without proof.

Two suborders of Colobognatha are represented in America. In the suborder Polyzonoidea the head is narrowed in front and in some genera is produced into a slender beak. The mouth parts have been described as suctorial rather than manductatory, though the manner of feeding seems not to have been observed. The segments are convex or flattened, sharply angled at the junction of the scuta with the pleurae, but not produced into lateral carinae and lacking a median suture. In the suborder Platydesmoidea the head is not narrowed or produced, the segments have lateral carinae, and the median line of the segments is marked with a distinct groove or suture.

Three families are known to represent this order north of the Mexican boundary. The Siphonophoridae have the head suddenly constricted in front into a slender, sharp-pointed beak; the dorsum is pilose and tuberculate but lacks an impressed median sulcus. The Polyzoniidae have the dorsum without hairs, tubercles, or an impressed median sulcus, and are lacking in flattened or projecting lateral carinae but are provided with eyes. In the Andrognathidae the dorsum is either hairy or tuberculate or both, and there is a well-marked median sulcus, the lateral carinae are flattened or projecting and all of the species are without eyes.

Family SIPHONOPHORIDAE

The genus *Siphonophora* has been the only representative of this family in America. There are numerous tropical species, but until recently no member of this family has been reported in or near the United States. In 1923 a representative of the family was described from Sonora, Mexico, and in the autumn of 1924 another was discovered in the mountains bordering the northern edge of the southern Arizona desert. This Arizona species offers sufficiently distinctive characters to call for a generic recognition distinct from *Siphonophora*.

A second genus of Siphonophoridae was found in San Benito County, Calif., in November, 1926. This genus is remarkable because the mouth parts are not produced into a beak, because of the extreme slenderness of the body, and because of the very large numbers of segments, in this respect probably exceeding any other milliped.

SIPHONACME, new genus

Type.—*Siphonacme lyttoni*, a new species from Arizona.

Diagnosis.—Closely related to *Siphonophora* but differing in having the posterior gonopods very slender and the distal joint of both anterior and posterior gonopods nearly straight, as long or longer than the preceding joints taken together. Also the head is broadly oval and the beak relatively short, slender, and abrupt.

Description.—Body slender, from twenty to thirty times as long as broad, rather strongly convex.

Head subglobose-pyriform, abruptly contracted to a short slender beak. Antennae short, crassate, subclavate, a sense organ present near the margin, on the outer face of the fifth joint.

First segment oblong with anterior margin transverse or but slightly emarginate. Segments rather strongly convex; anterior and posterior subsegments tuberculate, the latter hirsute, with the hairs rising from between the tubercles.

Repugnatorial pores opening from a slight but abrupt prominence on the dorsal surface close to the lateral margin; the orifice of the pore surrounded by a fine rim bordered by a series of short, erect, closely placed hairs. On a few of the anterior segments the pore is near the front margin of the posterior subsegment, but on the other segments it is near the posterior margin and almost in the angle. Pleurae scarcely exceeded by the dorsal plates at the lateral margin.

Last segment with pleural and ventral sutures fused; the ventral suture open on the penultimate segment.

Preanal scale distinct.

Both pairs of gonopods simple, long and slender, the terminal joint of each pair nearly straight; anterior gonopods directed forward, with the last joint as long as all the preceding joints together; posterior gonopods longer and more slender and reaching forward between the anterior gonopods to their tips, the last joint longer than all the other joints together.

The type of *Siphonophora* is *S. portoricensis* Brandt. The original specimens are in the Berlin Museum and show a tapering conical head equaled or exceeded in length by a long slender beak. The antennae are moderately crassate with the joints gradually thicker from the base, joint 2 slightly longer than joint 3, joints 3 to 5 subequal in length, joint 6 about twice as long as joint 5, and joint 7 very short and scarcely projecting beyond joint 6; the first segment more than twice as long as the second and distinctly emarginate in the middle. The repugnatorial pores are borne on large rounded prominences which give the segments the appearance of being distinctly shouldered. A larger female specimen with 70 segments has the beak much longer than the head, and the head is smaller and more abruptly narrowed than in the male specimen, which has a shorter beak, scarcely longer than the head.

SIPHONACME LYTTONI, new species

Description.—Body small, very long and slender, twenty to thirty times as long as broad, scarcely tapering at the ends; the segments rather strongly convex. Motions in crawling very slow. Male with 78 segments, females with 88 and 121 segments. Length of male, 16 mm.; width 0.7 mm.; largest female 29 mm. long and 0.9 mm. broad.

Living colors.—Head, antennae, and first segment white; segments 2 to 4 with a longitudinal median band of dull pinkish abruptly broadened and divided at segment 5, becoming gradually paler to the middle of the body and finally disappearing so that the last segments also are white. The beak is a pale waxy yellow, and the large lateral sense organs of the antennae, on joint 5, appear as distinct orange-yellow spots.

Head subglobose-pyriform, abruptly contracted to a short, slender beak piliferous to the tip, less than one-third as long as the mass of the head; surface of head tuberculate and pilose, the beak smooth with scattered large and small hairs.

Gnathochilarium distinct, narrowly triangular, a group of large bristles at the apex as long as the slender apical portion of the beak; median groove present, basal angles rounded, very close to the insertion of the first pair of legs.

Antennae crassate, rather strongly clavate, joints 5 and 6 distinctly thicker than the others; joint 6 about twice as long as joint 5; joints 2 and 4 subequal, distinctly exceeded by joint 5; joint 7 distinctly projecting; a large, orange-yellow transversely-oval sense organ near the rim of joint 5 on the lateral face. In crawling the antennae are carried directly forward.

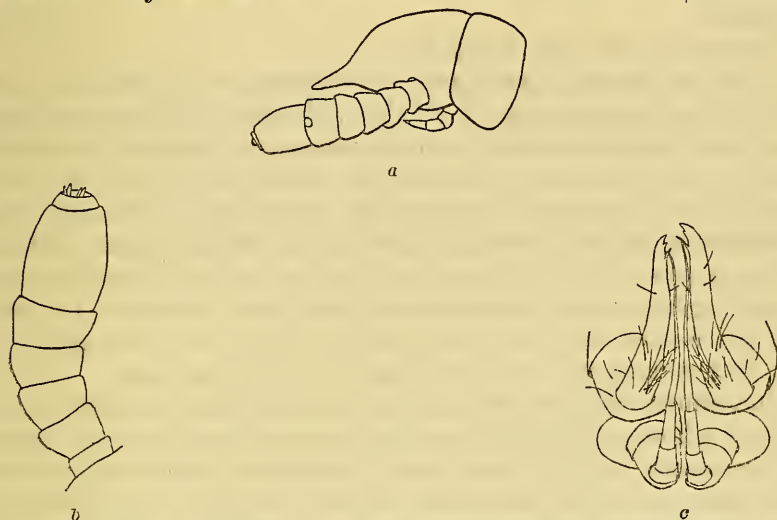


FIG. 1.—SIPHONACME LYTTONI. *a.* LATERAL VIEW OF HEAD. *b.* ANTENNA OF FEMALE, VENTRAL VIEW. *c.* GONOPODS, VENTRAL VIEW

First segment large, subelliptic, the anterior margin transverse or with a slight angular emargination; a transverse crescentic area in front of the middle of the segment slightly depressed or less convex than the surface behind it, forming a thin collar over the base of the head.

