

ART. XIV.—*Preliminary Notice of New North American Phyllopoda*; by A. S. PACKARD, Jr., M.D.

THE following brief descriptions are extracted from a monographical notice of our Phyllopod Crustacea, which, with the exception of the Branchipodidæ, so thoroughly investigated by Prof. Verrill, have been sadly neglected. It will be noticed that North America is rich in the species of *Apus*, more so than any other quarter of the globe so far as yet known. It is a little singular that no species has yet occurred east of the Mississippi river. The species of *Limnadiadæ* are probably more abundant than naturalists are aware of, and the attention of collectors of shells is called to these *Cyclas*-like shelled Crustacea, whose shells may not infrequently be mistaken and passed by as simply species of *Cyclas*. For the privilege of studying the species of *Apus* I am indebted to Dr. William Stimpson, who has loaned me the specimens placed on deposit in the Chicago Academy of Sciences by the Smithsonian Institution, and to Prof. A. E. Verrill, who has contributed the specimens in the Yale Museum; while the Museum of Comparative Zoology at Cambridge has contributed a new *Apus* from northern India, and for the *Limnadiads* my acknowledgments are due to Mr. G. W. Belfrage, an industrious collector, and Prof. E. S. Morse, who have given several species to the Peabody Academy of Science.

APODIDÆ.

The known species of *Apus* may be for convenience divided into three sections, characterized in part by the length of the

shield, or carapace, the highest forms having the shortest carapace, those with the longest shields, as the European *Apus cancriformis*, approximating in this and other characters to the genus *Lepidurus*.

Section *a* comprises *Apus longicaudatus*, *Lucasanus*, *Newberryi*, and probably *Domingensis*.

Section *b* comprises *Apus æqualis*, and *Guildingii*.

Section *c* comprises *A. cancriformis* and *Himalayanus*.

Apus longicaudatus Leconte, Ann. N. Y. Lyceum.

Prof. Dana's type specimen, which is now very imperfect, was labelled "Rocky Mountains, near Long's Peak." Four specimens from "Texas, J. H. Clark, No. 3." Three specimens from "pools near Yellowstone river. Dr. Hayden, No. 6." Mus. Chicago Acad. Both sexes occurred, the females having eggs. James's *A. obtusatus* (Long's Expedition) is probably this species. *A. Numidicus* Lucas, from Algeria, in the form of the carapace seems to be allied to *A. longicaudatus*.

Apus Lucasanus, n. sp.—♂ closely allied to *A. longicaudatus*. The frontal doublure rather longer than in *longicaudatus*, and hypostoma a little smaller. Maxillipeds shorter and smaller, and telson longer than in the preceding species, with three median spines above. Anal stylets less spiny.

No. of segments behind posterior edge of shield 33; no. behind the last pair of gills (including telson) 13; length of body (excluding caudal stylets) .94; of carapace along the middle .37; total length of carapace .48; length of tergal carina .24; distance from anterior end of carina to front edge of carapace .16; length of caudal stylets .57; being a little over half the length of body; breadth of shield .40 inch.

Six specimens in a bottle labelled "Kansas, No. 5," and containing thirteen ♀ *A. æqualis*. Mus. Chicago Acad. They cannot be distinguished from St. Lucas specimens.

♀, carapace longer than in ♂, and caudal stylets not so heavily spined. No. of segments behind posterior edge of shield 29; no. behind last pair of feet 11; length of body .80; of carapace along the middle .30; total length of carapace, .40; length of tergal carina .25; distance from front end of carina to front edge of carapace .16 (stylet broken); diameter of egg-sacs .09 inch.

One specimen from "Cape St. Lucas, John Xanthus, No. 4." Mus. Chicago Acad.

Apus Newberryi, n. sp. ♀.—This fine species differs chiefly from *A. longicaudatus* in the shorter maxillipeds, and much longer, smooth telson with 3 instead of 4 median spines, and in the smooth, finely spinulated caudal stylets, while the carapace is longer. No. of segments behind posterior edge of carapace 29; no. beyond last pair of feet 11; length of body 1.78; of

carapace along the middle .75; total length, 1.00; length of tergal carina, .50; distance from front end to front edge of carapace .30; length of caudal stylets, 1.05 inch.

Two specimens from "Utah, J. S. Newberry, No. 1." Mus. Chicago Acad.

A. æqualis, n. sp. ♂.—In this species the carapace is much longer than in the preceding species, the eyes are larger, the tubercle behind them is smaller, and the gills reach much nearer the telson.

