A Curious Fossil Charophyte Fruit.

By JAMES GROVES.

THROUGH the kindness of Mr. Henry Woods, I have had the opportunity of examining three blocks of limestone belonging to the Sedgwick Museum at Cambridge, which were collected by the late E. B. Tawney, from the "Chara Bed", Etage Oeningien, Upper Miocene, at Locle, Jura (Canton Neuchatel, Switzerland). The blocks contain a number of the remains of fruits of a species of Charophyte, which present a feature I had not hitherto observed, and to which I think attention may advantageously be drawn. Before describing this peculiarity, however, it will be desirable to say something as to the conditions of preservation in which such bodies are usually found.

In living species of *Chara*, *Lamprothamnium*, *Lychnothamnus*, *Nitellopsis*, and *Tolypella*, when the fruits are more or less mature, the five spiral-cells which form the sac of the oogonium often secrete a deposit of lime extremely fine and close-grained, almost porcelain-like in texture. The lime is gradually deposited on the inner wall of each spiral-cell, that is, on the side adjacent to the oospore, often only partially, but in its fullest development almost entirely, replacing the original protoplasmic contents of the cell. The lime-contents of the five spiral-cells combine to form a firm hard shell, known as the lime-shell, which envelopes the oospore, and is no doubt protective in character. When the fruit becomes dry and the soft part collapses, if the lime deposit is thin, each of the spiral-cells appears as a rounded furrow. The concavity of the cells decreases in proportion as the lime deposit thickens, becoming flat or even convex when the cell is completely filled. Neither the five cells forming the coronula nor the single stalk-cell secrete lime.

Apparently in almost all cases it is to the presence of such a lime-shell that we owe the preservation of charophyte fruits as fossils, and it is noticeable that the one living genus, *Nitella*, which does not produce a lime-shell, is not known in the fossil state. The remains of charophyte fruits, ordinarily found as fossils, consist of the sac formed by the five spiral-cells only, without either the coronula or the foot-stalk, and therefore correspond with the lime-shell. Occasionally the oospores are found in the sacs. We find the spiral-cells in the fossils in all stages of thickness, ranging from the very thin concave bands in some types, which I refer to *Tolypella*, to the thick convex coils found in some specimens of the *Chara medicaginula* type.

On the interior surface of some of the fossil oogonium sacs one comes across a layer of soft fine white lime of varying thickness, but usually much thinner than the hard darker outer shell. In the specimens of which I am writing it is in this inner layer of white

lime that the unusual feature occurs in the shape of a tubular hollow, which follows the course of each of the spiral-cells, as shown in Fig. 1, *B, C*. I had previously assumed that the layer of white lime was simply a deposit, extraneous in origin, which had taken place between the oogonium sac and the possibly shrunken oospore. The presence of these uniform tubular hollows in Mr. Tawney's specimens, and the division of the white line into regular bands, as shown in the illustration, however, seems to point to an organic origin.

FIG. 1.—Fruit of fossil Charophyte from Locle, Switzerland. *A*. Nearly entire oogonium, $\times$ circa 31. *B*. Broken specimen, showing section of part of the wall of the oogonium and an internal layer of soft white lime with tubular channels, $\times$ circa 31. *C*. Transverse section (diagrammatic of three of the petrified spiral-cells forming the wall of the oogonium), *a a* with the corresponding bands of the white lime layer, *b b* having compressed tubular channels shown as black ovals, $\times$ circa 65.

I am at present unable to suggest any explanation of this problematic feature, and the main object of this note is to draw attention to its occurrence, in the hope that those having the opportunity of investigating freshwater deposits will keep a look-out for charophyte fruits, which may throw some light on the development in question.

I have not seen authentic specimens of *Chara Merianii* Braun, which is reported from the Miocene of Switzerland and Baden, but conclude from Heer's figures in *Flora Tertiaria Helvetiae* that the specimens under consideration belong to that species.