Segments rather strongly convex; the surface of the posterior division tuberculate and pilose, the hairs inserted between the tubercles, the posterior margin minutely and regularly serrate, supplementary margin not apparent; anterior subsegments beset with circular or oval flattened or broadly rounded tubercles like those of the posterior subsegments, but usually without hairs or with only a few near the posterior subsegment; pleural sutures at the lateral margins of the segments, the dorsal plates scarcely projecting beyond the pleurae.

Last two segments longer than any of the preceding, without legs or ventral plates; last segment with the pleural and ventral sutures completely fused; penultimate segment with the sutures open.

Last segment distinctly longer than the penultimate, gradually narrowed at the sides and rather broadly rounded at the apex; pre-anal scale distinct, the margin transverse, nearly straight; anal valves prominent, evenly convex, somewhat exceeding the posterior margin of the segment, the surface pilose but not distinctly sculptured.

Gonopods very long; the anterior pair extending forward beyond the basal joints of the two preceding pairs of legs, the terminal segment quite slender, slightly tapering, nearly straight, and as long or slightly longer than the other joints taken together; posterior gonopods longer than the anterior pair and more slender, the last joint simple, very long and slender and reaching the apex of the anterior gonopods.

Type.—Cat. No. 975, U.S.N.M.

Three specimens, a male and two females, were found by L. R. Lytton, in company with O. F. Cook, October 27, 1924, on slightly moist soil largely composed of loose decomposed granite, under large stones in an open dry place near the summit of a pass, $1\frac{1}{4}$ miles north of the monument marking the boundary of Gila and Pinal Counties, on the road between Superior and Miami, Ariz. The conditions appeared quite unfavorable for a humus fauna and even with much digging no other millipeds and no thread centipeds (Geophilidae and related families) were found. Only a few Scolopendridae and Lithobidae and a few specimens of *Japyx* were seen.

On January 28, 1925, after the region had been covered by snow and ice, a long and diligent search of the same locality by the writers was rewarded with but two living female specimens and two dead specimens, the sex of which was not determined. Other humus animals were much more plentiful than in October and four other species of millipeds were collected. The locality was visited again by Mr. and Mrs. Loomis on March 1, 1925, when four more specimens were found. Two of these were males with 98 and 108 segments, respectively.

SIPHONACME PSEUSTES (Chamberlin)

Siphonophora pseustes CHAMBERLIN, Proc. Cal. Acad. Sci., ser. 4, vol. 12, 1923, pp. 389–402.

From the drawings and description of *Siphonophora pseustes* Chamberlin⁴ it seems probable that this species should be placed in *Siphonacme*, but *Siphonacme pseustes* apparently is distinct from *Siphonacme lyttoni* in having the beak and antennae longer, in the more deeply emarginate first segment, and the body with fewer segments, especially in the males. Possibly an examination of the gonopods of *Siphonophora globiceps* Pocock would show it should be included in *Siphonacme*.

ILLACME, new genus

Type.—*Illacme plenipes*, a new species from California.

Diagnosis.—Similar to *Siphonophora* and *Siphonacme* but readily distinguished by the triangular-cordate head, narrowed gradually

⁴ On chilopods and diplopods from islands in the Gulf of California. Proc. Cal. Acad. Sci., ser. 4, vol. 12, pp. 389–407, 1923.

to an acute angle below, but showing no tendency to form a projecting beak.

Description.—Body extremely slender, moniliform, about fifty times as long as broad; composed of a very large number of segments, in the longest specimens approaching 200; dorsum strongly convex, nearly semicylindrical; the surface shining, moderately hirsute.

Head triangular-cordate in outline, resembling that of *Polyzonium* and without any suggestion of a beak, the sides continuous and sharply converging to a rather blunt angle, but not produced into a snout. Position of the head nearly vertical to the body, not reflexed under the body.

Antennae inserted at the sides of the head, abruptly capitate-clavate, subgeniculate; joints 1 to 4 very small, joints 5 and 6 abruptly thicker and larger, held parallel to the sides of the head; joint 6 the longest, but scarcely as broad as joint 5; joint 7 broad and short.

First segment slightly narrowed, about half again as long as the second; oblong, the lateral margins evenly rounded, anterior margin nearly parallel with the posterior; the surface nearly even, lacking the abrupt convexity of the posterior subsegments on the rest of the body; segments 2 to 4 shorter than the following, the transverse constriction with an irregular row of rounded tubercles on the anterior slope; surface of anterior subsegments rather coarsely reticulate, surface of posterior subsegments finely hirsute, each of the hairs subtended by a short sublunate transverse groove, giving the general effect of an indistinct network; supplementary margin distinct, with regular truncate divisions.

Repugnatorial pores difficult to detect, located on slight prominences near the posterior margins of the segments, not close to the lateral margins, pores of segment 5 in the same position as the others; lateral sutures open, bordered by slight parallel ridges; surface of pleurae with a rather open reticulation, sparsely hirsute along the posterior margins.

Last three segments somewhat longer than the preceding; the anal segment nearly as long as the penultimate, the sides converging to a broadly rounded apex, even with the valves, not projecting; surface of the anal valves rather strongly and evenly convex, the margins not prominent; preanal scale not distinct.

Legs rather short, scarcely exceeding the sides of the body, the basal joints prominent and swollen on the inner side, sometimes with an extruded membrane or exudate, nearly in contact on the median line.

This genus separates at once from *Siphonacme* and *Siphonophora* by the absence of a beak. The antennae are different from those of

Siphonacme in having joints 1 to 4 much narrower and more slender, while joint 5 is abruptly larger and more nearly equal to joint 6. Also the body is much more slender and the number of segments is much greater, approaching twice as many, and perhaps exceeding any other millipede. A diplopod with 192 segments, as counted on one of these specimens, has a total equipment of 750 legs, and may be the nearest approach to a literal "thousand legs."

ILLACME PLENIPES, new species

Body very slender and flexible, filiform, strongly and evenly convex, moderately pubescent on all of the exposed surfaces; number of segments attaining 192, with a length of 36 mm. and a width of 0.7 mm. in the largest female specimen; other individuals 26 to 29 mm. long, 0.5 to 0.6 mm. wide, with 136 to 152 segments.

Head rather narrowly triangular-cordate, the vertex more densely hirsute, the hairs rather short, the clypeus with longer and sparser hairs, nearly naked above the rather blunt-pointed labium; position of head nearly vertical, not strongly recurved under the body.

