ON THREE EXTINCT ASTACI FROM THE FRESH-WATER TERRITORY OF IDAHO. By Prof. E. D. Cope.

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Astacus subgrundialis, Cope.

This craw-fish is represented by four specimens, which include the cephalothorax and region of the front, one of them including, also, the post-abdomen to the end, with limbs; three specimens with cheles, one including a pair; and one other specimen representing the post-abdomen.

The prominent characters of the species may be stated diagnostically thus: Two tubercles on each side the front, the anterior spiniform and external to the basis of the lateral ridge of the ensiform process. The latter narrow, medially grooved, acute, with five spinous points on each side, and a terminal recurved spinelet. Surface of the cephalothorax smooth or obsoletely wrinkled. Cheles nearly smooth, not granulate, the superior edge spiniferous. Margins of the segments of postabdomen produced into acuminate plates.

I cannot determine the presence or absence of hooks on any of the legs. The cheles are badly preserved in specimens of this species.

The last segment of the cheles is furnished with a longitudinal series of strong reverted spines along the superior margin. They diminish in length proximally; four or five are most prominent. In a specimen much smaller than the type, where the surface is preserved, it is nearly smooth, and minutely striate. The longitudinal groove of the penultimate joint is well marked; this segment is not spiniferous.

The antennal plates are large, and extend to nearly opposite the end of the ensiform process at the front. The free abdominal segment is punctate on its anterior half. The outer lamina of the postabdominal segment is four times as wide as that of the others, with convex outline to a point directed outwards and backwards. The laminæ of the other segments are acuminate triangular and transverse.

The transverse suture of the external lamina of the flipper, marks the posterior fourth of the whole length of the lamina.

The lateral suture of the cephalothorax is deeply impressed.

Four of the specimens represent individuals of large size: two are smaller. The measurements are as follows:

	M
Length to dorsal suture, No. 1	0.0415
" of ensiform process only	.0182
Width " " at base	.005
Length postabdominal and flipper	.072
" (width) free lamina 1st segment	.013
" outer lamina flipper	.02
" terminal segment flipper	.005
" femur, second pair abdominal legs	.024
" dorsum No. 2 from basal spine to suture	.021

Width basis fixed claw of cheles..... .009
Length penultimate joint cheles, No. 3..... .0175
Width distal end of same..... .0115

In the small specimen (No. 2) it appears to be the inferior margin of the cheles which is spiniferous. The mesonotum is exposed, and is of moderate width.

From a fresh water deposit in the Teritory of Idaho, near Hot Spring Mountain. Obtained by Capt. Clarence King's expedition. Museum Smithonian, No. 9779.

ASTACUS CHENODERMA, Cope, sp. nov.

This species is represented by the cheles of opposite sides of one individual, with which I associate with great probability one from the right side of a second. Part of a cephalothorax of a third is associated, but without conclusive evidence of identity, chiefly because of a near resemblance in the sculpture.

The first mentioned are remakable for their long slender form, and the absence of all spinous armature from their margins. The surface of all parts is covered with thickly placed granular tubercles. The external surface is regularly convex on the middle line, the inner convex on the lower portion, the convexity separated from the lower margin by a groove. Upper portion gradually thinned out to the edge. The edges are simply rugose like the sides, though more coarsely so, with small granular prominences. The denticulation of the opposed edges of this joint are insignificant, though but a small part of the latter is cleared from the matrix.

In the second specimen part of the penultimate segment is preserved. Its inferior margin is unarmed, but on the middle of the outer face is a series of short spines rather distantly placed.

In the third, represented by a cephalothorax, the dorsal suture is regularly convex backwards, and the mesonotum of moderate width. The surface is delicately wrinkled by the confluent bases of fine pointed granules directed forwards. They become more scattered on the sides of the cephalothorax. As in the last species there are two spines on each side the front.

	M.
Length from anterior spine to middle of cross suture	0.0235
Width between posterior spines	.0105
" mesonotum .25 inch from front	.007
Length of last segment of cheles (No. 1)	.045
Width basal part	.0173
" terminal at middle	.006

From Catharine's creek, Idaho; collected for Capt. Clarence King by J. C. Schenk. No. 9779, Museum Smithonian.

ASTACUS BREVIFORCEPS, Cope.

Species nova.

Established primarily on three cheles or last segments of the fore limbs; with these I have associated a cephalothorax of one, and abdominal and

postabdominal regions of three individuals. The only reason for such reference of the latter, is their superficial texture, in which they resemble the cheles, and differ from the corresponding parts in the two other species.

The cheles are short and thick, the section of the stoutest proximal part being an oblique oval. The inferior edge is thinned by longitudinal contraction above and below it. The fixed process is of a rather short conic form. The surface is granular tuberculate, except on the convex faces, where it is finely vermiculate rugose.

	M.
Length last segment cheles,	0.039
Width	021
Proximal transverse diameter	.013

The cephalothorax associated is quite similar to that of *A. subgrundialis*, and may possibly belong to it. It however, differs in the finely vermiculate rugose character of its surface. The rugæ are generally transverse on the back and sides. The supra-anteunal lamina is exhibited in a clear manner; it is as long as the spine of the muzzle, and as wide at the base.

The superior surfaces of the abdominal segments are marked with a delicate vermiculate rugosity, like that of the last specimens. In *A. subgrundialis*, it is impressed punctate. This species also differs from the latter in that the transverse marginal lamina of the first postabdominal segment, is narrower than in the latter, its width not equaling twice that of one of the others, instead of being four times as wide. The succeeding laminæ are acuminate elongate, and slightly curved forward. It is, however, quite uncertain as to whether these postabdominal specimens belong to the species which has the stout cheles. Some of the specimens indicate individuals larger than those referred to *A. subgrundialis*.

From the same locality and collection as the last. No. 9779.

General remarks.

The preceding species differ from those at present inhabiting North America, as I have been able to determine by examining the excellent monograph of the latter, published in the catalogue of the Museum. Compar. Zoology, by Dr. J. H. Hagen. They differ from all of them in the prominence and acumination of the lateral margins of the postabdominal segments. In the serrate simple frontal process, the first described resembles the *Astacus gambelii* Girard, but its process is longer and narrower.

I have already described * twelve species of fishes from the same locality and deposit, whence these Astaci were procured.

* Proceed. Amer. Philos. Soc. 1870, December 8.