

## FOSSIL ORTHOPTERA FROM THE ROCKY MOUNTAIN TERTIARIES.

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*Homœogamia ventriosus*.—The remains upon which this species is based consist of the apical portion of the ventral surface of a cockroach's abdomen found by Mr. T. L. Mead at Castello's ranch, South Park, Colorado. Five segments are seen in natural juxtaposition, showing that the apical portion of the abdomen was very regularly rounded, almost exactly semicircular; the terminal segment presenting no break in the regular continuity of the curve. This segment was ample, broader than long, and probably neither very tumid nor greatly keeled; for in the present perfectly flattened condition of the fossil there is neither break nor folding of the integument; the two segments following this are very strongly arched (the penultimate being semicircular) and greatly contracted at the middle, so that this portion is ~~not~~ <sup>much</sup> less than half as long as the lateral parts; the anterior border of the antepenultimate segment is straight along the middle; the segment anterior to this is also arched, though not strongly, is oppositely sinuate (as are, to a less extent, the segments posterior to it), and also much contracted in the middle, so as to be less than half as long as at the sides; while its predecessor is slightly arcuate in the opposite direction (probably exactly transverse in life), and equal or subequal throughout. All the segments are uniformly, rather abundantly, and very delicately granulate throughout. There is no trace of cerci, but the place where they should occur is too broken to assert that they did not exist externally; still the conformation of this region would lead one to suppose that they must have been excessively minute, and perhaps altogether concealed within the segments, as in *Cryptocercus* Scudd.

Length of fragment, 8<sup>mm</sup>; width of same, 12.25<sup>mm</sup>; length of terminal segment, 3.6<sup>mm</sup>; width of same, 6.3<sup>mm</sup>; length of antepenultimate segment in the middle, 0.6<sup>mm</sup>; at the sides, 1.85<sup>mm</sup>.

I have referred this species to *Homœogamia* with some doubt; on some accounts, it would seem to be more nearly allied to *Polyphaga*, but, as the specimen is too fragmentary to allow of more exact determination, I have preferred to place it in the New World genus, rather than in its close ally, which is restricted to the Old World; possibly it should be referred to neither, but to a new group.

A great many fossil cockroaches have been found, mostly in the Carboniferous formation. Nearly all are described from tegmina. Only a few species have been discovered in the Tertiaries; and one of these, found in Parschlug in Steiermark, has been referred by Heer\* to *Heterogamia*, a name used to include both *Polyphaga* and *Homœogamia*.

*Labidura tertiaria*.—A single fairly-preserved specimen (No. 1725) was found near Castello's ranch, South Park, Colorado, by Mr. Jesse Randall, and brought home by the United States Geological Survey of the Territories. The specimen is a female, as shown by the number of the abdominal segments. The head, which is badly preserved, is of about equal length and breadth behind the labrum, so that as a whole it is

\*Heer, Insekt.Fauna Oening. ii, 1, pl. 1, fig. 1.

er than broad, but it is slightly narrower than the pronotum, and has large eyes, reaching back nearly to the hind border—characters which are scarcely in keeping with the reference of the insect to *Labi-dura*; with no other genus, however, does it accord so well. The antennæ are too fragmentary to furnish us any clue to their structure, and of the mouth-parts nothing can be determined. The pronotum is of about equal length and breadth, quadrate, the anterior angles bluntly rounded, the posterior border very broadly convex, the margin nowhere elevated; there is a slight but distinct median sulcation, fading posteriorly. The rest of the thorax is of the same width as the pronotum; the tegmina are twice as long as the pronotum, squarely docked at the tip; the folded wings reach more than half as far again beyond the tip of the tegmina, and, in the specimen examined, are partially opened on the right side, so as to show incompletely the peculiar rayed arrangement of the nervules. The legs are short, the femora broadest in the middle, the tibiæ moderately slender and slightly bowed; but the tarsal joints are too obscure to determine their structure; the faintness of the legs probably shows that they were paler than the body, which is of a griseous brown. The joint of the abdomen can readily be distinguished, although a portion of some of them are injured, and especially of the third segment; this renders it impossible to decide certainly whether plications were present on this segment; but there are no signs of any, either on this or on the better-preserved second segment; it would seem as if such plications should be seen, if present, at least on the second segment; for the abdomen is preserved on a partial side-view, and the portion of the second segment where plications are to be looked for is perfectly preserved. The abdomen appears to have been equal as viewed from above, although the greater fullness in depth of the middle joints gives the specimen preserved on a partial side-view a great height in the middle; the last segment is large, scarcely narrowing, and furnished with a pair of stout, straight, tapering, bluntly-pointed forceps as viewed from the side, not so long as the tegmina, and apparently curved inward at the tip. The insect is slightly smaller than the common *L. riparia* (Pall.) Dohrn.