Antennae inserted at the sides of the head, moderately hirsute, abruptly capitate-clavate, subgeniculate, the terminal joints carried at the sides of the head, the second and third joints at the lateral margin of the first segment; joints 2 to 4 gradually thicker but much smaller and narrower than joints 5 and 6; joint 2 somewhat longer than joints 3 and 4, which are subequal and nearly as broad as long; joint 5 also about as broad as long, but much thicker than joint 4; joint 6 slightly narrower than joint 5, and distinctly longer, about one and one-half times as long as broad, cylindrical-oval, slightly narrowed toward the end; joint 7 projecting as a rather broad frustum about one-sixth of the length of joint 6; olfactory cones not prominent.

First segment with the lateral margins evenly rounded and the anterior margin nearly parallel with the posterior; the surface more even than on other segments, which are abruptly convex behind the transverse constriction.

Penultimate segment without legs, the large pleura meeting in the middle and apparently united, but the sutures indicated by a fine median groove; last segment converging to a broadly rounded apex, not projecting beyond the margins of the valves, scarcely equal to the margin when viewed from the side.

Type.—Cat. No. 976, U.S.N.M.

Numerous specimens were collected by O. F. Cook in San Benito County, Calif., November 27, 1926, a short distance after crossing the divide between Salinas and San Juan Bautista. Only one colony was found, in a small valley of a northern slope wooded with oaks, under a rather large stone. The living animals were nearly white, moved very slowly, and rolled themselves into regular, close spiral coils when disturbed, the coils with three or four turns.

Family POLYZONIIDAE

ANALYTICAL KEY TO GENERA OF POLYZONIIDAE

Segments strongly depressed, the dorsum nearly horizontal; segments 20.

Platyzonium.⁵

Segments strongly convex, 30 to 50 in number.

Sterna with a broad median groove separating the basal joints of the legs; head broadly rounded below; antennae and first two pairs of legs distinctly crassate.-----Buzonium, new genus.

Sterna narrow, the basal joints of the legs nearly in contact; head narrowed below; antennae and first legs slender.

Body strongly narrowed in front from the fifth segment; first segment less than half as wide as the body; antennae long, extending beyond the sides of the body, joints 5 and 6 distinctly larger than the others.

Bdellozonium, new genus.

Body moderately narrowed in front, the first segment more than half the body width; antennae short, the joints subequal.

Last segment covered and exceeded by the large, broadly rounded penultimate segment; segments 30.-----Hypozonium.

Last segment exposed and projecting beyond the distinctly emarginate posterior edge of the penultimate; segments variable in number, adults commonly with 40 to 50.-----Polyzonium.

BUZONIUM, new genus

Type.—*Buzonium crassipes*, a new species from California.

Diagnosis.—Head subquadrate, the clypeus widened below and the labrum broadly rounded; antennae robust, clavate, uncolored; first two pairs of legs of both sexes distinctly crassate.

Description.—Body small, moderately convex; body cavity about one and three-quarter times as broad as high.

Head small, subquadrate, narrowed between the antennae but the clypeus broad and convex and the labrum broadly rounded, the margin denticulate.

Eyes, two on each side, not prominent nor heavily pigmented, reddish or brownish.

Antennae not colored, robust, distinctly clavate, joints 5 and 6 longer and thicker than the others.

First segment scarcely half as wide as the broadest diameter of the body, crossed in front above the lateral angles by a distinct ridge from the lower edge of which the thin anterior margin is produced.

Subsequent segments somewhat polished, marked with fine longitudinal striations; dorsum margined by the extended plurae which are visible from above; pore of the fifth segment lower than on the following segments and located on the exposed posterior corner on the anterior subsegment.

⁵ *Platyzonium* is a European genus known only from Spain, originally described as a species of *Cryptodesmus*. See Cook, O. F., On *Cryptodesmus Getschmannii* Karsch. Zoologischer Anzeiger, No. 488. 1895.

Last segment subtriangular, exposed above.

Legs short and with large coxal joints, separated by the broad sterna which are narrower and more elevated behind; first and second pairs of legs conspicuously smaller and more crassate than those following, with the claws also reduced.

BUZONIUM CRASSIPES, new species

Number of segments from 52 to 72; length of largest specimen 21 mm., width 2.8 mm. Dorsum strongly convex; body cavity hardly twice as wide as high; body very abruptly rounded behind, more gradually in front.

Alcoholic specimens with the dorsum pinkish brown, the sides lighter, ventral surface pale. The semitransparency of the exoskeleton allows the internal organs to affect the color of the dorsum.

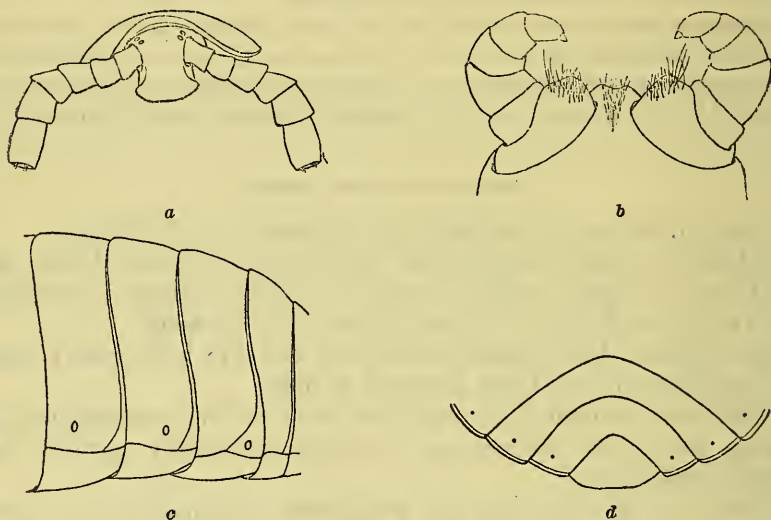


FIG. 2.—*BUZONIUM CRASSIPES*. *a*. HEAD. ANTENNAE AND FIRST SEGMENT, ANTERIOR VIEW. *b*. FIRST LEGS OF MALE, POSTERIOR VIEW. *c*. SEGMENTS 4, 5, 6, AND 7, LATERAL VIEW. *d*. LAST THREE SEGMENTS, DORSAL VIEW

Head with the clypeus and labrum greatly widened and rounded and with numerous very short, stiffly erect hairs; labrum considerably broader than the distance between the base of the antennae, the margin coarsely serrate on the sides, more finely in the middle; vertex and front roughened by rather deep and somewhat irregular length-wise impressions; eyes very widely separated, not hidden by the first segment, composed of two ocelli each, placed quite obliquely; antennae subclavate and as long as the width of the first segment, first and second joints together equal in length to the sixth, which is the longest; sense cones 4.

