

second group embraces the Levant, Surgent, Scalent, and Pre-Meridional. These are said to be “the very near representatives of the true European Silurian, regarding this series as commencing with the May-Hill sandstone.” The Levant division is farther declared to be the equivalent of the sandstone just named; while the Matinal is made to correspond to the Landeilo, Bala, or Upper Cambrian; the Auroral with the Ffestiniog or Middle Cambrian; and the Primal with the Lingula-flags, the Obolus sandstone of Russia, and the Primordial of Bohemia.

The range of Silurian should therefore be restricted, as maintained by Sedgwick and by the Messrs. Rogers, to the rocks of the third fauna: the so-called Upper Silurian of Murchison; and the names of Middle Silurian, Lower Silurian, and Primordial Silurian banished from our nomenclature. The Cambrian of Sedgwick, however, includes the rocks both of the first and second faunas. To the former of these, the lower and middle divisions of the Cambrian (the Bangor and Ffestiniog groups of Sedgwick), Phillips, Lyell, Davidson, Harkness, Hicks, and other British geologists, agree in applying the name of Cambrian. The great Bala group of Sedgwick, which constitutes his Upper Cambrian, is, however, as distinct from the last as it is from the overlying Silurian, and deserves a not less distinctive name than these two. Its original designation of Upper Cambrian, given when the zoological importance of Lower and Middle Cambrian was as yet unknown, is not sufficiently characteristic; and the same is to be said of the name of Lower Silurian, wrongly imposed upon it. The importance of this great Bala group in Britain, and of its North American equivalent, the Matinal of Rogers,—including the whole of the limestones of the Trenton group, with the succeeding Utica and Hudson-River shales,—might justify the invention of a new and special name. That of Cambro-Silurian, at one time proposed by Sedgwick himself, and adopted by Phillips and by Jukes, was subsequently withdrawn by him, when investigations made it clear that this group had been wrongly united with the Silurian by Murchison. Deference to Sedgwick should therefore prevent us from restoring this name; which, moreover, from its composition, connects the group rather with the Silurian than the Cambrian. Neither of these objections can be urged against the similarly-constructed term of Siluro-Cambrian, which moreover has the advantage that no other new name could possess, of connecting the group both with the true Silurian, to which it has very generally been united, and with the Cambrian, of which, from the first, it has formed a part. I therefore venture to suggest the name of Siluro-Cambrian, as a convenient synonym for the Upper Cambrian of Sedgwick (the Lower Silurian of Murchison), corresponding to the second fauna; reserving at the same time the name of Cambrian for the rocks of the first fauna,—the Lower and Middle Cambrian of Sedgwick,—and restricting with him the name of Silurian to the rocks of the third fauna,—the Upper Silurian of Murchison.

It would be unjust to conclude this historical sketch of the names Cambrian and Silurian in Geology, without a passing tribute to the venerable Sedgwick. The labours of his successors in the study of British geology, up to the present time, have only served to confirm the exactitude of his early stratigraphical determinations; and the last results of investigations on both continents unite in showing that in the Cambrian series, as defined by him more than a generation since, he laid, on a sure foundation, the bases of Palæozoic geology.

NOTICES OF MEMOIRS.

L.—CARDIFF NATURALISTS' SOCIETY: REPORTS AND TRANSACTIONS. Vol. III., Parts 1 and 2, for 1870-71 (1872), and Vol. IV. for 1872 (1873).

AMONG a great deal of general information on Natural History and scientific subjects, together with special descriptions of local points of interest, in which antiquary, botanist and geologist are concerned, and a monthly series of valuable meteorological reports by Mr. F. G. Evans, backed by tables of observations, we find in these Transactions an elaborate and exhaustive memoir on the Rhætic Beds of Penarth and Lavernock, by Mr. Etheridge, F.R.S., vol. iii. part 2, pp. 39, etc., with two plates of fossils, and two of sections.

II.—ON THE SPECIES OF *Favosites* FROM THE DEVONIAN ROCKS OF WESTERN ONTARIO.¹ By Prof. H. ALLEYNE NICHOLSON, M.D., D.Sc., etc., etc.

THIS paper is intended by Prof. Nicholson to supplement one by Mr. Billings on the Devonian Corals of Canada West (Canadian Journal, new series, vol. iv. p. 97), with some of whose conclusions, as to the species of *Favosites*, Prof. Nicholson is unable to agree.

The genus *Favosites*, Lam., comprises branched or massive corals, composed of numerous more or less polygonal corallites, divided internally by transverse septa or "tabulæ," sometimes quite rudimentary. The walls of the corallites are perforated by one, two, three, or more rows of mural pores. The septa are absent or rudimentary, being at most represented by tubercles or short spines.

