

IV.—NOTES ON THE CEPHALOPODA BELONGING TO THE STRACHEY COLLECTION FROM THE HIMALAYA. PART I: JURASSIC.

By G. C. CRICK, Assoc. R.S.M., F.G.S., of the British Museum (Natural History).

IN 1851 Captain (now Sir) Richard Strachey¹ communicated to the Geological Society of London a paper "On the Geology of Part of the Himalaya Mountains and Tibet," based upon the observations which he had made during the years 1848 and 1849. The Palæozoic and Secondary fossils therein mentioned were described in 1865 by J. W. Salter and H. F. Blanford respectively in a work of which the title-page reads as follows: "Palæontology of Niti in the Northern Himalaya: being descriptions and figures of the Palæozoic and Secondary Fossils collected by Colonel Richard Strachey, R.E. Descriptions by J. W. Salter, F.G.S., A.L.S., and H. F. Blanford, A.R.S.M., F.G.S. Reprinted with slight corrections for private circulation from Colonel Strachey's forthcoming work² on the Physical Geography of the Northern Himalaya. Calcutta: O. T. Cutter, Military Orphan Press. March, 1865."

On p. 2 of this work Salter says: "The [Strachey] collection was brought home numbered and catalogued, but still required months of patient work in breaking up and chiselling out the specimens. When finally arranged upon tablets, with localities, he [Colonel Strachey] placed them all in the colonial collections of the Museum of Practical Geology, and left me the more pleasant task of comparing and describing them"; and in a footnote on p. 80 Salter adds that "all the figured specimens of Colonel Strachey's collection have been liberally presented by that gentleman to the Museum of Practical Geology, London." In 1880 the foreign collections (and among them the Strachey Collection) were transferred from that Museum to the British Museum. As many of the figured specimens were not marked as such, and having regard to the importance of this collection and in view of the interest which is now being manifested in the sedimentary deposits of the Himalaya, it seemed desirable that the collection should be carefully examined and the described and figured specimens identified and marked. The following notes are based on an examination of the collection as it now exists in the National Museum. The present part refers only to the Jurassic Cephalopoda; these were described by Professor H. F. Blanford in the work already mentioned (pp. 74-88 and 105-111). The systematic position of the species has not been discussed; this is being done by Professor V. Uhlig, of Vienna, who is preparing from a much larger amount of material a memoir on the fauna for publication in the *Palæontologia Indica*.

In Salter & Blanford's work on the "Palæontology of Niti," the plates are numbered from i to xxiii and are all marked vol. ii; of these the first nine are photographs of engraved plates, whilst the rest (x-xxiii) were lithographed and printed in Calcutta. As

¹ Quart. Journ. Geol. Soc., vol. vii (1851), pp. 292-310.

² This work was never published.

I have stated elsewhere,¹ besides a complete copy of the work, the library of the Geological Department of the British Museum contains a set of plates presented by Sir Richard Strachey in 1892. The first nine are engraved, and it is evident that it was from precisely similar imprints that the photographs issued with the work were taken; plates x-xiii, xvi-xviii, and xxi-xxiii were drawn and lithographed by W. H. Baily, the others, xix and xx, by C. R. Bone; and they were all printed by Ford & West, evidently in England. The two sets of plates present, in the drawing of the specimens, sufficient differences to show that the 'English' set was not copied from the 'Indian,' but that most of the figures at any rate were re-drawn from the actual specimens, additional details being given in several instances.² General Sir Richard Strachey informs me that the 'English' set of plates has never been "formally published," so far as he knows, "certainly not in England." The additional details given in this set of drawings has assisted in the identification of some of the figured specimens.

The majority, and probably the whole, of the figures are reversed. Some of them have been so much restored that the identification of the originals is attended with great difficulty. That they did not entirely meet with the approval of Professor Blanford is evident from Salter's remark at the end of the author's descriptions (p. 88) that reads as follows: "Since this was in type the figures have been corrected (as far as the state of the lithographic stones would allow) in conformity with Professor Blanford's instructions.—J. W. S."

In the first volume of his work entitled "Illustrations of Indian Zoology; chiefly selected from the collection of Major-General Hardwicke," published in 1830-32, J. E. Gray figured on plate c four figures of three species of Ammonites which he named *Amm. Nepaulensis* (figs. 1, 2), *A. Wallichii* (fig. 3), and *A. tenuistriata* (fig. 4). According to the legend on the plate, which is stated to have been "published [in] 1829," they all came from "Sulgranees, Nepal."³ Three of these specimens, viz., the originals of figs. 1, 3, and 4, are in the British Museum collection [No. C. 5052 = *A. Nepaulensis*; C. 5041 = *A. Wallichii*; and C. 5051 = *A. tenuistriata*], but the fourth, viz. the original of fig. 2 (*A. Nepaulensis*),

¹ G. C. Crick: Proc. Malac. Soc., vol. v, part 4 (April, 1903), p. 286.

² Compare, for example, in the two sets, pl. xi, figs. 1*a*, 2*e*; pl. xiii, fig. 1*a*; pl. xv, fig. 1*a*; pl. xvi, figs. 1*a*, 2*a*; pl. xvii, figs. 2*a*, *b*; pl. xxi, fig. 1*b*.