First segment subreniform, slightly emarginate in front and behind; the lateral anterior margin thick, rounded, and carried up as a high ridge across the dorsal portion behind a thin, expanded margin produced from the lower edge of the ridge.

Subsequent segments slightly shining; posterior division impressed with many fine, short longitudinal striations much stronger at the middle of the dorsum near the anterior edge of the subsegment; plurae projecting slightly, forming a narrow raised lateral margin of the segments; pores of the fifth segment located low down on the enlarged caudal corners of the anterior subsegment, pores on subsequent segments higher and on the posterior subsegment.

Last segment exposed above, subtriangular; segments immediately preceding it sharply and deeply emarginate.

Legs not reaching the sides of the body; sterna broad, separating the legs, narrower and much more elevated behind; coxae of all legs at least half again as broad as the next joint, with the exception of the first two pairs of legs the coxae have a large oval pit at apex on the inner side; first and second pair of legs reduced in size and strongly crassate, more noticeable in the male, and with the claws shorter and less acute than on the other legs.

Type.—Cat. No. 977, U.S.N.M.

Six mature specimens collected beneath bark of oak logs near Seneca, Plumas County, Calif, December, 1922, and January, 1923, by H. S Barber, and two other specimens from same locality collected in March, 1924, by F. J. Silor.

BDELLOZONIUM, new genus

Type.—*Bdellozonium cerviculatum*, a new species from California.

Diagnosis.—Related to *Polyzonium* and *Hypozoneum*, but with the clypeal portion of the head longer, the labral extremity broader and more rounded, the antennae much longer and the joints more equal, the anterior segments relatively smaller.

Description.—Body small, moderately convex, with the body cavity about three times as broad as high.

Head very small, subconic, the clypeus gradually narrowed, the apex obtusely angled in front; anterior surface pigmented.

Eyes of four ocelli on each side in an oblique row, prominent, heavily pigmented.

Antennae deeply colored, scarcely clavate, long, projecting beyond the sides of the body, joint 6 the longest; joints 3 and 5 subequal, longer than joints 2 and 4; joints 5 and 6 longer and slightly thicker than joints 2 to 4.

First segment very small, scarcely longer than segment 2 and about half as wide; anterior margin with a fine raised rim.

Segments flat underneath, moderately convex above, with a distinct transverse groove separating the subsegments; anterior subsegment smooth and even, more exposed than in *Polyzonium*; posterior subsegment somewhat inflated behind the groove, the surface minutely wrinkled, punctate or striate, especially in the groove. Repugnatorial pores on slight prominences in front of the middle of the posterior subsegment and rather remote from the margins on anterior segments, closer to the margin on posterior segments; pore of segment 5 much closer to the lateral margin than on the other segments, located on the anterior subsegment, with the transverse suture of the segment sinuate behind the pore, forming a small lateral elevation around the pore.

Penultimate segment slightly longer than the preceding, with a wide posterior sinus exposing the last segment.

Last segment small, with a broadly rounded apex concealing the anal valves.

Basal joints of the legs nearly in contact at middle, while in *Polyzonium* they are distinctly separated, especially on the anterior segments.

BDELLOZONIUM CERVICULATUM, new species

Number of segments 39 to 46. The largest specimen 16 mm. long by 3.3 mm. broad. Body rather strongly convex above, the posterior end more abruptly rounded than the anterior; body cavity about twice as wide as high.

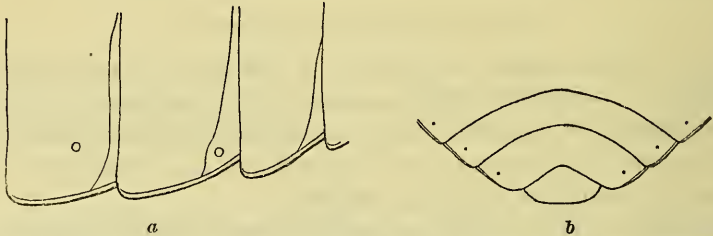


FIG. 3.—*BDELLOZONIUM CERVICULATUM*. *a*. LATERAL MARGINS AND REPUGNATORIAL PORES OF SEGMENTS 4, 5, AND 6. *b*. LAST THREE SEGMENTS OF BODY, DORSAL VIEW

Color of the dorsum salmon pink in living specimens, more brownish in alcohol, the side of the segments and the ventral surface pale; head and antennae light, mottled with purplish.

Antennae about one and a half times as long as the first segment is wide and reaching well beyond the sides of the body; joints 3 and 6 distinctly longer than the others. Ocelli 3 to 4 on each side in a

very oblique row, 1 or 2 in each series usually being covered by the first segment. A low tubercle bearing a long hair above the lower ocellus of each series. Below the base of the antennae is a broad transverse depression in front of which the clypeus is somewhat inflated; labral area gradually narrowed, the apex somewhat rounded.

First segment very small, only one-third as wide as the full-sized segments, almost squarely truncate in front and with a narrow raised rim; posterior margin broadly and evenly rounded.

Body shining; anterior subsegments almost smooth, a few faint impressed longitudinal lines near the caudal margin; posterior subsegments more conspicuously impressed with similar lines, rather deep on the anterior third, fainter toward the middle, the hind margin smooth; exposed portion of the anterior subsegment usually about one-third the length of the posterior subsegment, the hind margin of the middle segments of the body slightly and broadly emarginate at middle; pores of the fifth segment on the anterior subsegment slightly above the posterior corner and near the transverse sulcus; other pores on the posterior subsegments, closer to the transverse sulcus than to the lateral margin; dorsal encroachment of the pleurae very slight but forming a narrow raised lateral margin to each segment.

Legs almost reaching the sides of the body, slightly separated from each other by the sterna which are elevated behind and on the sides and form a depression open in front; basal joints of the legs with rounded-oval pits.

Females with the first pair of legs very small and slender, much more reduced than those of the males, which also are smaller than the following pair.

Type.—Cat. No. 978, U.S.N.M.

Several specimens from Belden, Plumas County, Calif., collected by H. S. Barber, January 2, 1923. "It is numerous, in several sizes from about 4 mm. up, under bark and in splintered crevices of oak log near the mouth of Chipps Creek."

Genus HYPOZONIUM Cook

HYPOZONIUM ANURUM Cook

Hypozonium anurum COOK, Myriapoda of Northwestern America, Harriman Expedition, p. 63.

This species was described from Seattle, Wash. It has been reported also from Bremerton, Wash.⁶

⁶ Chamberlin, R. V., Can. Ent., p. 262, August, 1911.

Genus POLYZONIUM Brandt

POLYZONIUM BIVIRGATUM (Wood)

Octoglena bivirgata WOOD, Proc. Phila. Acad. Nat. Sci., p. 186, 1864.

Petaserpes rosalbus COPE, Trans. Amer. Ent. Soc., vol. 3, p. 65, 1870.

Hexaglena cryptocephala McNEILL, Proc. U. S. Nat. Mus., vol. 10, p. 328, 1887.

