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for every organ of the mandibulate mouth ; it requires no change of function for any organ ; the galea as a "scraping and tearing" organ being maxillary in its character, not labial ; the development required is simply a further development of the line started in the Hymenoptera, of which Cresson says : "mouth mandibulate, and with a lower lip or tongue,\* *sheathed by the maxillæ*;" it requires no further segmentation of any structure ; it does not require the total loss of any part at *all* points of the series, nor does it anywhere require any unusual development or change from a sensory to a functional organ ; finally, it does not require any change in relative position of the parts.

I have not the least doubt that the series presented by me could be rendered much more conclusive ; but I am hampered by a lack of material, only the few species which I collected as I ran across them during the past season being at hand to draw from.

If my explanations are correct, some changes must be made in the nomenclature of the mouth parts in the Hemiptera as well.

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#### SOME NOTES ON *ARÆOSCHIZUS*.

BY GEO. H. HORN, M.D.

Since my Revision of the family Tenebrionidæ in 1870, very little has been done beyond the description of new genera and species which have been discovered. All the species of the genus now under consideration have been rare in collections with the exception of *sulcicollis*, which was found by me in considerable number, and distributed liberally, thereby making the genus known in collections. In the meantime other collectors have, from time to time, found small numbers of one or other species, so that at the present time quite good series of all the species have accumulated in my boxes.

The species are all quite small, somewhat ant-like in form, but more depressed, and very sluggish in their movements. Their color is some shade of brown, the surface without lustre. The elytra are elongate-oval, the humeri rounded, the curve descending from the peduncle of the body. The surface of the elytra is costate, there being four elevated costæ on each side, excluding the sutural, of which the first and third are nearly entire, the others shorter. Between these costæ are two rows of coarse and deep punctures, never

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\* The italics are mine. The enveloping "maxillæ" are the galea.

so closely placed as to be crowded, but so large that those of one row alternate with the other, the surface between the rows is smooth and glabrous. The summits of the costæ have a single row of scale-like hairs, yellowish in color, usually flatly recumbent, sometimes quite erect.

In about an equal number of species (rarer and but little known in collections) the costæ are less elevated, the punctures of the rows smaller and separated by a finer costa, which bears at its summit a row of scale-like hairs similar to that of the principal costa. This sculpture give the appearance of seven finely elevated costæ in place of four.

One species has the anterior and middle femora toothed at middle, in all the others the femora are simple.

The head varies in form in all the species, the most broadly in *regularis*, narrowest in *sulcicollis*, and most abruptly constricted in *armatus*.

Based on the above observations the following table is presented as a more satisfactory arrangement of the species.

Elytra with four discal costæ, the interspaces coarsely biserially punctate.....2.  
Elytra with seven less elevated costæ, the interspaces with a single row of punctures.....3.

2.--Scales at summit of costæ and at margin of thorax short, inconspicuous, recumbent.

Thorax sulcate or longitudinally impressed at middle.

Head regularly oval, but little longer than wide, sides arcuate, hind angles broadly rounded.....**regularis**.

Head elongate-oval, longer than wide, sides nearly straight, oblique and convergent, at base rather abruptly narrowed to the neck.

**sulcicollis**.

Thorax convex, at most slight impression at middle of base; head oblong oval, sides arcuate and near the base arcuately narrowing to the neck.....**simplex**.

Scales at summit of costæ and margin of thorax long, on the costæ erect.

Thorax with very well marked median sulcus, limited each side by a row of erect scales; head oval, but little longer than wide, sides arcuate, rather abruptly narrowed to a neck at base.....**umbriatus**.

3. --Femora unarmed.

Thorax narrow, evidently longer than wide, and slightly narrower than the head, the disc not sulcate; head oval, sides arcuately narrowing from the base of the antennæ; humeri of elytra very obliquely rounded, the hairs at the summits of the costæ short, bristle-like and nearly erect.....**costipennis**.

Thorax very little longer than wide, as wide as the head, the disc vaguely sulcate; head rather broadly oval, sides regularly arcuate and broadly rounded at the hind angles; elytral humeri rounded, not oblique, the costæ with short scale-like, recumbent hairs.

**decipiens**.

Anterior and middle femora armed in front of middle with a small tooth.

Thorax as wide as long, vaguely sulcate at middle; head longer than wide, sides nearly straight, slightly convergent posteriorly and at base very abruptly narrowed to a neck; elytral humeri obtusely rounded, the costæ with short, recumbent, scale-like hairs..... *armatus*.

The characters given in the table are so full as to make any detailed descriptions of the species almost unnecessary, therefore only such remarks will be made as seem useful to supplement those already given.

**A. regularis** Horn, Trans. Amer. Philos. Soc. xiv, 1870, p. 274.

The thorax is longer than wide, sides arcuate in front, then obliquely convergent to base with a slight sinuation, the median sulcus rather feeble. The hairs at the summits of the costæ are short, semi-erect and inconspicuous. The propleuræ are coarsely, not closely punctate. Length 4.5–5 mm.; .18–.20 inch.

Collected by me originally at Fort Grant, and more recently by H. F. Wickham, at Tucson, about sixty miles further south, in Arizona.

**A. sulcicollis** Horn, Trans. Amer. Philos. Soc. xiv, 1870, p. 274.

The thorax is decidedly longer than wide, strongly arcuate in front, obliquely narrowed with a distinct sinuation toward the base, the median sulcus very well marked. The elytral humeri are somewhat obliquely rounded, the hairs at the summits of the costæ short, inconspicuous and scale-like. Propleuræ sparsely coarsely punctate. Length 4 mm.; .16 inch.

