

sions, the following conclusions may be reached. During pre-glacial time a system of valleys was here developed—valleys which had reached maturity. This maturity was more marked in and near the master valleys but became less and less strong as one pushed back up the little valleys. Many of the latter, especially south of the large east and west valley, gradually widened northward showing that the line of headwater divides must have lain near but south of this large valley.

The advancing ice would move more easily into the broad, mature valleys and into those lying more nearly in the direction of ice movement. The ice pushed in from the north, as it came into rougher and rougher topography it broke up into tongue-like dependencies,\* which extended into the valleys. While the ends of the tongues were fairly stationary, melting freed rock waste which accumulated in moraines. Any stream flowing toward the advancing ice would of necessity find its course closed during the ice advance by ice and moraine. The water, augmented by the melting of the ice, would accumulate in a lake between the advancing ice on the north, the valley walls on the sides and the divides on the south. Its outlet would be over the lowest places, whether of moraine or rock, whether in valleys or over low cols between ridges at the very heads of the streams. Thus was begun the discharge of water over the divides. As the ice continued to advance it crossed one of the divides and may have lowered it some by ice erosion, but this if done, is not very apparent.

While the ice front lay along the large east and west valley studied, it built masses of moraine in the valley and water rose in the tributary valley leading southward from Loudonville until it was pushed over the divide at Spellacy. When the ice withdrew, it became more markedly a series of valley dependencies, and the water accumulated in front of their noses until it went over the col in Muddy Fork northwest of Lakeville, but because of ice obstructions it could not go along the large valley leading to Big Prairie. Thus was started the stream over the divides between the narrow valleys and not along the earlier mature valleys.

Once started it was easier for the stream, when the ice withdrew, to maintain its course over the divides than to seek its old routes. Hence the cutting down continued and the little narrows were finally cut to present dimensions. The cutting down of the divide gave all side streams near the divide a chance to deepen their courses near their mouths which they proceeded

\*Carney, F. (Jour. Geol. XV, 1907 pp. 488 ff.) very happily applies this term to peripheral protuberances, which extended from the great ice sheet into preglacial rock valleys.

to do. Thus the theory seems to explain and incorporate every observed fact and not to be out of harmony with the general conditions of the vicinity.

Since drift of Wisconsin age lies in the smaller valleys and since the observed stream erosion, accomplished subsequent to the diversions, is so great, it is believed that the original diversion must have occurred in connection with some pre-Wisconsin ice invasion probably the earliest to come to this region.

### DESCRIPTIONS OF NEW MALLOPHAGA. III.

E. P. DURRANT.

#### 6. *Menopon colaptis*, nov. sp. Fig. 1, H.

Description of female. Body, length 1.82 mm., width .74 mm.; of pale golden-brown color, with darker and narrow transverse abdominal bands, many of the specimens, however, showing a reddish tinge.

Head, length .27 mm., width .58 mm.; forehead broadly rounded with temples projecting; on front of head near lateral margins, arising from a clear space, two small, and one large hair; palps projecting a little more than terminal segment; a distinct ocular fringe; back of eye two small hairs, and on temple two long ones; occipital border concave with eight long hairs and with narrow brown marginal band; head of rather uniform coloring, inner border of antennal pit dark; ventral surface with a pair of three-jointed backward-extending processes one-third the length of the head.

Prothorax large, with thin smoky lateral extensions reaching as far as first long hair on occipital border; two long pustulated hairs on each lateral margin and eight on the posterior, the one at the anterior angle with a small spine on each side of it. Metathorax a little broader than the prothorax, with the posterior border slightly curved backward and with a number of hairs; legs of the general body color.

Abdomen somewhat elongate, angles projecting slightly and bearing one long and two shorter hairs also one or two small spines; a row of hairs extending across near posterior margin of each segment; posterior border of last segment flattened and with a row of small hairs, a close fringe of fine hairs on ventral margin.

Male. Body, length 1.54 mm., width .78 mm.; head, length .27 mm., width .59 mm. Except in size much the same general appearance as the female.

Description from twelve specimens in the collection of Professor Jas. S. Hine, of Ohio State University, taken by him from the Flicker, *Colaptes auratus*, at Columbus, Ohio.

These forms show much similarity to *Menopon praecursor* Kell. and may possibly be only a variety. However, on account of the host, from which heretofore no *Menopon* has been reported, the difference in prothorax, the hairs of occipital region, and the more elongated body I have assigned it specific rank.

7. *Menopon titan* PIAGET. (New host.) Les Pediculines, 1880, p. 503, plate XL, fig. 7.