Polyzonium rosalbum BOLLMAN, and others.

This species has long been called *Polyzonium rosalbum* (Cope) but that it resembled *Octoglena bivirgata* Wood has been known for many years and the likelihood of its being a synonym of *bivirgata* was also considered on the basis of Wood's drawings being poorly made and failing to show the true relation and shape of the head and anterior segments. Since no material has ever been found to prove the distinctness of the two species, it seems best to assume that *rosalbum* is a synonym of *bivirgatum*, which is the older name.



FIG. 4.—POLYZONIUM BIVIRGATUM.
LATERAL MARGINS AND REPUGNATORIAL PORES OF SEGMENTS 4, 5, AND 6

The species has been reported from Georgia, Tennessee, New York, Indiana, and Michigan and may be expected from many other of the Eastern States. A peculiarity of *Polyzonium* is that the repugnatorial secretion has a camphor-like odor, but whether this is true of other members of the family is not known.⁷

Family ANDROGNATHIDAE

The separation of this family from the tropical Platydesmidae is based on the structure of the sterna. The Andrognathidae have the basal joints of the legs almost in contact, but separated by a peculiar fungiform structure, while the Platydesmidae have the legs separated by broad sterna and are without the intercoxal projections.

ANALYTICAL KEY TO GENERA OF ANDROGNATHIDAE

Repugnatorial pores elevated on a short stalk or pedicel; fifth segment with lateral carinae deeply emarginate, bilobed; anal scale absent.---*Andrognathus*.

Pores not elevated on pedicels; fifth segment not different from adjacent segments; anal scale present.

Body very slender, attaining a length more than twenty times the width; number of segments very large, sometimes more than 100; dorsum not tuberculate, evenly convex.-----*Mitocybe*, new genus.

Body broader, less than fifteen times as long as wide; segments less than 70; dorsum tuberculate; lateral carinae longitudinal or depressed.

Body about twelve times as long as broad; loosely jointed, with anterior sub-segments partly exposed; first segment not tuberculate, without lateral

⁷ Cook, O. F. Camphor secreted by an animal, Science, new ser., vol. 12, pp. 516-521, 1900.

carinae, about twice as broad as long, scarcely wider than the head, following segments with lateral carinae rather narrow, nearly horizontal, not tuberculate.-----**Ischnocybe**, new genus.

Body about eight times as long as broad, very compact, the anterior subsegments concealed; first segment with distinct tubercles and lateral carinae, much wider than the head; following segments with lateral carinae broad, sloping slightly, with rows of dorsal tubercles extending to near the lateral margin.-----**Brachygybe**.

Genus ANDROGNATHUS Cope

ANDROGNATHUS CORTICARIUS Cope

Andrognathus corticarius COPE, Proc. Amer. Philos. Soc., p. 182, 1869.

Known from Virginia and Tennessee.

MITOCYBE, new genus

Type.—*Mitocybe auriportae*, a new species from California.

Diagnosis.—From the form and sculpture of the body, the lamination of the segments and the situation of the repugnatorial pores, this genus appears to be closely related to European *Dolistenus*, from which it differs at least in having a distinct preanal scale. The presence of a preanal scale, the location of the pores on the surface of the segments, and the normal formation of segment 5 distinguish *Mitocybe* from its closest American relative, *Andrognathus*.

Description.—Body slender, from fifteen to twenty-five times as long as broad; segments very numerous, in females exceeding 100.

Head cordate, not produced into a pointed snout nor covered by the first segment, turned under the body; antennae short and stout, widely separated at base; eyes lacking.

First segment subreniform, emarginate in front, the angles abruptly rounded and the anterior margin raised; median sulcus absent; surface not tuberculate but covered with fine, erect hairs.

Subsequent segments hirsute, not tuberculate; dorsum evenly convex, the lateral carinae thickened instead of being flattened or depressed; the repugnatorial pores on the caudal angles; sulcus present on all segments from the second to the penultimate.

Last segment hoodlike, rather long and with the apex truncate; no impressed median sulcus.

Anal valves visible beyond the last segment.

Preanal scale present, comparatively large and pilose.

Sterna produced into lobes which separate the coxae.

Legs short and slender, not reaching the sides of the body; coxae twice as thick as the other joints; in addition to the coxal joint there appear to be six other joints.

Males smaller and with fewer segments than the females.

The generic name alludes to the long, attenuate body contrasting with *Brachygybe* and associated genera.

MITOCYBE AURIPORTAE, new species

Segments variable in number, two males have 52 and 64 segments and four females have 80, 84, 108, and 110 segments; the specimens ranging in length from 14 mm. to 44 mm. and in width from 0.8 mm. to 1.6 mm. Dorsum evenly convex without flattened or depressed lateral carinae.

Color creamy white in living animals, suggesting a resemblance to some species of *Siphonophora*.

Head turned back under the body but not covered by the first segment, cordate; the labral region bluntly rounded; vertex slightly inflated on the sides above the base of the antennae; surface pilose, with longer hairs on the sides of the front; antennae short and thick, clavate, pilose; bases remote; joints increasing in thickness to joint 6; joint 2 longest; joint 3 equal in length to joint 7; joint 5 broader than long.

First segment subreniform, slightly emarginate in front; anterior margin raised; angles abruptly rounded; no impressed median line; surface evenly covered with fine, erect hairs.

Following segments with the anterior subdivisions glabrous; with a very fine raised median line from which four or five annual folds bend sharply back and then proceed around the segment, the folds intersected by many fine impressed lines. Posterior subsegments evenly convex; the lateral carinae thickened instead of being flattened or depressed; median sulcus present, broader and deeper in front than behind; surface with fine, erect short hairs rising from minute punctations which give the dorsum a granular appearance, the pubescence more abundant on the lateral carinae. Lateral margins of carinae parallel; front angles abruptly rounded; anterior margin of the subsegment with a broad, shallow emargination between the angles; hind angles rounded on several of the anterior segments, slightly produced backward; more strongly and sharply produced on the last few segments; hind margin of all segments rounded except on the last few segments which are broadly emarginate behind. Repugnatorial pores on the caudal angle of the carinae, surrounded by a narrow margin.

Last segment rather long, hood-like, the hind margin truncate, slightly exceeded by the small inflated and sparsely pilose anal valves; insertion of valves round; preanal scale present, comparatively large, elliptic, sparsely hairy.

Legs short and slender, not attaining the sides of the body; the large produced oval lobe of the sterna separating the coxae; coxal joint twice as thick as the others and with a pore near the end on the inner and posterior face; joint 2 very short and closely applied to the coxa; joint 3 as long as 7; joints 4, 5, and 6 subequal in

length, together longer than the last joint with the claw included; last joint attenuated apically and with a long slender claw.

Type.—Cat. No. 979, U.S.N.M.

