we have to do not with a specific variation but with an abnormality produced by something interrupting the secreting action of the mantle: whether this was a foreign substance, a parasite, a disease, or a constantly recurring similar accident, I have not sufficient data at present to decide. As far as I know no similar series of forms has been elsewhere described; and in the Woodwardian Museum we have none from any other locality.

EXPLANATION OF PLATE IX.

(The figures are numbered to indicate the successive stages in the development of the abnormal features as exhibited in the series of specimens of *Spirifera lineata* from the Carboniferous of Settle.)

- FIGS. 1, 1a. Dorsal and ventral aspects. First and earliest stage.
 „ 2. Ventral aspect.
 „ 3, 3a. Dorsal and ventral aspects.
 „ 4. Anterior aspect.
 „ 5. Ditto. ditto.
 „ 6, 6a. Dorsal and ventral aspects.
 „ 7. Anterior aspect.
 „ 8, 8a. Dorsal and ventral aspects.
 „ 9, 9a, 9b. Dorsal, ventral, and anterior aspects of the most abnormal specimen.

IV.—ON A NEW SPECIES OF *DISCITES* (*DISCITES HIBERNICUS*) FROM THE LOWER CARBONIFEROUS LIMESTONE OF IRELAND.

By ARTHUR H. FOORD, F.G.S.; and G. C. CRICK, Assoc.R.S.M., F.G.S.,
 of the British Museum (Natural History).

THE specimen which forms the subject of the present communication was obtained by one of the writers from the Carboniferous Limestone, near Dublin. Although one side of the specimen is covered by matrix, yet the other side and the periphery are so splendidly preserved, and the shell has not been distorted during fossilisation, that the characters of the fossil can be accurately determined (see Woodcut, p. 254).

The specimen belongs to M'Coy's genus *Discites*, but differs, so far as we have been able to ascertain, from any species hitherto described.

The shell is discoid, compressed laterally, and composed of rather more than two volutions, which increase rather slowly in diameter. The extreme tip of the shell, possibly a length of about one millimetre but not more, has been broken off in developing the inner whorl from the matrix. The apex is bluntly pointed, and the whorls begin in a wide curve which is free to the extent of about half a volution, from which stage the outer whorl comes in contact with the inner for the rest of the growth of the shell. Thus the young shell to the extent of about half a volution is simply curved.

The transverse section of the free or earlier portion of the shell is subcircular, becoming in the outer whorl subquadrate with the lateral angles rounded. The sides are flattened, and in the second whorl a well-marked, shallow depression occupies the outer half of the lateral area. The periphery is sulcate, bounded on each side by a subangular ridge, and is about one half the width of the side

exclusive of the inner area or umbilical slope. The inner area in the young is convex and imperfectly defined; in the adult it becomes flattened, slopes outwards from the umbilicus and is nearly equal to the periphery in width.

The characters of the septa and suture-lines, as well as the length of the body-chamber, are not known, since the test is preserved over nearly the whole of the specimen.

The entire surface of the free portion of the shell bears well-marked crenulated longitudinal lines; these become less marked as the shell increases in growth and finally disappear. On the inner area they disappear soon after the commencement of the second whorl; on the sides, at the end of the first half of the second whorl; and on the periphery, some at the end of the second third of the second whorl and the rest at the end of the same whorl, *i.e.* at about one-fourth of the whorl from the aperture.

The periphery at the end of the first fourth of the second whorl, *i.e.* at the commencement of the last whorl in the specimen, bears seven nearly equidistant, longitudinal, feebly crenulated lines, one median and three on either side, the outermost on either side being upon the subangular margin of the periphery. The two lines, one on either side of the median line, disappear at about the end of the second whorl, and the rest at about the end of the second third of the same whorl (see *D* in Woodcut, p. 254).

The lateral area at the commencement of the second whorl bears seven nearly equidistant longitudinal lines. Counting from the peripheral margin, the fourth, fifth and seventh lines are crenulated, the rest plain. The third is a very feebly-marked, plain line and soon disappears, leaving at the commencement of the last whorl the wide space between the second and third lines noted below. The seventh line is followed by a plain line which eventually becomes the umbilical margin. Inside this line three other lines are seen, the middle one of the three having just lost its crenulations. The third line appears to occupy the centre of the antiperipheral area, but this point cannot be satisfactorily determined since the whole of this area is not visible at this spot.

At the end of the first fourth of the second whorl, *i.e.*, at the commencement of the last whorl in the specimen, the lateral area bears six longitudinal lines. The two outer lines are very fine and plain; the two next inner are distinctly crenulated; these are succeeded by a fine, uncrenulated, somewhat indistinct line, and then a crenulated line. Then follows the umbilical margin, which becomes more marked as the shell increases in size, and inside this margin is a single feebly crenulated line. The lines on the lateral area are equidistant with the exception of the second and third (counting from the peripheral margin), the space between these being twice as great as the space between any other two adjacent lines (see *C* in Woodcut, p. 254).