Occurs in Owen's Valley, California. I have not seen any other specimens than those collected by myself in that region.

**A. simplex** Cas.\*—Brownish, head, thorax and legs sparsely clothed with yellowish, recumbent, scale-like hairs; head oval, longer than wide, widest between the antennæ, thence gradually arcuately narrowed to the neck; thorax longer than wide, slightly narrower than the head, sides arcuate in anterior third, then obliquely narrowed with a feeble sinuation to base, disc convex with a depression at middle of base; elytra elongate-oval, equally narrowed at apex and base, the humeri obliquely rounded, disc quadricostate, the intervals coarsely, biserially punctate, the costæ with recumbent scales at summit; propleuræ sparsely punctate. Length 3–4 mm.; .12–.16 inch.

This species might readily be mistaken for *costipennis*, but the intervals have not the elevated line between the costæ as in that spe-

\* Just as the proof sheets of these pages came to hand a pamphlet extract from the *Annals of the N. Y. Acad. Sc.* vol. v, was received from Capt. Casey, in which the two species were found described on p. 369. I have therefore changed the names given and allowed the descriptions to remain.

cies. Exterior to the outer costa there are three series of punctures, two coarser which belong to the interval proper and a finer row on the epipleuron.

Occurs in southwestern Texas, locality unknown.

**A. fimbriatus** Cas.\*—Brown, elytra paler; antennæ apparently stouter than normal, clothed with rather long, scale-like hairs; head oval, longer than wide, sides arcuately narrowing from the base of the antennæ, rather abruptly constricted at the neck, sparsely clothed with yellowish scales; thorax but little longer than wide, sides arcuate, near the base sinuate, disc sulcate at middle, the groove limited each side by a row of erect scale-like hairs, margin of thorax similarly fimbriate; elytra elongate-oval, equally narrowed at apex and base, humeri obliquely rounded, disc quadricostate, the costæ at summit with erect, scale-like hairs, curved at tip, intervals coarsely biserially punctate; propleuræ rugulose, coarsely and closely punctate; legs sparsely scaly, femora mutic. Length 4 mm.; .16 inch.

This species resembles *sulcicollis*, but the thoracic groove is much better marked and limited. The sides of the head are arcuate and not straight and oblique. The scale-like hairs are here much more conspicuous than in any other species known to me, especially as the margin of the thorax, the summits of the costæ and on the antennæ.

Collected by Mr. H. F. Wickham, near Tucson, Arizona.

**A. costipennis** Lec., Amer. Lyc. v, p. 138.

In this species the sides of the thorax are very feebly arcuate, obliquely narrowed from the anterior third to base, the disc convex, with a slight impression at middle of the base. The elytra are narrowly oval, equally narrow at either extremity, the humeri very obliquely rounded, the disc has the usual four costæ, the double row of punctures between them, these separated by a less elevated ridge, the costæ and ridges at their summits have short, erect, bristle-like hairs not closely placed. Propleuræ rather sparsely punctate and shining. Length 3-4 mm.; .12-.16 inch.

The resemblance between this species and *simplex* have already been alluded to.

Occurs at Vallecito, Cal. (LeConte), Fort Grant, Tucson, Ariz. (Wickham), and Fort Cummings, N. Mex. The last named specimen has the hairs of the costæ more scale-like and less erect, and may be a distinct species.

**A. decipiens** n. sp.—Brown, opaque; head, thorax and legs sparsely clothed with short yellowish scales; head broadly oval, scarcely longer than wide, sides arcuate, the hind angles broadly rounded; thorax a little longer than

\* See foot-note on page 341.

wide, sides arcuate in front, thence oblique and straight to base, disc convex, a slight impression at middle of base; elytra oblong oval, humeri obtusely rounded, the disc with seven nearly equally elevated costæ, the intervals with a single series of coarse punctures, the summits of the costæ with small, recumbent scales; propleuræ coarsely, sparsely punctate, somewhat rugose in front. Length 4 mm.; .16 inch.

This species has a deceptive resemblance to *regularis* in form and color, but differs in the absence of the thoracic groove and the greater number of elytral ridges. In this species and the next there is but little difference between the costæ in their elevation.

Collected in southern Arizona by Morrison.

**A. armatus** Horn, Trans. Amer. Philos. Soc. xiv, 1870, p. 275.

The head is longer than wide, the sides straight and narrowed from the base of the antennæ, at base abruptly narrowed to the neck. Thorax about as wide as long, sides arcuate in front, then obliquely narrowed to base, disc convex, with a vague median sulcus. Elytra oblong oval, humeri broadly rounded, disc with seven elevated lines, the intervals with a single series of coarse punctures, the summits of the ridges with short, semi-erect, scale-like hairs. Propleuræ coarsely, rather closely punctate and rugose. Anterior and middle femora toothed in front of middle. Length 3.5-4 mm.; .14-.16 inch.

Resembles the preceding in appearance, but easily known from all the other species by the dentate femora.

One specimen, Owen's Valley, Cal., Green River, Wyo., Wickham. Mr. Wickham observed these associated with ants in the same manner that I had noticed *sulcicollis*; this is, however, merely an accident of habitat, as *Aræoschizus* is neither parasitic nor inquiline.