Two males and four females of this species were collected on Mount Tamalpais, near San Francisco, Calif., on November 23, 1919, by O. F. Cook and H. F. Loomis. They were found in Spring Valley in thick oak woods, scattered in the stony soil immediately beneath the surface layer of dead leaves. The females appear to have a conspicuously greater number of segments, as both male specimens were mature.

The evenly convex dorsum and thickened sloping carinae are further differences from *Dolistenus* Fanzago, where only the middle of the dorsum is convex and the carinae somewhat concave, with the margins rectangular and somewhat ascending.

According to Fanzago's descriptions and figures of *Dolistenus*,⁸ the body is very slender with narrow, short, strongly carinate segments.



FIG. 5.—MITOCYBE AURIPORTAE. a. GONOPODS, VENTRAL VIEW. b. LEG, POSTERIOR VIEW

Antennae with rather short, thick, rounded joints, the second joint longer and more slender than the others, joints four to six gradually thicker, joint seven very small, surface of segments minutely pilose, with a distinct median suture and a transverse groove; first segment ovoid, without the longitudinal and transverse sulcus and with no trace of carinae. Posterior segments with carinae slightly produced, the last segment swollen and obtuse; legs very short, even in relation to the narrow body; length 23 to 36 mm., number of segments attaining 100.

ISCHNOCYBE, new genus

Type.—*Ischnocybe plicata*, a new species from California.

Diagnosis.—Somewhat intermediate between *Andrognathus* and *Brachycybe*; the body slender and narrow as in *Andrognathus*, but the repugnatorial pores not stalked and the segments with two rows of dorsal tubercles, as in *Brachycybe*.

⁸ Atti, Soc. Veneto. Trentino, vol. 4, p. 62, Oct. 1875.

Description.—Body slender and narrow, twelve times as long as broad, narrowed and rounded at the ends but the sides parallel; surface covered with short hairs.

Head small, broadly triangular-oval in outline; vertex inflated, the sides strongly converging but the labrum rounded or slightly truncate below; antennae inserted at the sides below the middle; vertex prominent, inflated.

Eyes wanting.

Antennae rather slender, distinctly clavate; joint 6 much the largest; joint 5 not greatly exceeding joint 4; joint 7 well developed, about half as long as joint 6, subconic, truncate.

First segment without carinae; much narrower than the second, scarcely wider than the head; surface not tuberculate, a distinct prominence near the posterior corner.

Segments gradually broader from the second to the fifth; carinae of anterior segments turned forward, five to six tubercles in the anterior row, three to four in the posterior; margins of carinae distinctly thickened, more strongly around the pore.

Repugnatorial pores on thickened posterior corners of the carinae; on anterior segments somewhat in front of the corner, on posterior segments directly at the apex of the produced carinae.

Last segment a closed cylinder projecting well beyond the produced corners of the penultimate segment.

Sterna narrow, the coxae nearly in contact; each ventral plate with median process directed obliquely forward, between the coxae of the preceding pair of legs.

Legs rather long and slender, extending somewhat beyond the sides of the body; coxa scarcely thicker than the femur; coxal aperture small, on a slight posterior prominence of the joint.

The generic name alludes to the more slender body with the carinae smaller and the anterior subsegments more exposed than in *Brachycybe*.

ISCHNOCYBE PLICATA, new species

Number of segments attaining 55. Length of largest specimen, 19 mm., width 1.5 mm. Body long and slender, gradually narrowed in front and behind; dorsum rather strongly convex and with depressed and outwardly somewhat upturned lateral carinae longer than in *Brachycybe* but not as broad.

Color a very distinct pink in living specimens but changing to a rather reddish brown when placed in alcohol.

Head completely visible in front of the first segment; pilose; broadly cordate, narrowing abruptly in front to an obtusely angular snout; vertex and front greatly inflated; eyes lacking; antennae placed on the sides of the head below the middle; rather long, exceed-

ing the sides of the body; distinctly clavate; joints from 1 to 6 gradually thickened; joints 2 and 6 longer than the others, subequal; joint 7 less than half as long as 6.

First segment scarcely wider than the head, longer than the following segment; subhexagonal in shape, front margin longer than posterior, both squarely truncate, sides broadly angulate in advance of middle and without any trace of lateral carinae. Immediately behind the front margin and on either side of the middle the segment is very strongly inflated but lacks a true impressed median sulcus; surface pubescent but not tuberculate.

Second segment with strong, forwardly directed lateral carinae; a single transverse series of about six large raised tubercles across the middle.

Following segments have the anterior subsegments conspicuously exposed and widely separating the posterior subsegments so that the lateral carinae are not in as continuous a series as in *Brachycybe*; surface with several annular folds directed backward as they approach the impressed median line; edges of the folds crossed by short, closely placed flutings. Posterior subsegments with two transverse series of 8 to 12 rounded tubercles across the dorsum but not extending to the lateral carinae; between the series of tubercles is a curved furrow, directed backward on either side of middle; carinae of a few of the anterior segments curved forward, thereafter produced laterally and on the last few segments with the posterior angles more greatly produced backward; pores on the middle of the outer edge of the carinae on a few of the anterior segments behind which they are on the posterior angle.

Several segments before the last with the tubercles reduced in size or entirely lacking, with the transverse furrow visible.

Last segment cylindrical, as long as the two preceding segments and extending beyond the caudal angles of the penultimate segment; posterior margin truncate; surface without tubercles, but pubescent and with several long hairs on the margin. Anal valves exceeding the last segment; strongly and evenly inflated and bearing a few stiff hairs in addition to smaller finer ones; margins meeting in a deep groove. Preanal scale present, located in an excision of the last segment; small, rounded in front and truncate behind, the hind margin continuous with that of the last segment; smooth.

Legs extending beyond the sides of the body; coxae closely placed, between them an erect, elongate, mushroomlike prominence with the apex produced forward; the first and second pairs of legs appear to be somewhat reduced in size and slightly crassate.

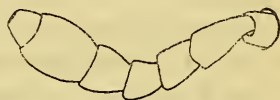


FIG. 6.—*ISCHNOCYBE PLICATA*.
ANTENNA

Type.—Cat. No. 980, U.S.N.M.

Several mature specimens "numerous with young under pile of rotting lumber" collected 14 miles up the north fork of Feather River from Belden, Plumas County, Calif., December 25, 1922, by H. S. Barber.

Genus BRACHYCYBE Wood

This genus has been treated by several writers as a synonym of *Platydesmus*, but not correctly. As pointed out by Pocock in the *Biologia Centrali Americani*, the closely placed coxae and large, erect intercoxal lobes of *Brachycybe* at once distinguish it from the tropical *Platydesmus*.

After Wood's description of *Brachycybe* in 1864, with *lecontei*, an eastern species, as the type, two other species were named from California—*B. rosea*, by Murray in 1877, and *B. (Platydesmus) californicus*, by Karsch in 1880. In 1893 Bollman, comparing specimens of *lecontei* with the descriptions of the two California millipeds, was not able to find that differences existed between any of the three species and so included the latter two as synonyms of *lecontei*.