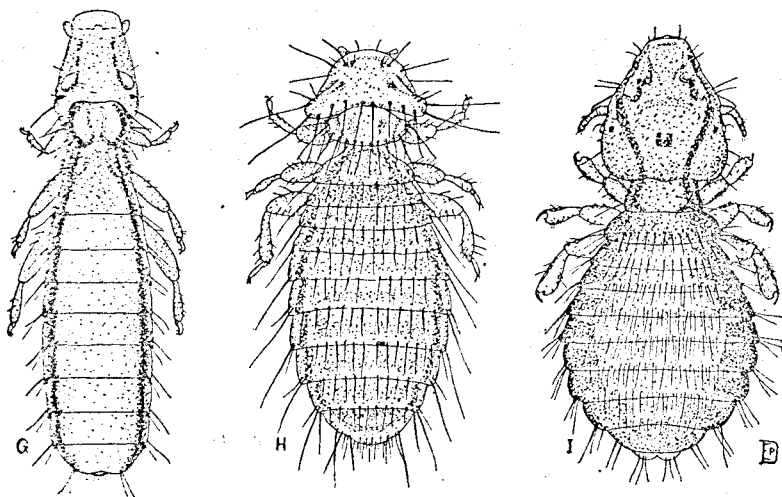


Fig. 1. G, *Physostomum invadens* Kell., female from *Dendroica pennsylvanica*. H, *Menopon colaptis*, female from *Colaptes auratus*. I, *Docophorus syrni*, female from *Syrnium nebulosum*.

Taken from *Phalacrocorax dilophus* by Professor Jas. S. Hine at Columbus, O. Professor Kellogg, KELLOGG and CHAPMAN, *Mallophaga from Birds of California*, New *Mallophaga* III, 1899, describes the variety *incompositum* from *Phalacrocorax penicillatus*. The specimens from *P. dilophus* conform very closely with Piaget's description.

8. *Eureum cimicoides* NITZSCH. (New host.) PIAGET, Les Pediculines, 1880, p. 608, Supplement, 1885, p. 137, Plate XV, fig. 2.

Two specimens taken from *Chaetura pelagica* by Professor Jas. S. Hine, at Columbus, O. In KELLOGG and CHAPMAN, New *Mallophaga* III, p. 133 *et seq.*, reference is made to the seemingly inadequate ground for the establishment of the Genus *Eureum*, and also to the suspicion on the part of Piaget that the forms so

named were only aberrant members of the genus *Menopon*. Professor Kellogg in *Psyche*, XV, p. 11, gives a systematic summary of the *Mallophaga* of the World, but makes no mention of this genus. However, it seems to the writer that the two specimens under consideration hardly can be placed in the genus *Menopon*. They agree closely with Piaget's description and figure; and the occipital tubercles, as Burmeister says, "*cum processu pronoti chelam formante*," have not their counterpart among the *Menopon* species so far as I have observed.

9. *Nirmis selliger* NITZSCH. (New host.) PIAGET, Les Pediculines, 1880, p. 197, plate XVI, fig. 2.

Two males and two females taken from the Common Tern, *Sterna hirundo*, on Hen Island, Lake Erie, by Professor Jas. S. Hine.

10. *Physostomum invadens* KELL. Fig. 1 G. A single specimen taken from *Dendroica pennsylvanica* at Columbus, O., by Professors Osborn and Hine.

This single female specimen conforms quite closely to the description by Professor Kellogg in New *Mallophaga* III, KELLOGG and CHAPMAN, p. 50, the only apparent difference being that it is a little more slender as shown by the following dimensions: Body, length 3.06 mm., width .68 mm.; head, length .70 mm., width .53 mm.

11. *Docophorus syrni* [PACKARD?], fig. 1 I.

Female. Body, length 2.08 mm., width .92 mm., margin of abdomen, legs, and head colored a golden brown.

Head. Length .67 mm., width .66 mm., front obtusely angular with a slight acuminate projection at middle, one medium, and one short hair at each lateral angle; two small hairs in front of clypeal suture and two larger ones in front of trabecula; trabecula not so prominently curved as in *D. communis*, reaching a little beyond first segment of antenna; eye prominent and with a short curved hair above; temples broadly rounded, the distance from eye to prothorax divided into three nearly equal spaces by two long hairs, these spaces again nearly bisected by three short bristles; occiput perceptibly curved backward; signature distinct but not strongly marked; head rather uniform light brown, except antennal and occipital bands are distinct.

Prothorax with straight sides slightly diverging; a hair at posterior angle. Metathorax of equal length with prothorax, several hairs in rounded posterior angle; posterior margin nearly straight, with a row of pustulated hairs. Legs pale brown with dark brown markings on anterior margins.

Abdomen broadly elliptical, anterior segments scarcely projecting, posterior ones a little more so; two or three hairs at each posterior angle; short lateral transverse blotches with inner ends rounded; last segment deeply emarginate.

Male. Body, length 1.70 mm., width .70 mm.; head, length .59 mm., width .57 mm. Considerably smaller than female, coloration much the same. Last segment of abdomen rounded and clear; genitalia showing quite prominently.

This form bears some resemblance to *D. cursor* Nitzsch, but differs in size and in various other characters.