³ Respecting the locality of these Ammonites Dr. W. T. Blanford, who was for many years connected with the Geological Survey of India, writes (Proc. Malac. Soc., vol. v, No. 6, October, 1903, p. 345):—"So far as I am aware, no such place as 'Sulgranees' is known, and I may add that it is very doubtful whether the Ammonites represented in the 'Illustrations' came originally from Nepal at all; it is more probable they were brought from further west, from the region whence Ammonites have been supplied to India in all probability for ages. It is certain that there has long been an importation of small Ammonites into India from the Tibetan side of the Himalayas, chiefly from the Spiti district, N.N.E. of Simla, or from the neighbourhood of the Niti pass, north of Kumaun. These Ammonites, together with certain other stones, are known to Hindus by the name of 'Saligram.' I think it is probable that this name, slightly modified and written *Sulgranees*, has been mistaken for the locality of the fossils."

I have not been able to trace. The example of *A. Wallichii* can be easily recognized as the figured specimen; and, although some of the matrix has been removed from the examples of *A. Nepaulensis* and *A. tenuistriata* since Gray's figures were drawn, there is abundant evidence as to the identity also of these specimens.

I have already shown elsewhere that Blanford refigured Gray's types of *A. Wallichii* and *A. tenuistriata* (in part) in pl. xv, figs. 1a-c, and pl. xv, figs. 2b, c, respectively. I also considered Gray's type of *A. Nepaulensis* (fig. 1) to have been refigured by Blanford in pl. xiv, figs. 1a, b, but quite recently I have seen the original of Blanford's figure in the Museum of the Geological Society of London (R. 10,256).¹ Professor Blake thought it possible that this was Gray's figured specimen, but such is not the case. The Geological Society's collection also contains the original of Professor Blanford's pl. x, fig. 7 (*Belemnites sulcatus*).

In the following notes the species are arranged in the order in which they were described in the "Palæontology of Niti," pp. 74-88.

1. BELEMNITES SULCATUS, J. S. Miller.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 76, pl. x, figs. 1-8.)

Of the eight figured specimens seven are now in the National collection. These are the originals of figs. 1-6 [Nos. C. 2566 - C. 2571]² and of fig. 8 [No. C. 2572]. They are accompanied by a Jermyn Street Museum label bearing the inscription "Oolitic: Niti Pass. Belemnites sulcatus. Stra. Him. Pl. 10. Pres. by Col. Strachey." The original of fig. 6 [No. C. 2571] is marked in ink "L" with a cross; the specimen represented in fig. 3 [No. C. 2568] is numbered in ink "1015"³; the original of fig. 5 [No. C. 2570] is numbered "1691" in a similar manner, and each of the originals of fig. 1 [No. C. 2566], fig. 2 [No. C. 2567], and fig. 4 [No. C. 2569] is similarly numbered "1692." The original of fig. 8 [No. C. 2572] is numbered in ink "1720"; it has been broken across and shows a subcentral siphuncle; it does not exhibit any depression near the margin such as is indicated in the figure. It seems, therefore, to be referable to the genus *Orthoceras*, and is most probably of Triassic age. This age of the specimen is supported by its lithological character, which agrees with that of the example of *Orthoceras pulchellum*—a Triassic species—represented in pl. viii, fig. 10b.

The specimen depicted in fig. 7 is now in the Museum of the Geological Society of London⁴ (R. 10,252).

¹ See Professor J. F. Blake, "List of the Types and Figured Specimens in the Collection of the Geological Society of London," 1902, pp. 34 and 55.

² The numbers in square brackets refer to the Registers in the Geological Department, British Museum (Natural History).

³ From a comparison with the Silurian Cephalopoda in the Strachey Collection it is quite evident that these numbers refer to Colonel Strachey's Catalogue of Localities referred to by Salter on p. 4 at the end of his description of *Asaphus emodi*.

⁴ The specimen is duly recorded in Professor Blake's "List of the Types and Figured Specimens in the Geological Society of London," 1902, p. 55.

Besides these seven specimens five fragments were also transferred from the Museum of Practical Geology as part of the Strachey Collection. They are accompanied by a Jermyn Street Museum label bearing the inscription "Oolite: Niti Pass. Belemnites sulcatus, var. canaliculatus. Stra. Him. Pl. 10. Pres. by Col. Strachey," and are now numbered C. 2565*a-e*. Only two of these have any original ink-marks on them; the specimen No. C. 2565*c* is numbered "1015," like the original of fig. 3, and the example No. C. 2565*b* is marked "Laptet." The "L" of the word Laptet is in the same handwriting as, and precisely like, the "L" on the specimen represented in fig. 6 [No. C. 2571]. It is therefore possible that the "L" on that specimen may stand for "Laptet."

On p. 106 of the "Palæontology of Niti," H. F. Blanford puts Oppel's *Belemnites Gerardi* as a synonym of the present species, for which he retains Miller's name *B. sulcatus*, this claiming priority of publication.

With regard to the dimensions of the specimens Professor Blanford says: "The largest specimen in Colonel Strachey's collection measures as follows:—length, 3·6 in.; antero-posterior diameter, 0·9 in.; transverse diameter, 0·9 in." There appears to be some mistake here, because the largest guard at present in the collection, the original of fig. 1, has the following dimensions:—length, 126·5 mm. (nearly 5 inches); antero-posterior diameter, 30 mm. (1·2 in.); transverse diameter, 28 mm. (about 1·1 in.). The specimen represented in fig. 2 is nearly of the same size, its measurements being:—length, 115 mm. (4·5 in.); antero-posterior diameter (at about 30 mm. from the anterior end), 27 mm. (1·05 in.); transverse diameter (at same place), 27 mm. (1·05 in.).