While Murray's description was extremely short and lacking in details, nevertheless he seemed to imply that his species differed from Wood's in the number of segments, for he said of *rosea* "the segments numerous (in other species 47 in number)," Wood having given 47 segments as the number for *lecontei*. The larger number of segments indicated by Murray for his species seems sufficient to separate the Pacific coast form from the eastern *lecontei*, so that *rosea* may be recognized as a valid species, and a short description is included, from specimens collected by Mr. Barber in Plumas County.

The characters used by Karsch in describing his species are not sufficiently definite for the separation of his species from either *lecontei* or *rosea*, so that *californicus* is placed as a synonym under *rosea*.

BRACHYCYBE LECONTEI Wood

Brachycybe lecontei WOOD, Proc. Phila. Acad. Nat. Sci., p. 187, 1864.

This species is known from Georgia and Tennessee, and Bollman^o reported it from Arkansas.

BRACHYCYBE ROSEA Murray

Brachycybe rosea MURRAY, Econ. Ent. Aptera, p. 21, 1877.

Platydesmys californicus KARSCH, Mitth. Munch. Ent. Ver., p. 144, 1880.

Description.—Number of segments from 62 to 66. Body of the largest specimen examined 23 mm. long and 3 mm. broad.

^o Ent. Amer., vol. 4, p. 1, 1888.

First segment considerably wider than the head; lateral carinae bent forward on either side with the dorsum produced slightly forward into a truncated lobe between the carinae, with six to eight tubercles in an irregular transverse row on either side of the middle, the outermost tubercles extending onto the lateral carinae; behind the lobe are two transverse rows of tubercles as on the segments following.

Segments, except a few at the ends of the body which have the number of tubercles reduced, with from 25 to 35 tubercles in the anterior row and from 18 to 30 in the posterior row which does not extend as near to the lateral margins as the anterior row.

Repugnatorial pores laterally placed on the edges of the carinae, near the middle of the carinae on a few of the anterior segments but almost at the posterior angle of the middle and posterior segments.

Last segment not exceeding the posterior corners of the penultimate segment; dorsal surface not tuberculate but with several small seta-tipped tubercles projecting from the hind margin on either side of the middle.

Anal valves projecting beyond the hind margin of the last segment.

Numerous fragments and several entire but dead specimens were collected by H. S. Barber from beneath bark of an old fir log at the Sunnyside mine, near Seneca, Plumas County, Calif., December 19, 1922.

ADDENDA

Genus GOSODESMUS Chamberlin

This genus was overlooked until the paper was in proof, but is readily distinguished from *Brachycybe* by the presence of two transverse rows of large oval cariniform tubercles forming longitudinal ridges on the dorsal surface of the segments.

The body is described as more slender than in *Brachycybe*, with the pores not stipitate, the lateral carinae horizontal, broadly rounded in front, with narrow thickened margins, straight or slightly sinuate near the middle, bearing minute pores near the rounded posterior corners, the corners somewhat produced on posterior segments, on the penultimate segment nearly attaining the broad apex of the last segment; dorsal tubercles rather widely spaced, the anterior row usually of 10 tubercles the posterior row six to eight, the first segment narrower and scarcely longer than the second, the tubercles rather short and irregular, six in each row. A transverse groove between the rows of tubercles is indicated on the drawing, as well as a median suture. Antennae slightly clavate, joint six much the largest, nearly twice as long as joint five; joint seven distinct, about half as long as joint five. The legs and sterna not described.

The tuberculate segments of *Gosodesmus* suggest the European genus *Fioria* Silvestri,¹⁰ which also has two transverse rows of large tubercles, but not in the form of longitudinal ridges. *Fioria* was described as related to *Dolistenus*, but apparently is closer to *Brachycybe* and *Ischnocybe*. The segments have two transverse rows of large subconic dorsal tubercles, those of each side standing rather close together, and the rows interrupted by a strong median groove. First segment has 8 tubercles, the others 12 tubercles. Antennae with joint six the largest and joint seven unusually large, exceeding joint five, the other joints distinctly smaller. Anterior gonopods three-jointed, the posterior five-jointed. The body is very small, only 7 mm. long by 1 mm. wide, and with only 35 segments.

Chamberlin also refers to *Pseudodesmus* Pocock, from the Malay Peninsula as related to *Gosodesmus*, on account of the large dorsal tubercles, but not in the form of longitudinal ridges. *Fioria* was not with *Andrognathus* and *Brachycybe*. The head is covered by the expanded anterior segment and the body is strongly convex, each segment with a pair of large dorsal processes and large lateral carinae inserted very low, scarcely above the level of the legs. Also *Pseudodesmus* is a relatively large animal, 34 mm. long and 4.5 mm. wide, with 76 segments.

GOSODESMUS CLAREMONTANUS Chamberlin

Gosodesmus claremontanus CHAMBERLIN, Pomona College Journal of Entomology and Zoology, vol. 14, p. 9, with two figures, March, 1922.

The largest specimen measured 13 mm. by 1.2 mm., with 52 segments. The color is described as reddish or pinkish fulvous, paler underneath. The only locality is at Claremont, in southern California.

EXPLANATION OF PLATES

PLATE 1

Ischnocybe plicata, female, dorsal view. $\times 7.5$ times.

Brachycybe rosea, male, dorsal and ventral views. $\times 6.5$ times.