Palæontologists are not agreed as to the generic limits of *Favosites*, and several new genera have been founded, which Prof. Nicholson gives reasons for rejecting.

The numerous species of *Favosites* may be divided into two groups—massive and ramose; *F. Gothlandica* being the type of the former, and *F. polymorpha* of the latter.

The following characters have been relied on for separating the species of this genus:—1. The diameter of the corallites; 2. The equality or inequality of their size; 3. The completeness or incompleteness of the tabulæ; 4. The number of rows of mural pores; 5. The position of the mural pores; 6. The presence or absence of rudimentary septa.

For convenience of reference, the author gives the following table of the more important species of *Favosites*, it being remembered that some of them are perhaps not valid, and the number of rows of mural pores not constant even in the limits of the same species.

A. Massive species.

a. Tabulæ complete. One row of mural pores, placed on the faces of the corallites.

1. *Favosites basaltica*, Goldf.

2. *Favosites turbinata*, Billings.

b. Tabulæ complete. Two rows of mural pores, placed on the faces of the corallites.

3. *Favosites Gothlandica*, Lam.

4. *Favosites Niagarensis*, Hall.

c. Tabulæ complete. Three rows of mural pores, placed on the faces of the corallites.

5. *Favosites multipora*, Lonsd.

6. *Favosites Troosti*, Edw. and Haime.

d. Tabulæ complete. Mural pores situated in the angles formed by the prismatic walls of the corallites.

7. *Favosites alveolaris*, Goldf.

8. *Favosites aspera*, Goldf.

e. Tabulæ more or less incomplete. Mural pores in one, or more commonly two rows.

¹ From "The Canadian Journal."

9. *Favosites hemispherica*, Yandell and Shumard.

10. *Favosites Forbesi*, Edw. and H.

B. Ramose species.

a. With one row of mural pores, on the faces of the corallites.

11. *Favosites polymorpha*, Goldf.

12. *Favosites cervicornis*, De Blainville.

13. *Favosites reticulata*, De Blainville.

b. With one row of pores, placed in the angles formed by the prismatic faces of the corallites.

14. *Favosites fibrosa*, Goldf.

Of the above species, those which have been recognized as occurring in the Devonian rocks of Canada are: *Favosites Gothlandica*, Lam.; *F. hemispherica*, Yandell and Shumard; *F. Forbesi*, Edw. and H.; *F. turbinata*, Billings; *F. cervicornis*, De Blainville; and *F. polymorpha*, Goldf.

I. *Favosites Gothlandica*, Lamarck.—“Corallum forming spheroidal, pyriform, or large hemispheric or flattened masses; corallites are in general between one and one a half lines wide, sometimes more, sometimes less, often two lines; transverse diaphragms usually complete, rarely incomplete; mural pores in one, two, or three series, usually two, those of the same series about half a line distant, sometimes less; pores surrounded by an elevated margin; faces of the tubes with one or two longitudinal striæ, more or less distinctly developed; radiating septa represented by a series of small spines, often in the rudimentary form of tubercles.”—Billings.

Whilst the above exist in typical specimens, there are numerous departures from this state of things. The corallites are often uniformly below the average in an entire colony, or nearly round instead of polygonal. There is sometimes but one, and sometimes three rows of mural pores. The tabulæ are sometimes absent, and sometimes form little projecting lamellæ, or ridges, sometimes resembling those of *F. hemispherica*, being closely set and incomplete, often more or less bent, and commonly interlocking.

The septa as a general rule are absent, or at any rate indeterminate, but are, however, not uncommonly to be recognized in the form of small inequalities or minute tubercles.

The shape of the colonies also varies much. The colony is based on a concentrically wrinkled epitheca, which is very commonly wanting in decorticular specimens, and attains a considerable thickness in aged examples.

Locality and Formation—Common throughout the Corniferous Limestone in Canada West.

II. *Favosites basaltica*, Goldfuss.—It is with regard to this species that Prof. Nicholson is inclined to differ from the conclusions arrived at by Mr. Billings.

Making a single row of mural pores the distinguishing character of this species, Goldfuss includes under this head—

1. Specimens which differ only in this respect from *F. Gothlandica*.

2. Specimens which agree with the preceding in having some-

times (not always) a single row of mural pores, but which differ in having nearly rounded or cylindrical corallites of very unequal size, whilst the tabulæ are only represented by short projecting lamellæ, imparting a peculiar and characteristic appearance to the inner surface of the corallites.

It is the first of these groups which is usually regarded as the type-form of *F. basaltica*, Goldf.; and the only question is whether these are separable from *F. Gothlandica*, Lam., or not. The author next discusses the opinions of various writers on this point.

The second group was separated by MM. Milne-Edwards and Haime from the first under the head of *F. Forbesi*; but Mr. Billings re-united them under the former name of *F. basaltica*, Goldf.