Many specimens taken from *Syrnium nebulosum* at Columbus, O., by Professor Hine. European writers refer to a form under this name, but Professor Kellogg, Proc. U. S. Nat. Mus. Vol. XXII, p. 48, says, "neither Osborn nor I have been able to find the original record for this species." Hence the figure and description given in this paper.

This work was done mostly in the Zoological Laboratory of Ohio State University under the direction of Professor Herbert Osborn, whose kindly assistance is hereby gratefully acknowledged. Thanks are due also to Professor Jas. S. Hine for access to his collection of Mallophaga.

## THE DEPOSITS OF GLASS SAND AT TOBOSO, OHIO.<sup>1</sup>

F. CARNEY and A. M. BRUMBACK.

This glass sand quarry, about one half mile west of Toboso, on the Baltimore & Ohio railroad, is conveniently reached by traction line from Newark to Zanesville, leaving the car at the Black Hand station. The quarry, located in a cliff bank on the south wall of the Licking which joins the Muskingum at Zanesville, is owned by the Edward H. Everett Company of Newark, Ohio. The sand produced is used chiefly by the American Bottle Company of the same place. This company manufactures annually about 1,000,000 gross of amber and green bottles.<sup>2</sup>

The rock used here for glass sand belongs to the Black Hand formation of the Waverly series, Mississippian period. A section at the quarry, measured and described by Professor Charles S. Prosser, is as follows:

1. Presented at the Annual Meeting of the Ohio Academy of Science, Oxford, Nov. 30. 1907.

2. Figures supplied by Mr. J. M. Keckley, employed by the American Bottle Company, Newark, O.

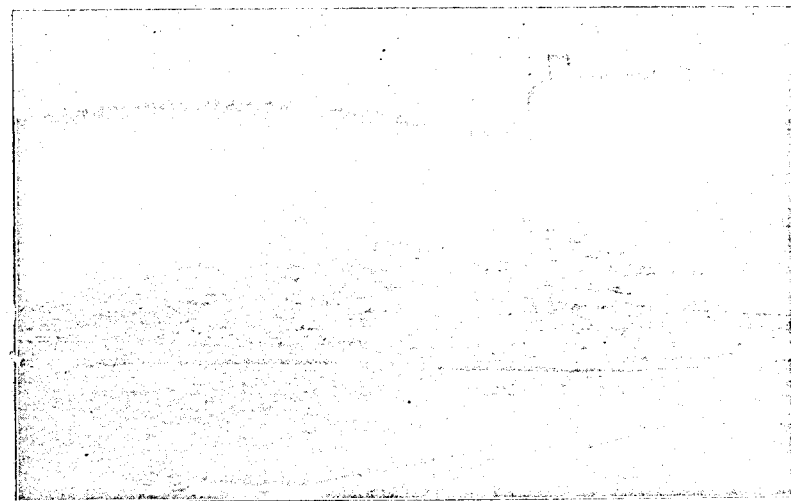


FIG. 1. The coarsely rippled surface of Conglomerate II, which caps the stone used for glass sand; above this, about twenty feet of the Logan shows.

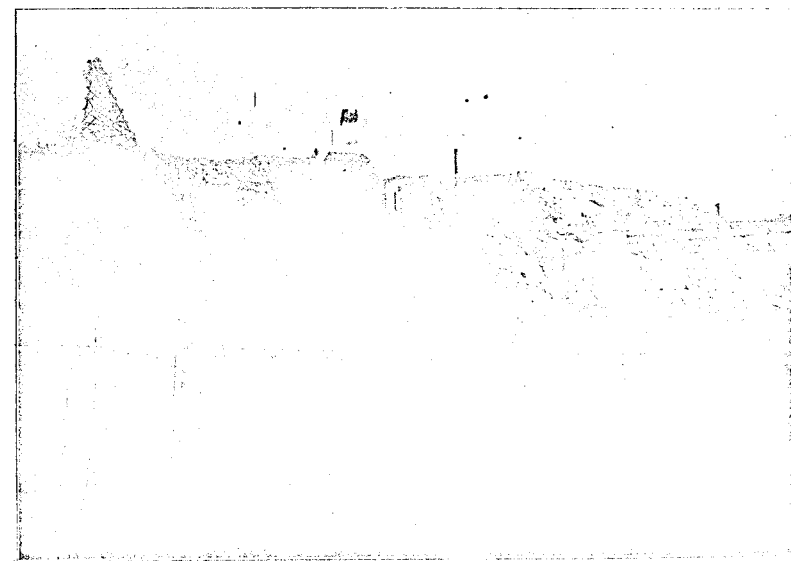


FIG. 2. View of the east end of the Everett quarries, showing the cable and conveyor; camera stands on the north bank of the Licking which flows at the foot of the retaining wall of the railroad, the Baltimore and Ohio. The prepared sand is loaded directly into the cars.