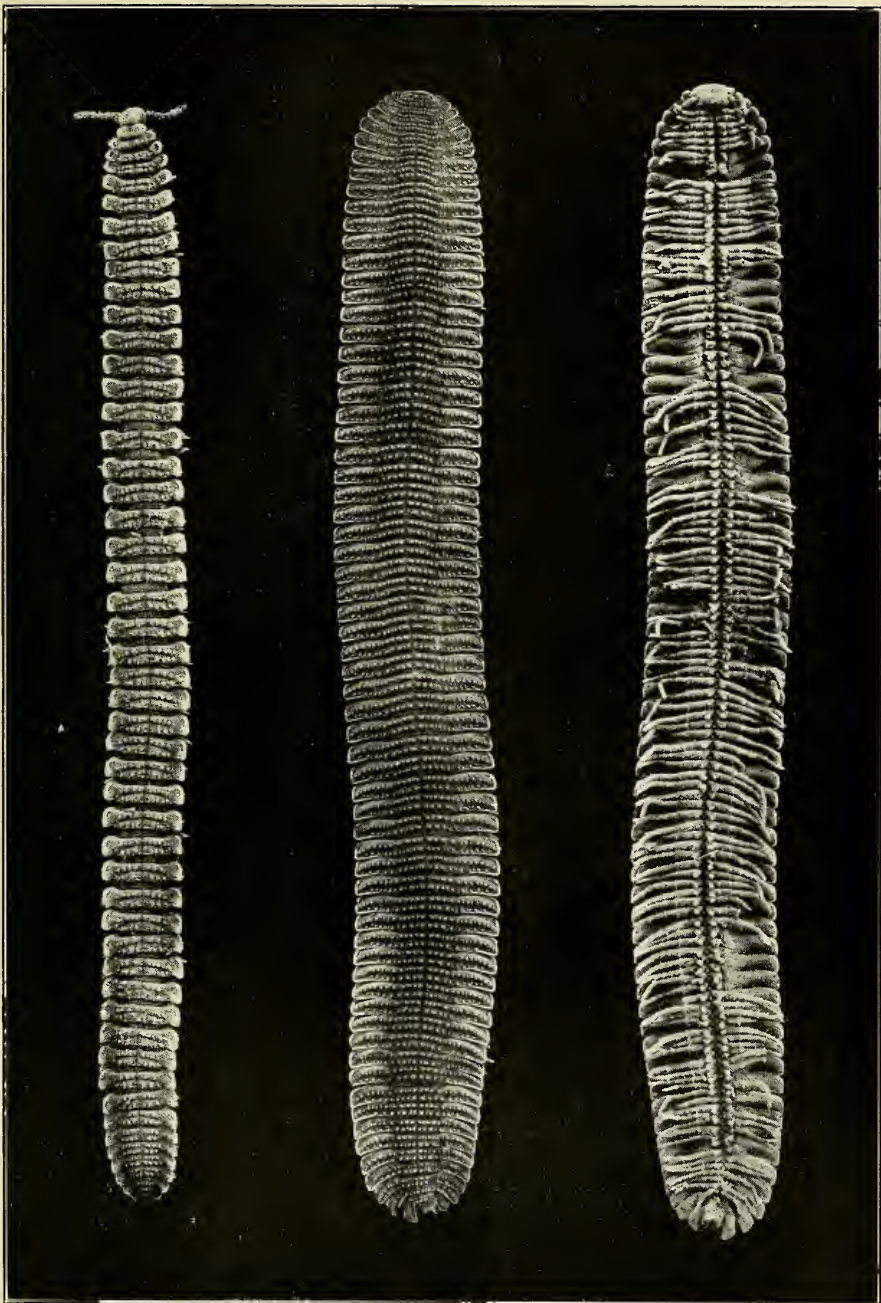
PLATE 2

Bdellozonium cerviculatum, male, dorsal and ventral views.

Siphonaeme lyttoni, male, ventral view; female, dorsal and ventral views. Photographs $\times 10$ times.

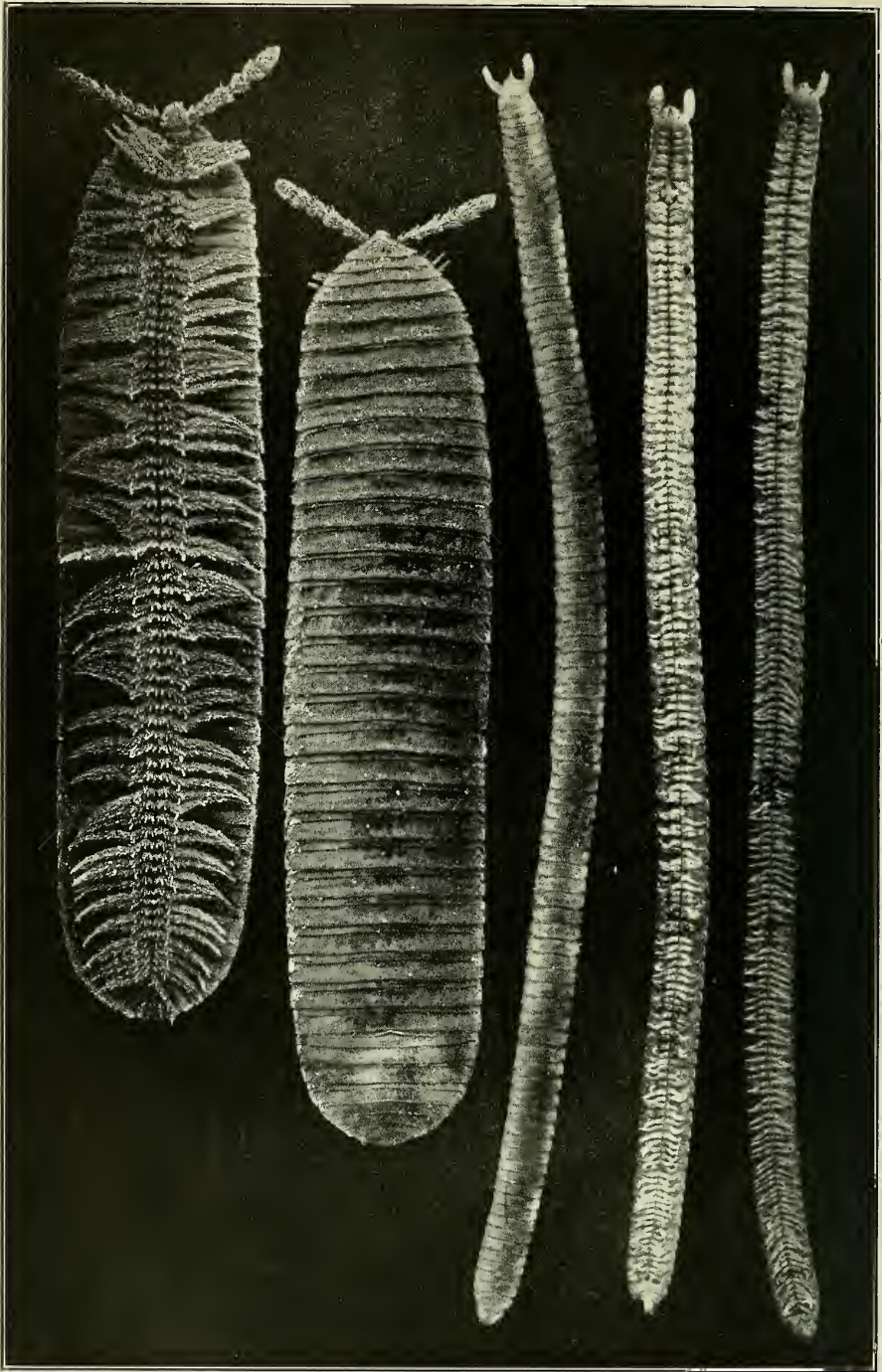
¹⁰ Ann. Mus. Civ. St. Nat. Genova, vol. 38, p. 664, pl. 5, 1898.





ISCHNOCYBE PLICATA AND BRACHYCYBE ROSEA

FOR EXPLANATION OF PLATE SEE PAGE 26



BDELLOZONIUM CERVICULATUM AND SIPHONACME LYTTONI

FOR EXPLANATION OF PLATE SEE PAGE 26