2. AMMONITES ALATUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 76, pl. xviii, figs. 3*a, b*.)

Of this species three fragments belonging to the Strachey Collection are now in the British Museum. Two of these [Nos. C. 7364*a* and *b*] are accompanied by a Jermyn Street Museum label bearing the inscription "Oolitic. Niti Pass. Ammonites alatus. Coll. by Col. Strachey," but they are not numbered in ink like many of the Strachey specimens. With them there is a guttapercha squeeze of the example numbered C. 7364*a*. To the third specimen [No. C. 7365], which is numbered "1834" in ink, there is attached a label bearing the words "alatus. Spiti Shales" written in pencil.

One specimen [No. C. 7364*b*] is merely the impression of the half of one side of a shell; the other two [No. C. 7364*a* and No. 7365] are evidently "the two fragmentary casts" from which was "compiled" the "restoration" that is represented in Blanford's pl. xviii, fig. 3*a*. There is no specimen in the collection which can be identified with Blanford's fig. 3*b*, the original of which possibly furnished the dimensions given by the author.

Although two of the specimens [Nos. C. 7364a and b] are labelled "Niti Pass" and the third [No. C. 7365] merely "Spiti Shales," yet the matrix and mode of preservation of the specimens are such as to lead one to believe that they all came from the same locality.

3. AMMONITES NEPAULENSIS, J. E. Gray.

(*A. Nepaulensis* [sic], J. E. Gray: *Illustr. Indian Zool.*, vol. i, 1830-1832, pl. c, figs. 1 and 2. *A. Nepalensis* [sic], H. F. Blanford, in *J. W. Salter & H. F. Blanford: Palæont. Niti*, 1865, pl. xiv, figs. 1a, b.)

There are two examples of this species in the National collection [Nos. C. 5052 and C. 7687].

One [No. C. 5052] is undoubtedly one of the specimens figured by Gray (op. cit., pl. c, fig. 1).¹ It is accompanied by a label belonging to the Museum of Practical Geology bearing the inscription "Oolitic; Niti Pass. Ammonites Nepalensis. Coll. by Col. Strachey." This is certainly an error; it could not have been collected by Colonel Strachey, because the specimen was figured in 1830-32 by Gray, whereas Colonel Strachey's specimens were not obtained until the years 1848 and 1849.²

The fossil is imbedded in a nodule, the greater part of one side only of the specimen being exposed. Since Gray's figure was drawn an attempt has been made to develop the fossil. A little more of the anterior part of the outer whorl has been uncovered, and some matrix has been removed in front of the aperture so as to display the commencement of the outer whorl, but only a little piece of this—a length of 12 or 13 mm.—has been successfully exposed close to the aperture. The surface of the rest of the first third of the outer whorl that was covered by matrix when Gray's figure was drawn has been injured during development. A small piece of the penultimate whorl bearing five principal ribs has been uncovered immediately beneath the aperture. The ribbing is well preserved over a little more than half of the outer whorl; it is very regular, and there are eighteen principal ribs in the last half-whorl. Notwithstanding the attempt at development there is no difficulty whatever in recognizing the fossil as the original of Gray's fig. 1. A specimen in the Museum of the Geological Society of London (R. 10,116) is thought possibly to be Gray's type (fig. 1), but an examination of the fossil clearly shows that such is not the case.³ The dimensions of the exerted portion of the fossil, as nearly as can be measured, are:—diameter of shell, 101 mm.; height of outer whorl, 46.5 mm.; thickness of outer whorl, estimated at about 37 mm.; width of umbilicus, 23 mm.

The other specimen in the Museum collection [No. C. 7687] bears a label on which is written in pencil simply the name "*A. nepalensis*"; there is no other information with the specimen,

¹ G. C. Crick: *Proc. Malac. Soc.*, vol. v, pt. 4 (April, 1903), p. 285.

² *Quart. Journ. Geol. Soc.*, vol. vii (1851), p. 294.

³ See Professor J. F. Blake's "List of the Types and Figured Specimens in the Collection of the Geological Society of London," 1902, p. 34.

but from its lithological character there can be no doubt whatever that it came from the Himalaya; it forms part of a nodule, like so many of the Niti fossils. It is 91 mm. in diameter.

I have not been able to recognize in the collection the original of Gray's pl. c, fig. 2.

I have elsewhere expressed the opinion that the original of Gray's fig. 1 was also the original of Blanford's pl. xiv, figs. 1a, b,¹ but this statement is incorrect, the original of Blanford's figures being in the Museum of the Geological Society of London (R. 10,116).² Blanford's figure is reversed. Both sides of the fossil are free from matrix, and well preserved, the side opposite to that which is figured being the better preserved of the two. On the figured side the surface of the first third of the outer whorl has been injured just as in the example figured by Gray; this was evidently the septate part; no septa are visible on the remaining two-thirds of the whorl, which therefore most probably constituted the body-chamber. The inner whorls, though incomplete, are better preserved than in Gray's type-specimen. There is a slight irregularity in the ribbing of the outer whorl, but not nearly so much as is indicated in the figure; on the side of the specimen opposite to that which is figured there are 33 or 34 principal ribs in the outer whorl, nineteen of these being in the last half-whorl. The measurements given by Professor Blanford are as follows:—diameter, 4·8 inches [= 122 mm.]; diameter [or height] of outer whorl, 2·2 inches [= 56 mm.]; thickness, 1·9 inches [= 48·5 mm.]. My own measurements of the fossil are:—diameter, 121 mm.; height of outer whorl, 55 mm.; height of outer whorl above preceding, 38·5 mm.; thickness of outer whorl, 48 mm.; width of umbilicus, 29 mm.