No. of segments behind posterior edge of shield 23; no. behind last pair of feet 11; length of body 1.15; of carapace along the middle .56; breadth .56; length of tergal carina .35; distance from front end of carina to front edge of carapace .21; length of caudal stylets .75 inch.

Two specimens from "Matamoras, Mexico, General Couch." Mus. Chicago Acad.

♀. The telson has 5 median spines and is shorter, and the stylets have more numerous and shorter spines than in *A. Newberryi*. The under side of the telson is much smoother than in *A. longicaudatus*, and the outer gill of the 1st maxillipeds is a little longer and more acute. No. of segments beyond the hind edge of carapace 25; no. beyond the last pair of feet 9; length of body 1.07; length of carapace in middle .56; breadth .46; length of carina .33; length from front end of carina to front edge of carapace .23; length of caudal stylets .75; diameter of egg-sac .24 inch.

Thirteen specimens from "Matamoras, General Couch" and "Kansas No. 5," Mus. Chicago Acad., and a specimen from Yale Museum labelled "Plains of Rocky Mts., no. 390."

Apus Guildingii Thompson, Zool. Researches, Jan. 1834, p. 108, belongs to the same section of the genus as *A. æqualis*, but the 4th branch of the 1st maxillipeds is longer than in any other species known to me, being represented as reaching almost to the end of the caudal stylets. St. Vincent, West Indies.

To the third section of the genus belongs the European species *A. cancriformis*, and the following species from North India. They differ from the North American species in the longer carapace, the smaller eyes, and round postorbital tubercle, the less spiny telson, the more hairy caudal stylets, and the larger hypostoma.

A. Himalayanus, n. sp. ♀.—Frontal doublure and hypostoma as in *A. cancriformis*; the first pair of maxillipeds are of about the same length as in *cancriformis*, but the joints are more numerous and smaller, there being 80 joints in the longest branch, while in a specimen of *cancriformis* four times larger, there are 50. The telson is longer than in *cancriformis*, but the number and arrangement of the spines is the same, as is the

under side. The stylets are scarcely as long as the body, while in *cancriformis* they are considerably longer, and the fine spines are a little stouter. No. of segments beyond the hind edge of carapace 19 (in *cancriformis* 19); no. behind last pair of feet 7 (in *cancriformis* 6); length of body 1·00; length of carapace along the middle ·64; length of carina, ·45; distance from end of carina to front edge of carapace ·36; length of caudal stylets ·95; diameter of ovisac ·15 inch, ovisacs situated on the 11th pair of maxillipeds as in all the other species of the genus known to me.

"Collected from a stagnant pool in a jungle four days after a shower of rain had fallen. For five months previous to this rain there had been no rain upon the earth. Himalaya Mountains, North India, near where the Sutlege river debouches into the plains. April, 1870." Mus. Comp. Zoology, Cambridge. Two specimens.

BRANCHIPODIDÆ.

Streptocephalus Texanus, n. sp.—The male differs from *S. similis* Baird, from St. Domingo, to which it is otherwise closely allied, in the longer branch of the inferior antennæ being much longer and slenderer at tip (according to Baird's figure), while the shorter branch is much narrower. In the female the ovisac reaches to the penultimate segment of the abdomen, while according to Baird's figure it scarcely reaches to the end of the 4th segment from the end, and the second antennæ are represented as being much larger than in our species. The male organs arise from the 8th segment from the telson, and the 15th of the body; and are simple, unarmed, slender, cylindrical, very long, and curled around (in alcoholic specimens) so as to touch at their insertion. Total length, male, ·65; length of longer appendage of 2d antennæ ·17 inch; caudal stylets ·13; length of male organs when extended ·13. Female ·55 long, caudal stylet ·11; ovisac ·20 inch. "Waco, Texas. Found in the summer in the same pool as the *Limnadia* was taken. The pool was formed by the summer rain, and as it had passed a considerable time in a dry condition, I suppose this species appears much later, or at least not at the same time as the *Limnadia*." G. W. Belfrage. It also occurred in April, the females having eggs, as did those found in the summer of the year previous.

LIMNADIADÆ.