Entire length of specimen, 19.5<sup>mm</sup>; length of head, 2.2<sup>mm</sup>; breadth of same, 1.75<sup>mm</sup>; length of pronotum, 1.9<sup>mm</sup>; breadth of same, 2<sup>mm</sup>; length of tegmina, 3.6<sup>mm</sup>; extent of folded wings beyond tegmina, 2.5<sup>mm</sup>; length of hind femora, 2.75<sup>mm</sup>; of hind tibiæ, 1.75<sup>mm</sup>; of forceps, 2.5<sup>mm</sup>.

Fossil earwigs are not unknown, but have been imperfectly studied. Heer gives woodcuts of two, *Forficula recta*, which he compares with *Forcinella annulipes* (Luc.) Dohrn, and *F. primigenia*, compared with the common earwig, i. e., *Forf. auricularia* Linn.; he also mentions a third, *F. minuta*, compared with *Labia minor* (Linn.) Leach. These all come from the Miocene of Oeningen.\* Long ago, Serres spoke of a species allied to *Forficula parallela* Fabr. and *F. auricularia* Linn. (both the same species), of which many specimens had been found at Aix in Provence.† Perhaps Mr. Onstalet, in his forthcoming memoirs on the fossil insects of Southern France, will acquaint us more perfectly with this insect; but I saw no specimens of *Forficularia* in his hands in 1873. One or two species are also reported from Prussian amber. Burmeister says that the Berlin Museum possesses a specimen "having short filiform antennæ, composed at most of sixteen joints, gradually increasing

in size, and a short, straight ovipositor [forceps]. It is of the size of *Forficula minor*, but is still a larva."\* And Germar writes that, up to 1856, but a single specimen of an earwig had been found in amber, a larva, agreeing so completely with the full-grown larva of *Forf. auricularia* that description and illustration are superfluous.† The full-grown larva of *F. auricularia*, however, has but fourteen, and even the perfect insect but fourteen or fifteen, joints in its antennæ; and the forceps are neither short nor straight, but nearly as long as the abdomen, and incurved at the tip. It would seem probable, therefore, that these authors were writing of different insects, and that Germar overlooked Burmeister's statement. Gravenhorst, also, is said to refer to a German species from amber; but I have not yet been able to examine the reference to it. Finally, Massalongo describes and figures‡ a species from the Tertiaries of Monte Bolca, which he calls *Forficula bolcænsis*, and which again he compares to *F. auricularia* Linn. This species, which in point of fact is much nearer *F. albipennis* Muehlf. than *F. auricularia*, is even more perfect than ours, and seems to be a true *Forficula*. The same may probably be said of Heer's species, or at least of the two which are figured (none are described); but in these cases we have only a few abdominal joints and the forceps from which to draw any conclusion. It is by no means improbable that the two insects figured by Heer are different sexes of the same species.

\* Burmeister, Handb. of Entom., Engl. trans., 579.

† Berendt, Org. Reste in Bernstein, ii, i, 33.

‡ Massalongo, Stud. Pal., 15-16, pl. 1, figs. 5-7.

\* Heer, Urwelt der Schweiz, 367, figs. 226-227.

† Serres, Géognosie des terrains tertiaires, 225.