4. AMMONITES TENUISTRATUS, J. E. Gray.

(*A. tenuistriata*, J. E. Gray: Illustr. Indian Zool., vol. i, 1830–1832, pl. c, fig. 4.
A. tenuistriatus, J. E. Gray: H. F. Blanford, in J. W. Salter & H. F. Blanford, Palæont. Niti, 1865, p. 78 [pl. xiv, fig. 2 ?], pl. xv, figs. 2a–c.)

The British Museum collection contains Gray's type-specimen [No. C. 5051]. It is accompanied by a label belonging to the Museum of Practical Geology bearing the following inscription: "Oolitic; Niti Pass. Ammonites tenuistriatus. Coll. by Col. Strachey (belongs to Brit. Mus.)," but the statement that it belonged to the Strachey Collection is obviously incorrect, for, as we have already stated in regard to *A. Nepaulensis*, Gray's figures were published many years before Colonel Strachey's specimens were collected. Although some of the matrix has been removed since Gray's figure was drawn, there are still indications on the fossil of the original extent of the matrix, and there can be no doubt whatever about its being the figured specimen. I have already shown elsewhere³ that a portion of this specimen in its present condition formed the original of Professor Blanford's pl. xv, figs. 2b, c.

¹ G. C. Crick: Proc. Malac. Soc., vol. v, pt. 4 (April, 1903), pp. 286–7.

² Professor J. F. Blake: "List of the Types and Figured Specimens in the Collection of the Geological Society of London," 1902, p. 34.

³ G. C. Crick: Proc. Malac. Soc., vol. v, pt. 4 (April, 1903), pp. 288–9.

The National collection also contains the original of pl. xiv, fig. 2 [No. C. 5039] and the natural mould [No. C. 5036] from which the guttapercha impression figured in pl. xv, fig. 2a was taken; both specimens belonged to the Strachey Collection, and were transferred from the Museum of Practical Geology in 1880. Their exact locality is not recorded; they probably came from the Niti Pass, because this is the only locality given by Salter & Blanford in their "List of the Himalayan Oolitic Fossils from the Niti and Spiti Passes" (p. 102). The specimen No. C. 5039 was accompanied by a label bearing simply the name "*Amm. Jubar*, Strachey."

5. AMMONITES UMBO (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 78, pl. xvii, figs. 2a-d.)

Professor Blanford states that "the only specimen in the [Strachey] collection is a fragment of the whorl represented two-thirds of the real size." The fragment is now in the British Museum collection [C. 5040]; it was transferred from the Museum of Practical Geology, labelled "Oolitic. Niti Pass. Ammonites umbo (Stra.). Coll. by Col. Strachey." It is numbered in ink "1690." It is entirely septate: the suture-line is well shown, but is very difficult to follow; its details are not quite correctly represented in the figure (2d). The suture-lines are not indicated in the figure in the 'Indian' set of the plates of Salter & Blanford's work, but in the 'English' set they are distinctly represented.

The measurements of the specimen, taken at about its centre, are as follows:—height of whorl, 1·5 in. or 38 mm.; width of ditto, excluding nodes, 1·9 in. or 48 mm.; width of ditto, including nodes, 2·25 in. or 57 mm. The dimensions given by Blanford are:—diameter [= height] of whorl, 1·7 in.; thickness [or width], 2·1 in.

On p. 106 Blanford places this species, as well as Oppel's *A. Seideli*,¹ as a synonym of the species *A. Hyphaspis*, which he himself described in 1863.²

6. AMMONITES GUTTATUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 79, pl. xiii, fig. 2.)

The example that was in the Strachey Collection is described by Professor Blanford as "an imperfect external cast of one side of a shell." This specimen is now in the British Museum collection [No. C. 7358], having been transferred in 1880 as part of the Strachey Collection from the Museum of Practical Geology. It was labelled "Oolitic. Niti Pass. Ammonites guttatus. Coll. by Col. Strachey." The figure given in the "Palæontology of Niti" is a somewhat restored, and very unsatisfactory, representation of a cast taken from this natural mould; its unsatisfactory character was recognized by the author, who states that "the restoration herewith given at Plate 13, fig. 2, is . . . erroneous, the diameter

¹ Pal. Mittheil., 1863, p. 283, pl. lxxx, figs. 3a, b.

² Journ. Asiatic Soc. Bengal, vol. xxxii, No. 2 (1863), p. 132, pl. iv, figs. 2, 2a, 2b.

of the whorls being probably at least half as much again as they are represented, while from each tubercle springs a bundle of 4 or 5 ribs, which cross the ventral region with a slight convex curve towards the mouth."

Owing to the imperfection of the external part of the outer whorl it is impossible to give accurate dimensions of the specimen.