Limnadia Texana, n. sp.—Eyes double, but with the inner edges contiguous; pyriform tubercle behind them one half as large as the eye-bearing prominence; ·20 segments behind the fore-head, including the telson; 15 pairs of feet. Antennæ with 8 joints on each branch, the 7th and 8th joints subdivided each into two subjoints; the setæ slightly plumose on the basal

joints. Telson with 16 fine teeth, not including the terminal acute spine. Caudal lamellæ long and slender, cultriform; under edge slightly curved, fringed with long hairs, those at the base slightly plumose; the upper edge straight; end blunt. Carapace valves rounded oval, pure white; 5 lines of growth; shells minutely dotted, the markings being coarser at the posterior end of the shell, and about the region of the adductor muscle. Length of shell .27; breadth .16 inch. It is much longer and narrower than *L. Americana* Morse, and with a less number of lines of growth, the latter having 18; in this respect it is much nearer *L. Hermannii* of Europe, though the shell is much narrower. Compared with Baird's figure of *L. antillarum* from San Domingo, to which our species is nearest allied, the shell is more rounded ovate at each end, being somewhat truncated. While the ends of the caudal stylets are said in *L. antillarum* to be "somewhat curved, sharp pointed and slightly serrated on upper edge," the tip in our species is blunt, smooth on the upper edge, and ends in a slight hook. *L. antillarum* is also said to have joints to the rami of the 2d antennæ, and 18 pairs of feet.

One specimen, Waco, Texas. "Quite common in many places in western Texas in the early spring. It occurs in muddy pools made after rains, and totally disappears with the first drying of the pools. As far as I have seen they are only found in the woody bottom lands and always near creeks. It occurred in the same pool as *Streptocephalus*." G. W. Belfrage.

Estheria Belfragei, n. sp.—Rami of the anterior antennæ with 16 joints, 17 pairs of dorsal spines exclusive of those on the telson, which are 15 in number (in *E. Mexicana* they are much more numerous) and the middle one is much larger than those near it. The spines on the telson are fewer in number and larger than Claus represents in *E. Mexicana*; caudal stylets longer and slenderer than in *E. Mexicana*, and the terminal spine is longer and slenderer, judging from Claus' figure.

Carapace valves with the umbones situated at the anterior third of the shell; dorsal edge straight behind the umbones, slightly serrate, bent rather suddenly downward at two-thirds of the distance from the umbones to the posterior end, the end being full and rounded; anterior dorsal edge slopes rapidly from the umbones, and the anterior end is full and convex. Umbones prominent and rather acute, but not oblique. About 24 lines of growth, between which the shell is coarsely punctate; from 5–8 dots (when placed in a straight line) between the lines in the central part of the shell; these punctures are reduced to a single row on the edge. Length .30; breadth .23; thickness .15 inch.

It differs from *E. Mexicana* Claus (Grube's figure) from Zimapan, Mexico, in the umbones being much more prominent; in

the prominent angle of the dorsal posterior edge, while there are half as many lines of growth. From *E. Dunkeri* Baird, also from Zimapan, it differs in the less numerous lines of growth; in the smaller, less tumid umbones, and the more marked angle of the posterior part of the dorsal edge. The punctures between the lines of growth are much more numerous in *Dunkeri*. Six specimens. Waco, Texas, April, G. W. Belfrage.

Estheria Morsei, n. sp.—Shell intermediate in form between *E. Caldwelli* Baird, from Lake Winnepeg and *E. Dunkeri* Baird, from Zimapan, Mexico; shell much swollen, oblong oval, of a pale horn color; umbones large, prominent, larger than in *E. Caldwelli*, and much less oblique and situated nearer the anterior end of the shell. Dorsal margin shorter than in *E. Caldwelli*, and in front of the umbones, instead of being straight and suddenly curved downward, is regularly rounded as in *E. Dunkeri*. Behind the umbones the shell is narrower than either in *Caldwelli* or *Dunkeri*; the dorsal edge sloping rapidly downward, without the well marked angle of *Caldwelli*, or the continuous, full curve of *Dunkeri*. Coarse punctures between the ribs, rather coarser than in *Caldwelli*, there being on an average 5–10 between the ribs in the center of the valve. Length .50; breadth .33; thickness .24 inch. Six specimens from Dubuque, Iowa, collected by Rev. A. B. Kendig. Dedicated to Prof. E. S. Morse, who has indicated to me that the species was undescribed.

Lymnetis gracilicornis, n. sp.—This interesting form may at once be known from *L. Gouldii* Baird, recently found by Mr. E. Burgess in Cambridge, Mass., by the long slender 2d antennæ which have about 20 joints, and are much longer than in that species. The keel on the front of the head does not reach to the front edge, while in *Gouldii* it does. Shell of the same form but much larger than in *Gouldii*. Length of shell .17, breadth .16 inch.

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