quantities as well as that of the gas occluded in the Lenarto iron and that of manufactured iron :

	Virginia Iron.				Lenarto Iron.	Shoeing Nails.
	I.	II.	III.	Total.		
Hydrogen	22·12	10·52	3·19	35·83	85·68	35·0
Carbonic oxide	15·99	11·12	11·22	38·33	4·46	50·3
Carbonic acid	7·85	1·02	0·88	9·75	—	7·7
Nitrogen	6·06	1·45	8·58	16·09	9·86	7·0
	52·02	24·11	23·87	100·00	100·00	100·0

These results unfortunately do not admit of very exact comparison, as only a portion of the gas extracted from the Lenarto iron was quantitatively examined. Although the relative quantity of hydrogen in the Augusta iron is much less than in the Lenarto iron, it amounts to 1·4 times the volume of the iron, while manufactured iron under ordinary pressure takes up only 0·42 to 0·46 of its volume of this gas. Mallet's results have shown that Graham's view, that the predominance of carbonic oxide among the occluded gases is indicative of telluric origin, is no longer tenable. In connexion with these differences in composition of the gases constituents of meteorites, it is interesting to notice that the observations of Secchi and Huggins have shown that carbon plays an important part in certain cosmical regions, although the spectroscopic evidence in the case of this element is as yet less definite than it is in regard to hydrogen.

1869 (and 1871). Trenton, Washington Co., Wisconsin.¹

An additional fragment of this meteorite, weighing 16½ lbs., was found in 1869; and another, weighing 35 lbs., was dug up in 1871. All the six fragments (143 lbs.) now collected were found in the same field.

(To be continued in our next Number.)

III.—DESCRIPTIONS OF NEW SPECIES OF *CYSTIPHYLLUM* FROM THE DEVONIAN ROCKS OF NORTH AMERICA.

By H. ALLEYNE NICHOLSON, M.D., D.Sc., F.R.S.E.,
Professor of Biology in the College of Physical Science, Newcastle-on-Tyne.²

(PLATE I.)

NO less than seven species of *Cystiphyllum* have already been recorded as occurring in the Devonian Rocks of North America; viz. *C. vesiculosum*, Goldf., *C. Senecaense*, Billings, *C. grande*, Billings, *C. sulcatum*, Billings, *C. Americanum*, Edw. and Haime, *C. aggregatum*, Billings, and *C. mundulum*, Hall. To these I have now to add the following four species, all of which have been obtained by me from the Devonian Formation of Canada and Ohio.

¹ J. L. Smith. *Mineralogy and Chemistry*, 348.—J. A. Lapham. *Am. Jour. Sc.* [3] iii. 69.

² Read before the British Association, Section C., Belfast, 1874.

CYSTIPHYLLUM OHIOENSE, Nicholson. Pl. I. Figs. 2, 2a.

Spec. char.—Corallum small, turbinate, simple, sometimes twisted, but usually straight, or slightly curved. Length of corallum usually about six lines, varying from four to nine lines; the calice varying in diameter from four to six lines. Epitheca distinct, marked with longitudinal striæ, and usually showing well-marked annulations and constrictions of growth. No calicular gemmation, nor radiform prolongations of the epitheca. Calice not oblique, very deep, generally occupying from one-third to two-thirds of the entire length of the corallum, not flattened below. The interior of the calice shows more or less distinct septal striæ, thirty or more in number. Vesicles of the interior small.

The dimensions of an average specimen are: length, eight lines; diameter of calice, six lines; depth of calice, four lines and a half.

This pretty little species is readily distinguished from all others previously described, although the specimens upon which it is founded are much silicified, and do not exhibit some points of structure as well as could be desired. The species is characterized by its uniformly small size, its deep, pointed, and not oblique calice, the presence of distinct septal striæ, and the absence of radiform prolongations of the epitheca. It is most nearly allied to *C. mundulum*, Hall, from the Devonian of Rockford, Iowa (Twenty-third Annual Report on the State Cabinet, 1874), but is distinguished by its smaller size, the smaller number of its septa, and its much deeper and more pointed calice.

Locality and Formation.—Common in the Corniferous Limestone, Columbus, Ohio.

CYSTIPHYLLUM SQUAMOSUM, Nicholson. Plate I. Figs. 4, 4a, 4b.

Spec. char.—Corallum simple, turbinate, but extraordinarily flattened. Dorsal surface greatly expanded, nearly or quite flat; lateral margins straight, and forming an angle with the curved ventral surface, which is much reduced in size. Calice extraordinarily oblique, making an angle with the dorsal surface of not more than 10° or 12° , very shallow and widely open, its deepest point being situated at a point about one-third of the length above the base. Vesicles of the interior about one line in diameter. Owing to the fact that all the examples of this coral which have been examined are converted into orbicular silica, the characters of the septal striæ and epitheca cannot be determined. Some specimens exhibit the same form of calicular gemmation as is seen in *C. vesiculosum*,—that is to say, the coral continues growing for a certain period, and then sends up a fresh calice from the centre of the old one. In this species, however, the new calice, instead of being continued in the axis of the coral, is directed more or less nearly at right angles to the plane of the old calice.

The dimensions of the largest individual observed are as follows: Length, measured along the dorsal surface, twenty-four lines; length, measured along the ventral surface, seven lines; greatest thickness, seven lines; diameter of calice, twenty-one lines; greatest depth of

calice, six lines. In the smallest individual observed the dimensions are: Length, measured along the dorsal surface, thirteen lines; length, along the ventral surface, four lines; greatest thickness, four lines; diameter of calice, ten lines; greatest depth of calice, two lines.