This species was first described in 1863 by Professor Blanford,¹ who regarded Oppel's *Ammonites Cautleyi*² as a synonym.³

7. AMMONITES BIPLEX, J. Sowerby.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 79, pl. xi, figs. 1*a-c*; pl. xii, figs. 1*a-c*.)

Professor Blanford says:—"Two specimens of this Ammonite occur in the collection, together with some impressions of the shell on black siliceous nodules. I can detect no difference between them and the characteristic Oxford clay specimens of Europe. They are identical also in all respects (mineral character included) with those from Spiti, lately described by myself, from Dr. Gerard's collection."

From the Museum of Practical Geology were transferred two specimens [Nos. C. 5033 and C. 5034] belonging to the Strachey Collection, labelled, with one of that Museum's labels, "Oolitic. Niti Pass. Ammonites biplex. Coll. by Col. Strachey"; and two fragments [Nos. C. 7683*a*, *b*] accompanied by a label, "A. biplex. Spiti Shales," but it is not recorded how these were obtained.

To one of the two Strachey specimens [No. C. 5033] is attached another M.P.G. label, on which is written in ink simply the name "Ammonites biplex." This is evidently the original of pl. xi, fig. 1*a*, the figure being reversed and considerably restored; its anterior end, however, does not exhibit a septal surface such as is shown in fig. 1*b*, nor is its suture-line visible; it cannot, therefore, have formed the originals of the figures 1*b*, *c*. Nor are these characters displayed on the other specimen [C. 5034] in the Strachey Collection. This is numbered in ink "1032*a*," and it also bears a small square white label, originally bearing the number "24," but this has been crossed out and the number "1032*a*" substituted. There is no specimen in the collection agreeing with figs. 1*a-c* of pl. xii. Perhaps fig. 1*a* is in part a restoration of the example No. C. 5034, but this is far from certain.

The larger of the two fragments from the "Spiti Shales" exhibits the suture-line somewhat indistinctly, but I do not think it could have furnished the drawing of the suture-line given either in pl. xi, fig. 1*c* or pl. xii, fig. 1*c*.

8. AMMONITES TRIPLICATUS, J. Sowerby.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 80, pl. xiii, figs. 1*a-c*.)

Professor Blanford says:—"This Ammonite is only distinguished

¹ Journ. As. Soc. Bengal, vol. xxxii, No. 2 (1863), p. 131, pl. iv, figs. 1, 1*a*, 1*b*. According to F. Stoliczka, the type-specimen "is deposited in the Asiatic Society's collection, Calcutta" (Mem. Geol. Surv. India, vol. v, 1866, p. 104, footnote).

² Pal. Mittheil., iv (1863), p. 279, pl. lxxviii, figs. 1*a*, *b*, 2*a*, *b*.

³ Palæont. Niti, 1865, p. 106.

from the preceding by the fasciculate character of the ribs in adult specimens, young shells of the two species being undistinguishable."

Two specimens are represented on pl. xiii. Figs. 1a, b are the lateral and front views (reversed and somewhat restored) of the specimen in the British Museum collection bearing the register number C. 5042. This fossil was transferred from the Museum of Practical Geology, but there is neither one of that Museum's labels nor any other original label with it, nor can I see any numbers written upon the fossil. But its agreement with Blanford's figure cannot be doubted for a moment. The author gave no dimensions of the fossil. The measurements are:—diameter of shell, 85 mm.; height of outer whorl, 28 mm.; thickness of outer whorl, 31 mm.; width of umbilicus, 37.5 mm. The sutures are not shown.

Fig. 1c has been drawn from a guttapercha cast of a natural mould; both the cast and the natural mould are in the national collection [Nos. C. 5031 and 5031a]. They were transferred from the Museum of Practical Geology, and are accompanied by one of that Museum's labels as follows:—"Oolitic: Niti Pass. Ammonites biplex (Sow.). Coll. by Col. Strachey." This was written in ink, but the word "biplex" has been crossed out in pencil, and above it has been written in pencil the name "triplicatus." The fossil is clearly the original of Blanford's figure, but this represents only a part of the specimen, and has been somewhat restored.

9. AMMONITES TORQUATUS, J. de C. Sowerby.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palaeont. Niti, 1865, p. 80, no fig.)

Professor Blanford's observations on this species are as follows:—

"The only character by which I can distinguish this species from *A. biplex*, Sow., are:—Its thicker and more depressed whorls, and a slight notching of the ribs above the siphuncle. These characters are exhibited by the typical Cutch specimens, as well as by those in Colonel Strachey's cabinet, and also by the specimens described and figured by me, in the Spiti collection of Dr. Gerard. The distinctness of the notching and the depression of the whorls vary, however, in different specimens, and a more extensive comparison is requisite to decide whether *A. torquatus* be really distinct from *A. biplex*."

"Mr. Sowerby, in his description of the figured specimens from Cutch, states that they are distinct from 'a Himalayan species,' in having an 'incurved inner margin.' On comparison of the specimens, I can, however, detect no such difference, nor, indeed, any other than that the Himalayan specimens have uniformly more numerous (about 55) ribs than those from Cutch, which have about 45."

