

LIST OF THE NORTH AMERICAN SPECIES OF MYRIAPODS BELONGING TO THE FAMILY OF THE LYSIOPETALIDÆ, WITH A DESCRIPTION OF A BLIND FORM FROM LURAY CAVE, VIRGINIA.

By JOHN A. RYDER.

Without specimens of each of the species identified by the authors who have described them, the writer finds himself quite unable to make a greatly needed revision of this group. The sexual appendages have not been described in *Spirostrephon casioannulatus* Wood, *S. copei* Packard, or ?*S. rudii* and *S. cavernarum* Cope. In the cases of the two last, Professor Cope, who described them in 1869, at first thought that they were provided with two pairs of lateral pores to each segment, and in the belief that *Spirostrephon* had no lateral pores he proposed the genus *Pseudotremia*. He afterwards seemed to agree with Packard that the last-named genus was not valid, and appears to have considered the *P. cavernarum* a *Spirostrephon*, as he adopts the last name as its genus in his paper on the Wyandotte Cave fauna, which he published in the American Naturalist in July, 1872. His principal reasons for this step seem to have been the foregoing, and that the species was not hairy and was furnished with well-developed triangular eye-patches. "The allied form found by Mr. Cooke in the Mammoth Cave has been described by Dr. Packard as *Spirostrephon copei*." And, Professor Cope continues, "It is eyeless, and is, on this account alone, worthy of being distinguished generically from *Spirostrephon*, though the absence of pores, asserted by Dr. Packard, would also constitute another character. *Spirostrephon* possesses a series of lateral pores, as I have pointed out in accordance with Wood's view." At this point Professor Cope refers to a paper by himself in the Proceedings of the American Entomological Society for 1870, where, in a foot-note, he says: "I must correct my character 'no lateral pores' for *Spirostrephon* (Proc. Am. Phil. Soc., 1869, p. 179) to one series of pores." He then proposes the genus *Scoterpes* for Packard's *Spirostrephon copei*. We are accordingly led to believe that he has abandoned the genus *Pseudotremia*. But when we come to learn the character of the external generative organs of the forms described by both Cope and Packard, I would be greatly disappointed if it was not found necessary to separate *S. cavernarum*, ?*S. rudii*, and *S. casioannulatus* Wood from *Spirostrephon* and refer them to another genus. For it is a very singular fact that, out of eight species of *Lysiopetalidæ* which have been described since the *S. lactarius* of Say, none are known to have more than 32 or less than 28 segments, while the type species has no less than 59, according to Wood. I am therefore inclined to believe with Cope that the *S. casioannulatus* is congeneric with *S. cavernarum* and *S. rudii*, for which the name *Pseudotremia* would perhaps become available in case they should be found to be dis-

tinet. Not only do the segments of *S. lactarius* greatly exceed in number those of the curious little Lysiopetalids now under discussion, but the secretion from the *foramina repugnatoria* of the former must be copious, for Say remarks that "when irritated it discharges a lacteous globule from the lateral portion of each segment, diffusing a strong and disagreeable odor". And Cope remarks (Proc. Am. Ent. Soc., 1870, p. 67) that "*Spirostrephon lactarius* exudes from a series of lateral pores a fluid which has in its odor a strong resemblance to creosote". Whether the genus *Scoterpes* is well enough characterized by the absence of eyes may be a matter of opinion; otherwise the form agrees too closely with *Trichopetalum* to warrant us in being certain that it is not closely related. Both *S. (Scoterpes) copei* and the three known species of *Trichopetalum* have no lateral pores, according to their describers, and are therefore probably a pretty closely related group, especially since they closely agree in the number of segments and the arrangement of the hairs or bristles on the back. The figure given by Packard (Am. Naturalist, v, 1871, p. 749) does not enable one to decide if it is male or female, on account of the carelessness of the artist with the first five pairs of legs, though it appears as if it were a female. Moreover, in the figure of the head from the front he contradicts his description on page 748, where he says: "No ocular depression behind the antennæ, the surface of the epicranium being well rounded to the antennal sockets." The figure 130 *a*, on page 749, would fairly represent the front of the head of the species which I shall describe farther on, only that the antennæ are relatively longer in Dr. Packard's species.

