THE COMB OF A WASP NEST FROM THE UPPER CRETACEOUS OF UTAH.

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ABSTRACT. Until now definite fossil remains of the social Hymenoptera have not been known to occur before the Eocene. The comb of a wasp nest described here was found in 1936 in Upper Cretaceous strata near Gunlock, Utah. No remains of the insects themselves are preserved and the comb is, therefore, referred to the form genus Celliforma.

INTRODUCTION.

On August 14, 1936, Dr. J. B. Reeside, Jr., with Dr. C. E. Dobbin, both of the U. S. Geological Survey, collected the specimen herein described from a horizon about 2500 feet above the base of a section of undifferentiated Colorado and Montana beds one-half mile northwest of Gunlock, Washington County, in southwestern Utah. The strata from which the fossil came are relatively barren, yellowish, sandy, continental deposits, the only other fossils found being a few unidentifiable, fragmentary, dicotyledonous leaves, a scrap of bone and some silicified wood.

The rock specimen itself is an irregular, flattened, reddish ironstone concretion, the iron being limonite impregnating and binding the sand and mud that comprise 58 per cent of the matrix. The fossil, which was exposed when the concretion was split, is a mold and occupies the central area of the concretion. Although numerous, similar, ferruginous concretions occur along the outcrop that yielded the fossil no other was found to be fossiliferous.

HYMENOPTERA.

Celliforma favosites, n. sp.

The upper, exposed side (Plate I, Fig. 1) of the fossil is undulatory and displays the rounded ends of cells that average 2 cm. in length and 5 mm. in diameter. These rounded ends represent the bottoms of the cells, the aggregate being the upper or dorsal part of the structure. There are no open ends of cells representing the lower or ventral part, because the fossil is a mold, and its substance must, therefore, be continuous.
with the enclosing matrix, except where the substance of the original object intervened. The fact that this fossil broke out of the concretion along the plane of the rounded ends of the bottoms of the cells is circumstantial evidence that the substance of the original object intervened along this plane and initiated a zone of weakness there.

The group of cells shows a regular arrangement, and one may detect parallel rows in three different directions. In side view (Plate I, Fig. 2) the cells reveal no special distinguishing marks. A thin deposit of yellowish clay now separates the cells from one another, and they appear rounded or somewhat angular but not noticeably hexagonal in cross section. In some areas the cells are slightly elliptic in cross section, as though there had been distortion, probably before fossilization.

From general appearance and analogy it is therefore concluded that this specimen represents the mold of a portion of the original papery comb of a social wasp nest. It is conjectured that the tough, papery material of such a comb would be more likely than the similar waxy comb of a bee to resist destruction long enough to permit a fossil mold to result after burial in appropriate sandy and muddy sediments. The writer, however, leaves to the reader the pleasure of speculating as to the circumstances and method by which the original comb became this fossil. Obviously, since no remains of the builders themselves are preserved, it is impossible to ascribe the structure to any particular living genus of wasp. However, suggestive comparisons can be made with the uncovered combs constructed by the common colonial wasps of the genus Polistes.

Except for some doubtfully identified Hymenoptera from the Jurassic beds at Solenhofen, Germany, this fossil appears to be the earliest definite evidence to suggest the presence of well-advanced social Hymenoptera in the Upper Cretaceous. Cockerell¹ points out that because unquestioned wasps and ants are known from the Eocene it can be presumed that they may have originated at least as early as the Cretaceous. Late in the Lower or early in the Upper Cretaceous, as indicated by fossil remains, there was a marked evolutionary outburst of flowering plants. This development in the plant kingdom was perhaps in part both the cause and result of a concomitant evolution among insects, especially the Hymenoptera.

The writer in 1934 and 1935 erected the form genus *Celliforma* to include the fossil larval chambers of generically unidentifiable Hymenoptera. It seems fitting to assign the present fossil to this form genus also.


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Fig. 1. Upper side of the comb of a wasp nest in an ironstone concretion from the Upper Cretaceous at Gunlock, Utah. x 2/3

Fig. 2. Side view. x 1