Among the specimens which were transferred from the Museum of Practical Geology as the Strachey Collection there are four examples [Nos. C. 7676a-d] labelled "Oolitic: Niti Pass. Ammonites torquatus (Sow.). Coll. by Col. Strachey"; of these, three have the broad whorls characteristic of *A. torquatus*, whilst the fourth has somewhat more compressed and more finely ornamented whorls

and is certainly specifically distinct. The largest specimen [No. C. 7676a], a broad-whorled form, has scratched upon it the locality "Lakur." Its dimensions are :—diameter of shell, 59·5 mm. ; height of outer whorl, 18·5 mm. ; thickness of outer whorl, 31 mm. ; width of umbilicus, 25·5 mm. The largest specimen but one is a little better preserved, with sharper and somewhat coarser ornaments, but is not such a broad-whorled form as will be seen from its dimensions, which are :—diameter of shell, 57·5 mm. ; height of outer whorl, 17·5 mm. ; thickness of outer whorl, 26·5 mm. ; width of umbilicus, 27·5 mm.

(To be continued.)

V.—STEVN'S KLINT.

By the Rev. E. HILL, M.A., F.G.S.

THE fine cliff of Stevn's Klint on the Danish coast is seldom mentioned in English geological writings. As it presents a clean section several miles long of the uppermost Danish Chalk, and is easily visited in a day's excursion from Copenhagen, a short sketch may have some interest for readers of this Magazine. It has none of the astonishing scenery displayed by the coasts of Möen and Rügen ; the land is level and bare, the cliff is not broken and not wooded : yet it possesses a prettiness of its own.

A railway running south from Kjöge, a town south-west of Copenhagen, forks at Haarlev : the western branch leads to the famous inland quarry of Fakse,¹ the eastern to a coast hamlet called Rödvig. The Chalk in the cliff here is only a few feet high, but it rises in the eastward direction and may be followed along its edge for the full length. Or the train may be left at Storre Hedinge, a little town with a respectable hotel, whence four miles of road lead to the cliff at Höjerup, where the section is most accessible.

The ancient church here stands on the cliff, closer to the edge than those at Dunwich or Sidestrand, and, unlike those, in full use still. Guidebooks print a local legend that it would have fallen long ago but that every Christmas night it shifts itself a hands-breadth (*hanefjed*, a cock's step) inland, to remain as before uninjured on the brink.

The country traversed from Storre Hedinge is level, almost without undulation, to the cliff edge. The cliff section shows this to be the upper surface of Glacial Drift, here a somewhat earthy or silty clay, containing stones and occasional boulders up to a foot across. Clean sections are not very frequent. In these, as elsewhere in Baltic Drifts, there is sometimes an appearance of divisions ; e.g., about 1 or 1½ miles north of the Lighthouse I noted (in descending order) : red earthy clay, 3 feet ; light-brown, dry, cracked clay, with chalk and large boulders, 4 feet or more ; pale chalky clay, tougher and less cracked, with more stones and flints, and with a boulder

¹ Commonly, but wrongly, Faxoe. See GEOL. MAG., 1901, p. 486.

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ORIGINAL ARTICLES.

I.—A RETROSPECT OF PALÆONTOLOGY IN THE LAST FORTY YEARS.¹

(PART II.)

IN any retrospect of scientific progress there are always special points, 'golden milestones,' along the road by which we travel, which mark unusual stages in our journey. Zittel, in his "History of Geology and Palæontology," fixes the 'heroic period' from 1790 to 1820, when the great masters of our science, Werner, Pallas, Saussure, Hutton, Playfair, William Smith, Leopold von Buch, Alexander von Humboldt, Alex. Brongniart, and Cuvier arose and laid the foundations of Geology.

The more recent development from 1820 to the close of the century may seem like an unbroken line of advance in geology and palæontology; but such is not the case. Special events of scientific interest from time to time, like the arrival of reinforcements, have given us fresh support and encouragement. The establishment of Geological Surveys in this country, in America, and on the Continent added an enormous onward impulse to such investigations, as did also the meetings of the Geological Society of London and its publications. The establishment of the British Association in 1830, and the increasing tendency to teach Natural Science in our great Universities, have stimulated and encouraged a very large number of ardent workers to enter the geological field. Nor must we forget the interest which the writings of Sedgwick, Buckland, Murchison, Lyell, Phillips, Forbes, Ramsay, Geikie, and many others, produced in the minds of students who came under their influence.

But the most powerful and wide-spreading impulse given to geological and palæontological investigations was undoubtedly due to the publication by Charles Darwin of his "Origin of Species," and the revolution caused by the introduction of the doctrine of 'the variation of species,' which the older naturalists had never admitted, having always treated them as permanent and immutable ideas. Only those of us who have lived through the period between 1858 and 1878 can fully realize the vast and radical change in the current

¹ Part I, of "A Retrospect of Geology," appeared in our January number, 1904, pp. 1-6.—EDIT. GEOL. MAG.

Palæomastodon differ in no important points from the corresponding bones of *Elephas*. The calcaneum, however, is less short and stout than in the recent forms, the *tuber calcis* being more elongate; some calcanea from the Miocene of France, probably belonging to *Tetralodon angustidens*, approximate most nearly to the Egyptian specimen.