Taking a retrospective glance at the genera of American *Lysiopetalidæ*, we find that a single species has furnished the basis for the genus *Spirostrephon*, defined by J. F. Brandt, in 1841, in his *Recueil*. His description is only comparative with other groups of *Julidæ* of equal rank; the family character of the Lysiopetalids (sterna rudimentary, not conjoined with scuta) was used by him to define the genus *Lysiopetalum*. In this way *Spirostrephon* was characterized, mainly with respect to the characters presented by the maxillo-labial elements. Can it be considered safe, in view of the facts before us, to indiscriminately assign species to a genus which has been quietly embraced amongst the ill-defined forms which have been discovered since the family has been founded? To the writer the answer seems to be in the negative. No reference to the characters assigned to the genus or the description of the typical species of *Spirostrephon* has been made by some of the authors of American species of *Lysiopetalidæ*. The present systematic condition of the group is not good, and we are reluctantly forced to admit that it is very little better than a mere list of names. While the intention is not to belittle any one, there has been a very manifest lack of definiteness as well as accuracy and completeness of the descriptions. From the description of *S. cavernarum*, ? *S. vudii*, and *S. copei*, we would be led to infer that the antennæ were 8-jointed, but when we observe Dr. Pack-

ard's figure of the last species (Am. Nat., v, p. 749) we find that there are but seven joints represented, which is in agreement with what we find in *Trichopetalum*, *Zygonopus*, *Craspedosoma*, and *Lysiopetalum*; and in the case of the two first, Professor Cope's virtual assignment of them to *Spirostrephon* makes the number of joints in their antennæ doubtful. *Trichopetalum* Harger, might probably have been more closely defined as to its generic characters, since those given by its author would not define it from *Zygonopus*, and it differs only from *S. (S.) copei* in having eyes, from *Craspedosoma* in having free sterna, though the latter may have free sterna too. Mr. Harger, however, admits the difficulties which beset him, at page 119, in a foot-note (Am. Jour. Sci., iv, 1872).

While examining some living specimens of *Trichopetalum lunatum* under the microscope, about a year since, I observed that the respiration of the animal appeared to be conducted in a most singular manner. The air seemed to be drawn in under the labrum and in some way to enter the dorsal cardiac sinus as bubbles, which could be traced for some distance, more than half the length of the animal, as they traveled slowly backwards, until they disappeared over the opaque mass of ingested food contained in the intestine. These bubbles of air always passed backwards. It may have been that they passed backwards inside of the intestine, but the impression I got was that they were traveling through the cardiac sinus or dorsal heart of the animal. This circumstance may explain why it is that there are no pores on the side of the body, though it is true that the lateral pores of millipeds are usually foramina repugnatoria, and have nothing to do with the trachea or respiratory apparatus. This raises the question whether our *Lysiopetalidae* are not distinguished from other forms in some more important way than has been hitherto supposed.

The species which have been described are the following, though it is to be understood that they are only given as a list for reference; no arrangement is yet possible and none is attempted:

1. SPIROSTREPHON LACTARIUS Say, Wood (Trans. Am. Phil. Soc., n. s., xiii), Art. Myriap. of N. Am., p. 192, with synonymy; Cope, Proc. Am. Phil. Soc., xi, p. 179.

Habitat.—Eastern United States.

2. S. CÆSIOANNULATUS Wood, op. cit., p. 194.

Habitat.—Allegheny County, Pennsylvania.

Length 1 inch.

3. PSEUDOTREMA CAVERNARUM Cope, Proc. Am. Phil. Soc., xi, p. 179, 1869; Cope, Proc. Am. Ent. Soc., iii, p. 67, 1870; Packard, Am. Nat., v, p. 749, 1871.—*Spirostrephon cavernarum* Cope, Am. Nat., vi, p. 414, 1872.—*P. cavernarum* Harger, Am. Jour. Sci., iv, pp. 118, 119, 1872.

Habitat.—Caverns in Virginia and Indiana.

Length 11 lines.