This wonderful species is readily distinguished by its extraordinarily flattened and scale-like form, due to the extreme obliquity and shallowness of the calice, the flattening of the dorsal surface, and the almost total disappearance of the lateral surfaces. No other species of the genus known to me even approaches *C. squamosum* in these characters, and these are, therefore, of themselves sufficient to characterize the species. All the specimens I have seen are covered with remarkably large and fine "Beekite-markings," and the more minute characters of the coral are thereby entirely obscured.

Locality and Formation.—Corniferous Limestone, Columbus, Ohio.

CYSTIPHYLLUM FRUTICOSUM, Nicholson. Plate I. Figs. 3, 3a.

Spec. char.—Corallum aggregate, composed of numerous cylindrical, straight or slightly flexuous corallites, growing side by side, but not connected by epithecal processes or expansions, and often forming colonies of several feet in circumference. Corallites about three lines in diameter, or rather less, and placed usually at intervals apart of two lines, less or more. Epitheca thin but distinct, marked with very numerous fine encircling striæ and fainter vertical striæ, as well as with irregular annulations and constrictions of growth. Calice moderately excavated, from one and a half to two lines in depth, exhibiting numerous bullæ, sometimes with septal striæ near the margin. Internal structure wholly vesicular, the vesicles having a diameter of from half a line to nearly one line.

With the exception of the present very remarkable form, and the equally singular *C. aggregatum* of Billings, all the species of *Cystiphyllum* are simple. Its compound character is, therefore, of itself sufficient to distinguish *C. fruticosum* from all the hitherto recorded species of *Cystiphyllum* except *C. aggregatum*, and from this it is separated by its wholly different form and mode of growth. In its general appearance *C. fruticosum* presents the closest possible resemblance to *Diphyphyllum arundinaceum*, Billings, with which it not uncommonly occurs associated; but its internal structure separates it at once, and shows it to be a genuine *Cystiphyllum*.

Locality and Formation.—Not uncommon in the Corniferous Limestone of the Townships of Wainfleet and Walpole, Ontario.

CYSTIPHYLLUM SUPERBUM, Nicholson. Plate I. Fig. 1.

Corallum of large size, simple, turbinate, very broadly expanding. Calice extremely large, circular, moderately deep, and very oblique, making an angle of about 50° with the dorsal surface of the corallum, and one of about 150° with the ventral surface. The septa are marked by distinct rows of bullæ or vesicles, which radiate from the bottom of the cup, and are not less than one hundred and forty to one hundred and fifty in number. The vesicles are small, not exceeding half a line in diameter in the circumferential portion of the coral. Epitheca well developed, with numerous fine encircling

1^b

1^c

1^d

1^e

2^a

2.

2^b

3.

3^a

3^c

4.

4^a

4^b

5^a

5.

Olson del. et lith.

Mintern Bros imp.

Devonian Polyzoa.

striæ and annulations of growth. Owing to the obliquity of the calice, the dorsal surface of the corallum is nearly twice as long as the opposite or ventral surface; and the greatest thickness is attained at a point situated about three inches above the base, or at about one-half of the total length. The only individual observed had the following dimensions: Length measured along the dorsal surface, six inches; along the ventral surface, three inches and a half. Greatest thickness, at three inches above the base, about three inches and a half. Diameter of calice, four inches and a half; depth of calice about one inch.

This fine species is most nearly allied to *C. vesiculosum*, Goldfuss; but it is distinguished from this and all other recorded species of the genus, by its comparatively gigantic dimensions, its very rapid expansion from the base upwards, and the striking obliquity of the calice. When viewed in profile (as in Pl. I. Fig. 1), its outline appears to be somewhat rhomboidal. This, however, is not a natural or essential appearance, but is due to the fact that the dorsal surface, in the individual examined, is abruptly geniculated at about the middle of its length. There is, however, no reason for supposing that this feature would prove to be a normal one in the species.

Locality and Formation.—Hamilton Group, Arkona, Township of Bosanquet, Ontario.

EXPLANATION OF PLATE I.

- FIG. 1.—*Cystiphyllum superbum*, Nich., viewed in profile, of the natural size. The single dark line shows the outline of the calice as seen in a front view.
 FIG. 2.—*Cystiphyllum Ohioense*, Nich., of the natural size. 2a. Calice of the same viewed from above, of the natural size.
 FIG. 3.—Fragment of *Cystiphyllum fruticosum*, Nich., of the natural size. 3a. Calice of one of the corallites of the same, slightly enlarged.
 FIG. 4.—*Cystiphyllum squamosum*, Nich., viewed from the front, of the natural size. 4a. Profile view of the same. 4b. Profile view of another individual of the same, in which a secondary calice has been produced at right angles to the primary calice. All these specimens are silicified, and are covered with "Beekite-markings."

IV.—DESCRIPTIONS OF NEW SPECIES AND OF A NEW GENUS OF POLYZOA FROM THE PALÆOZOIC ROCKS OF NORTH AMERICA.

By H. ALLEYNE NICHOLSON, M.D., D.Sc., F.R.S.E.,

Professor of Biology in the College of Physical Science, Newcastle-on-Tyne.

(PLATE II.)

Genus *HETERODICTYA*, Nicholson.

Polyzoary (?) forming a simple, flattened, unbranched, two-edged frond, with sub-parallel sides, consisting of two series of cells, the bases of which rest upon opposite sides of a thin longitudinally-striated central membrane or laminar axis, from which they pass obliquely outwards in opposite directions. The cells open in longitudinal rows on the two flat or slightly convex surfaces of the frond, and have the form of more or less cylindrical tubes, which are septate or are divided transversely by a series of well-developed tabulæ. In the only species known the cells of a few of the median rows of