A portion of the right ramus of a mandible shows that there existed in the Upper Eocene beds a species of *Palæomastodon* considerably smaller than *P. beadnelli*, even allowing for a very wide range of individual variation in size in that species. The specimen in question consists of part of the ramus and the coronoid process of an immature mandible, in which m. 3 has not yet been cut, although it is completely developed. M. 3 differs from the same tooth in *P. beadnelli* in having the outer half of the third transverse crest more clearly composed of two distinct tubercles, and in the presence of a short fourth transverse crest separated from the third by a fairly deep valley and composed of three small tubercles. M. 2 is trilophodont, the anterior valley being partly blocked by an accessory tubercle; as usual in this genus, the second molar is considerably larger than the first. This latter, which is already considerably worn, is also trilophodont. Pm. 4 is bilophodont, the anterior crest being considerably the higher. Pm. 3 consists of a single high anterior cusp and a low heel. This species may be called *Palæomastodon minor*; its dimensions compared to those of *P. beadnelli* are shown in the following table, which in the first column gives the length of the teeth in the type of *P. minor*, in the second of those of a small individual (? female) of *P. beadnelli*, and in the third of those of the type of that species:—

	<i>P. minor</i> .	<i>P. beadnelli</i> (? female).	<i>P. beadnelli</i> (type).
m. 3...	47 mm.	65 mm.	78 mm.
m. 2...	45 "	55 "	65 "
m. 1...	32 "	41 "	48 "
pm. 4	28 "	39 "	48 "
pm. 3	28 "	30 "	?

IV.—NOTES ON THE CEPHALOPODA BELONGING TO THE STRACHEY COLLECTION FROM THE HIMALAYA. PART I: JURASSIC.

By G. C. CRICK, Assoc. R.S.M., F.G.S., of the British Museum (Natural History).

(Concluded from the February Number.)

10. AMMONITES SCRIPTUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, p. 81, pl. xvi, figs. 2a-c.)

According to Professor Blanford the only example of this species in the Strachey Collection was the fragment which he figured. This is now in the British Museum collection [No. C. 5045]; it was transferred from the Museum of Practical Geology, labelled with one of that Museum's labels "Oolitic: Niti Pass. *Ammonites scriptus* (Stra.). Coll. by Col. Strachey." The figures, which are all reversed,

are not good. The portion of the fossil that is figured is entirely septate; the anterior part of the specimen that formed the base of the body-chamber is not included in the figure, nor does the figure show the shorter intermediate ribs which extend over the outer half of the lateral area of the whorl.

Blanford (p. 106) regarded this species as a synonym of Oppel's *A. Stanleyi*,¹ a species which he considered to have priority of publication.

11. AMMONITES JUBAR (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 82, pl. xx, figs. 2a-c; pl. xxi, figs. 1a-c.)

The British Museum collection contains three examples of this species, numbered C. 5043, C. 5044, and C. 5030 respectively.

The specimen numbered C. 5043 is the original of plate xx, figs. 2a, b. The posterior half of the outer whorl, that is, the portion to the right of the break indicated in fig. 2a, is now missing, but the cement still adhering to the fossil indicates its former presence; it was possibly from the now missing part that the suture-line depicted in fig. 2c was drawn. About one-third of the rest of the outer whorl is septate, whilst the remainder formed part of the body-chamber. As part of the Strachey Collection this specimen was transferred from the Museum of Practical Geology, labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites jubar. Coll. by Col. Strachey."

The example No. C. 5044 is the natural mould, of which a gutta-percha impression (also preserved) is figured in pl. xxi, fig. 1a. Belonging to the same collection it was also transferred from the same Museum. It is labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites jubar (Stra.). Coll. by Col. Strachey." To it is fastened a small white label on which is written in ink "Ammonites jubar, R. S. Budarinathix"; but the word 'jubar' has been crossed out in ink.

The specimen No. 5030 also belonged to the Strachey Collection and was transferred from the Museum of Practical Geology, but the precise locality of the specimen is not recorded. It is the original of plate xxi, fig. 1b, and probably also furnished the restored outline given in fig. 1c.

I have not been able to recognize the original of the suture-line which is figured on pl. xx and numbered 2d; this appears not to be referred to in the text.

On p. 106 Professor Blanford placed this species as a synonym of Oppel's *A. Sabineanus*,² a name which he considered to have priority of publication.

¹ A. Oppel, "Ueber ostindische Fossilreste aus den secundären Ablagerungen von Spiti und Gnari-Khorsum in Tibet": Pal. Mittheil., iv (1863), p. 282, pl. lxxix, figs. 1a-c.

² A. Oppel, "Ueber ostindische Fossilreste aus den secundären Ablagerungen von Spiti und Gnari-Khorsum in Tibet": Pal. Mittheil., iv (1863), p. 288, pl. lxxxii, figs. 1a-c, 2a, b.

AMMONITES JUBAR, var. A. MULTIRADIATUS (R. Strachey MS.),
H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 82.)

Professor Blanford states that "this differs from the normal form in the greater number of its ribs (55), which are consequently more close set and filiform. The variation probably occurs only in young shells." In the Strachey Collection transferred from the Museum of Practical Geology, and labelled with that Museum's label "Oolitic: Niti Pass. Ammonites triplicatus (Sow.). Coll. by Col. Strachey," there is a fairly complete specimen [C. 7366], 46.5 mm. in diameter, which agrees very well with Blanford's description of this variety. It has about 52 ribs in the outer whorl, and although labelled '*Ammonites triplicatus*' it certainly does not agree with that species. This is the only specimen in the collection that corresponds to Blanford's description, and it is therefore most probably the variety referred to.