4. *Ps. VUDII* Cope, loc. cit., p. 180; Packard, *Am. Nat.*, v, pp. 748, 749, 1871; Harger, loc. cit., pp. 118, 119.

Habitat.—?Montgomery County, Virginia.

Length 11 lines.

5. *SPIROSTREPHION* (*PSEUDOTREMA*) *COPEI* Packard, *Am. Nat.*, v, pp. 748, 749, 1871.—*Scoterpes copei* Cope, *Am. Nat.*, vi, p. 409, genus *Scoterpes* proposed and defined p. 414; Harger, loc. cit., pp. 118, 119; Packard, *Zoology*, pp. 356, 357.

Habitat.—Mammoth Cave, Kentucky.

Length .35 inch.

TRICHOPETALUM Harger, *Am. Jour. Sci.*, iv, p. 118, pl. ii, 1872.

6. *T. LUNATUM* Harger, loc. cit., p. 119; Ryder, *Am. Nat.*, xiv, p. 376, 1880.

Habitat.—New Haven, Conn., and Philadelphia, Pa.

Length 6^{mm}.

7. *T. GLOMERATUM* Harger, loc. cit., p. 120.

Habitat.—John Day River, Oregon.

Length 10^{mm}.

8. *T. JULOIDES* Harger, loc. cit., p. 120.

Habitat.—Simmons' Harbor, north shore Lake Superior. (Smith.)

Length 8^{mm}.

The ninth American species, described below, is the third form of *Lysiopetalid* which is known to inhabit caves, and the only one beside the species which stands fifth in the above list which is totally blind. I name the species for Dr. C. A. White, United States paleontologist. It is a hairy form, like the four preceding, and will, no doubt, with those constitute a pretty homogeneous group.

ZYGONOPUS,* nov. gen.

Char. gen.—Sixth pair of legs very robust and with the third joint greatly swollen (a unique feature amongst *Myriapods*, and one which, like the claspers and intromittent organ of *Branchipods*, is to be regarded as a secondary sexual character, and of value in the characterization of a genus).

9. *ZYGONOPUS WHITEI*, n. sp.

Char. specif.—Head with short, dense hairs. No eyes, but there is a well-marked depression, or rather vertical excavation, extending from the end of the labrum to behind and above the insertion of the antennæ. Behind the antennæ the head is much swollen, owing to the outwardly bulging basal pieces of the jaws; labrum emarginate inferiorly; epicranium emarginate behind to receive the anterior semicircular margin of the first

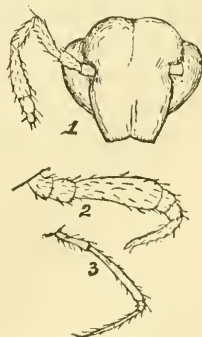


Fig. 1. Front view of head and antennæ.
Fig. 2. Swollen 6th leg or clasper.
Fig. 3. Normal leg.

* From ζυγός, a yoke, pair; γονέ, that which generates; and ποδς, foot (leg).

scutum. Antennæ pilose, rather robust, 7-jointed, 5th longest; next longest in the 3d joint, then the 4th, 2d, 6th, 1st, and 7th, which last is provided with two or three blunt, tactile processes at the tip. Segments 32, including the head; an impressed dorsal line as in *Spirostrephon casioannulatus*. Delicate and numerous impressed lines on the hind margins of the dorsal scutes. Six bristles surmount each scute; two are placed obliquely on each side, and another is closer to the median line on each side; the upper ones on the four penultimate segments are at or near the posterior margin, and are shorter, blunter, and stouter; two of them project backwards from the margin of the preanal scute. Apparently no pores. Forty-seven pairs of legs in ♂, of which 45 are of the normal shape; 1st, 2d, 3d, 4th, and 5th gradually longer; a wide interval between the 5th and 6th pairs, the latter very robust, the 3d joint being much swollen and somewhat flattened inside, with the terminal and basal joints stouter than in the remaining legs; 7th pair weak, but normal; place of copulatory apparatus in the position of the 8th; 9th pair 2-jointed, with basal joint very short, while the 2d is four or five times as long and greatly swollen, looking in shape like a minute melon, and is extended horizontally outwards the same as the similar pair of organs in *Trichopetalum*. Forty-eight pairs of legs in ♀; appendages of 3d segment aborted as usual; sexual openings bounded laterally by rounded elevations. Normal posterior legs slender and pilose. The bristles on the back of the animal are received into basal sockets, and when removed give the appearance of a pore with an elevated rim. A yellowish substance adheres to the hairs in drops or beads in alcoholic specimens, which may be the offensive secretion of the animal which has exuded at the base of the bristles, though there is none of the characteristic odor apparent to the smell. Length of the animal 8.5^{mm}. Color nearly white.