The surface of the test especially on the outer whorl is covered by very fine lines of growth, which, crossing the whorls somewhat obliquely backward, curve sigmoidally on the sides, and, becoming

more pronounced at the peripheral margin, make a deep, subangular, backwardly-directed sinus on the periphery.

At the commencement of the last fourth of the second whorl, *i.e.*, at about the half of the outer whorl in the specimen, a constriction follows the course of the lines of growth and probably marks the position of a former aperture; a similar but less distinct constriction occurs at about the end of the first fourth of the last whorl.

A small portion of the test is wanting on the periphery near the aperture, and the underlying cast of the body-chamber presents a roughened surface, the rugosities increasing in size towards the centre of the peripheral area and forming interrupted, feebly-curved lines having their convexity forwards. Doubtless, these are epidermids which reproduce the surface of the mantle at this part.

The dimensions of the specimen are as follows:—

Diameter	...	...	...	72	mm.
Width of umbilicus (between sutures)	...	...	...	33	"
" " (" margins)	...	...	...	about 42	"
Greatest thickness of last whorl	...	...	...	about 21.5	"
Height of last whorl at greatest diameter of shell	...	...	...	24	"
Width of periphery at	...	...	...	10	"
" " commencement of last whorl	...	...	...	7	"

The species with which the fossil just described may be compared are *Discites discors*, M'Coy; ¹ *Discites discoideus*, de Koninck, ² sp.; and *Discites compressus*, J. Sowerby, ³ sp.

From *Discites discors*, M'Coy, the shell under consideration differs in having fewer and more compressed whorls, fewer longitudinal lines on the sides, a sulcate periphery with longitudinal lines, and also in the direction of the lines of growth.

It differs from *Discites discoideus*, de Koninck, sp., in being less compressed, in having fewer whorls, the longitudinal lines on the lateral area crenulated, and in having longitudinal lines on the periphery.

Discites compressus, J. Sowerby, sp., has more compressed and more numerous whorls, a nearly smooth shell and the longitudinal lines on the lateral area do not reach to the end of the first whorl. Its umbilical margin is more angular and its periphery more concave.

We therefore propose to regard the specimen as representing a new species and to call it *Discites Hibernicus*. Its specific characters may be stated as follows:—

Discites Hibernicus, sp. nov.

[non *Nautilus Hibernicus*, d'Orbigny, Pal. univ., vol. i. pl. ci. figs. 2, 3. 1847.]

Discoid, compressed; whorls rather more than two; the first half

¹ *Nautilus (Discites) discors*, F. M'Coy, Synopsis of the characters of the Carboniferous Limestone Fossils of Ireland, 1844, p. 17, pl. iii., fig. 5. See also *Nautilus discors* (M'Coy) L.-G. de Koninck, Faune du calcaire carbonifère de la Belgique (Annales du musée royal d'histoire naturelle de Belgique, Palæont. ser., vol. ii.), part i., 1878, p. 143, pl. xxx., fig. 8.

² *Nautilus discoideus*, L.-G. de Koninck, *op. cit.*, p. 133, pl. xxv. fig. 3.

³ *Elipsolites compressus*, J. Sowerby, Min. Conch., vol. i. p. 84, pl. xxxviii, 1813. See also *Discites compressus*, A. H. Foord, Cat. Foss. Ceph. Brit. Mus., part 2, fig. 11, pp. 86 and 91. *Nautilus (Discites) mutabilis*, M'Coy, *op. cit.* p. 18, pl. iii., fig. 7, is a synonym of Sowerby's species.

whorl free, the rest only just in contact; whorl subcircular in section in the young, subquadrate in the adult; periphery convex in the free portion, concave in the last whorl and about one-half of the width of the side exclusive of the umbilical slope; sides flattened; surface of the young shell, also the inner and a portion of the outer whorl ornamented with longitudinal, mostly crenulated, lines; the last whorl bearing backwardly-directed, transverse, sigmoidal lines of growth, which form a deep, backwardly-directed, subangular sinus on the periphery. Septa and siphuncle not observed.

Discites Hibernicus, sp. nov., Lower Carboniferous Limestone, near Dublin.—

A, lateral view of the type-specimen; natural size.

B, peripheral view of the same; natural size.

C, lateral aspect of the portion of the whorl between the letters *a* and *b* in A; somewhat enlarged.

D, the portion of the periphery between the letters *c* and *d* in A; somewhat enlarged.

V.—ON THE THICKNESS, EXPANSION, AND RESULTING ELEVATION OF MARINE DEPOSITS.

By the REV. O. FISHER, M.A., F.G.S.

WHEN one refers back to such a paper as that by Babbage on the Temple of Serapis at Pozzuoli,¹ one feels humiliated by the little advance which has been made in certain branches of dynamical geology within the last sixty years. That paper contains a full and elaborate account of the plan and history of the Temple and of the remarkable changes of level which its site has under-

¹ Read March 12, 1834; under which date see full abstract in Proc. Geol. Soc. vol. ii. p. 72. For paper in full see Journ. Geol. Soc. vol. iii. p. 186.