Prof. Nicholson considers that *F. Forbesi*, M.-Ed. and H., is a good species, and proceeds to describe it.

III. *Favosites Forbesi*, Edw. and H.—Corallum forming spheroidal, pyriform, cylindroidal, or depressed hemispheric masses, composed of corallites, generally circular or cylindrical in shape, and usually very unequal in size; mural pores in two alternating rows, rarely in a single row; tabulæ mostly rudimentary and represented by very close-set projecting lamellæ, which roughen the interior of the corallites; radiating septa represented, sometimes clearly, sometimes indistinctly, by a number of longitudinal ridges or striæ.

The corallites are large and small, each larger one being surrounded by an incomplete ring of smaller, which vary considerably in size, whilst the larger are pretty constant; the mural pores often cannot be made out. The tabulæ are present in an incomplete and rudimentary form, projecting a short way into the corallite, giving it a peculiar and easily-recognized appearance, and in one specimen in Prof. Nicholson's possession extend half across the corallite, often bifurcating or interlocking at their free ends, and sometimes extending right across. The radiating septa are quite rudimentary, and when discernible have the form of obscurely marked longitudinal striæ. Lastly, the author has observed in some specimens, especially those of a cylindroidal or clavate form, the peculiar feature that the calices of a greater or less moiety of the colony are closed by an epitheca, closely resembling what is observed in *F. turbinata*, Billings.

Prof. Nicholson next mentions some other specimens which present several peculiar features, but which he cannot at present separate from this species.

Locality and Formation—Corniferous Limestone, Port Colborne, and lot 6, con. 1, Wainfleet.

IV. *Favosites hemispherica*, Yandell and Shumard.—In its essential characters this species is closely allied to *F. Gothlandica*; but the corallites are much smaller in size and the tabulæ incomplete, very thin, and closely set, usually extending only half-way across the corallite, and often interlocked towards its centre. Usually, however, some of the tabulæ are complete. The mural pores are stated to be in one, two, or three rows (M.-Edw. and H. and Billings), but the author has not detected any in the Canadian specimens which he has seen. According to Milne-Edwards and Haime, also, there

are twelve well-developed septa, but these are indeterminable in the Canadian specimens. The author agrees with Mr. Billings in thinking that this species may turn out to be identical with *F. Gothlandica*, and in refusing to adopt the genus *Emmonsia* proposed for this species by M.-Edw. and Haime.

Locality and Formation—Common in the Corniferous Limestone of Ridgway, Port Colborne, and many other places in Western Ontario.

V. *Favosites turbinata*, Billings.—“Corallum forming elongate turbinate masses, sometimes two feet in length and six inches in diameter, often curved at the base. Corallites nearly uniform in size, usually somewhat less than a line in width; transverse diaphragms thin, flat, flexuous, complete or incomplete. Only one row of pores has been observed. Whole surface, except the upper part, covered with a strong epitheca, which closes the mouth of the cells.”—Billings.

The form of the colony varies much, sometimes being merely an irregularly curved mass, which looks like a large potato.

The epitheca in most specimens is smooth and sufficiently thin to allow of the form of the corallites being traced through it. In a large number of specimens it has been denuded or decorticated.

The corallites radiate from the imaginary axis of the colony either in straight lines or curves, and in shape are rounded, subprismatic, or more commonly distinctly prismatic. They are by no means uniform in size, there being generally a considerable number of undersized corallites intercalated amongst the nearly equal-sized larger tubes.

The mural pores, so far as the author has observed, are uniformly in single rows, placed on the flat surfaces of the corallites, and from half a line to a line apart.

Locality and Formation—Common in the Corniferous Limestone of Ridgway, Port Colborne, and other localities in Western Ontario.

VI. *Favosites polymorpha*, Goldfuss.—Corallum dendroid, often dichotomously branched, or reticulated; diameter of branches varying from a little over a line to more than an inch. Corallites radiating in all directions from an imaginary axis nearly at right angles, more or less contracted internally, and widening as they approach the surface. Diameter of corallites from half to three-quarters of a line in branches of half an inch across, often with smaller ones intercalated. Calices in reality polygonal, but usually rendered circular by the thickening of their walls. Mural pores in a single series.

The ramose species of *Favosites* are so variable in their characters, that Prof. Nicholson intends to treat of them hereafter along with the species of *Alveolites*, to which they present many superficial resemblances.

The above definition includes the typical forms of *F. polymorpha*, but there are numerous examples which can be regarded either as mere varieties of it or as belonging to another species altogether. Such, for example, as *F. cervicornis* and *F. dubia*, De Blainville.

Besides the above, the Devonian rocks of Western Ontario yield at any rate one ramose form of *Favosites*, which appears to be distinct from any as yet described.—B. B. W.