Of the above singular form I have received four specimens, three males and one female, which were sent me by Dr. C. A. White, who obtained them from the owner of Luray Cave, in Virginia, who had collected them in the cavern himself. Some time last summer he sent me specimens which, upon being subjected to a test with acetic acid, proved to be only a calcareous crust which had been deposited over dead specimens lying in the cave. These were collected by himself, and were interesting as showing how pseudomorphs of organic forms might be developed in caverns. The acid, however, dissolved them completely, and no vestige of the organic basis upon which they were molded remained. I at first supposed them to be some form of *Julus*, but could not be certain.

Out of nine related species known to inhabit this country but two are blind, the other being the *Spirostrephon (Scoterpes) copei* Packard, which inhabits Mammoth Cave, Kentucky. Another, which, according to Professor Cope, inhabits Wyandotte Cave, Crawford County, Indiana; Erhart's Cave, Montgomery County; and Spruce Run and Big Stony Creek

Caves, in Giles County, Virginia, curiously enough, is not blind. This is paralleled in the case of two species of spiders, however, which were collected for me in a cave in Oregon, over a year ago, by Professor Cope. In one of them there is not a vestige of the eyes remaining, while in the other they are well developed. A Myriapod, which appears to be a *Julus*, from the same cavern also has eyes. The *Polydesmus caricola* Packard, from a cave in Utah, seems to have well-developed eyes. The *Orchesella ceca*, which still remains to be fully described, has very undeveloped eyes, but differs in no other essential from its congeners. It was also collected in an Oregon cavern by Professor Cope. Multitudes of facts might be added, but the subject is too large a one for hasty generalizations, and must be approached with the same thoroughness of purpose which has characterized the work of Messrs. Darwin and Wallace in their essays upon kindred subjects relating to the origination of species. We may be allowed, however, to add that, in the absence of proof to the contrary, with the increase in the number of known blind forms which are often congeneric with light-loving species, there is the strongest kind of ground for supposing that they have descended from forms which had eyes, and which wandered into these recesses, where, after many generations had lived and died, a blind form appeared, which resulted from the gradual abortion of the visual organs of its ancestors. In proof of this we have the partially blind *Orchesella*, which now seems to be verging towards such a condition. In the absence of a greater number of facts we are not justified in inferring more. True, we have a few instances amongst the mollusks, some of which in their larval states have useful eyes, but which afterwards become useless and abort as the shell develops and gets thicker. Some terrestrial Myriapods are blind, such as *Euryptauropus*; so is *Lumbricus*, the earth-worm, and some of the dirt-abiding *Thysanura*, which also live among fallen leaves, such as *Campodea*, while in the burrowing *Symphyla* (*scolopendrellæ*) the eyes are reduced to a single pair, with little or no red or dark coloring in the tapetum, differing widely in this respect from the compound-eyed, terrestrial Myriapods.

DESCRIPTION OF A NEW SPECIES OF PRIONOTUS (PRIONOTUS STEPHANOPHYRYS), FROM THE COAST OF CALIFORNIA.

By W. N. LOCKINGTON.

Prionotus stephanophrys, sp. nov.

L. lat. 53; D. 10-12; A. 11; P. 12; V. 1-5; C. 3-1-8-1-3.

Body less elongate than in *P. carolinus*, head not quite three and a half; greatest depth five and a third times in total length. Greatest depth under third dorsal ray.

Snout concave in profile; forehead convex immediately in front of eye, from which to the origin of the dorsal fin the profile rises in almost a