12. AMMONITES OCTAGONUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 83, pl. xii, figs. 2a, b.)

According to Professor Blanford's description, "the only specimen of this Ammonite in Colonel Strachey's Collection is a fragment, but of larger dimensions and in better preservation than that previously described from Spiti." This fragment is now in the British Museum collection [C. 5032], having been transferred from the Museum of Practical Geology, accompanied by one of that Museum's labels on which was written in ink simply the name "Am. octagonus, Strachey," without any record of either horizon or locality, and without any indication that it was the figured specimen. But of this fact there cannot be the slightest doubt; fig. 2a representing a lateral aspect of the fragment (reversed), and fig. 2b a much restored transverse section of the whorl.

Later in the same work (p. 106) Blanford united Strachey's *A. Hookeri* with the present species under the name *A. octagonus*, this species having been described some two years previously.¹

13. AMMONITES HOOKERI (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 83, pl. xvii, figs. 1a-d.)

The figures illustrating Professor Blanford's description (pl. xvii, figs. 1a-d) have been drawn (reversed) from two specimens, which are now in the British Museum collection [C. 5048 and C. 5049]. Fig. 1a has been drawn from the example bearing the register number C. 5048, and the other figures have been taken from the specimen No. C. 5049. Both specimens were transferred, in 1880, from the Museum of Practical Geology, the smaller one [C. 5048] labelled "Oolitic: Niti Pass. Ammonites Hookeri (Stra.). Coll. by Col. Strachey." There is now no Jermyn Street Museum label with the larger specimen, but there is no doubt whatever as to its

¹ Journ. As. Soc. Bengal, vol. xxxii, No. 2 (1863), p. 128, pl. i, figs. 5a-c.

being the other specimen figured by Blanford. Each fossil has been numbered in ink "1830"; this is Strachey's original number, and indicates that the two examples came from the same locality, viz. the Niti Pass, this being the only locality mentioned in the list of fossils given on p. 102 of Salter & Blanford's work.

The posterior third of the outer whorl of the smaller example (fig. 1*a*) appears to be septate, whilst the rest seems to have formed part of the body-chamber. The larger example (figs. 1*b-d*) is entirely septate; it is part of a whorl which must have been at least 70 mm. in diameter. The suture-line has been painted in, and evidently formed the original of fig. 1*d*. The transverse section depicted in fig. 1*c* has been much restored.

On p. 106 Professor Blanford places this species as a synonym of Strachey's *A. octagonus*, to which species he also refers Oppel's *A. Sommerringi*.¹

14. AMMONITES MEDEA (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 84, pl. xix, figs. 5*a, b*.)

Professor Blanford says: "The only specimen of this MSS. species of Colonel Strachey in his collection is the fragment figured, from which it is difficult to pronounce upon its affinities. It may be either, as surmised by Colonel Strachey, a species allied to *A. Jason*, Zieten, or a portion of a large specimen of the tuberculate form of *A. Wallichii*, Gray."

This specimen is now in the British Museum collection [C. 5047], having been transferred from the Museum of Practical Geology, in 1880, labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites medea. Coll. by Col. Strachey." It bears the number "18" in white paint. It is not well represented in the figures: the spines are not nearly so much elevated as shown in fig. 5*b*; and further, they are symmetrically disposed in regard to the median line of the flattened (i.e. the peripheral) area, and not irregularly placed as might be supposed from fig. 5*a*; the two rows of spines are 13 mm. apart, the spines being exactly opposite each other and arranged in each row at intervals of about 5 mm. The fragment shows no traces of septa, and appears to have formed part of the body-chamber.

15. AMMONITES WALLICHII, J. E. Gray.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 84, pl. xv, figs. 1*a-c*; pl. xix, figs. 1*a-c, 2a-c*.)

Besides the specimen [C. 5041] which was originally figured by Gray (Illust. Indian Zoology, 1830-32, pl. c, fig. 3) and refigured, as elsewhere shown,² by Blanford (op. cit., pl. xv, fig. 1), and the example [31,106] referred to by Blanford (p. 84, footnote) as measuring "not less than six inches in diameter," the British

¹ A. Oppel, "Ueber ostindische Fossilreste aus den secundären Ablagerungen von Spiti und Gnari-Khorsum in Tibet": Pal. Mittheil., iv (1863), p. 280, pl. lxxx, figs. 1*a, b*.

² G. C. Crick: Proc. Malac. Soc., vol. v, pt. 4 (April, 1903), p. 287.

Museum contains six specimens which were transferred from the Museum of Practical Geology. Five of these [Nos. C. 7675a-e] belonged to the Strachey Collection, and were labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites Wallichii. Coll. by Col. Strachey," but on one [No. C. 7675d] there has been written in ink the locality "nr. Chirchun." The sixth specimen [No. C. 7684] was labelled "A. Wallichii, var. γ . Spiti shales," but though there is no record as to its having formed part of the Strachey Collection, there is good reason to believe that it did, since it is numbered "11" in white paint exactly like the specimen No. 7675d.¹

Professor Blanford's figures of this species represent several individuals. His pl. xv, figs. 1a, b represent Gray's type-specimen, to which also belongs the suture-line lettered in the published copies of the plate 2b,² evidently a mistake for 1c.

The specimen in the British Museum numbered C. 7675a is the original of pl. xix, figs. 1a and b; the figures, besides being reversed, have been very much restored, the first third of the outer whorl being very imperfect in the original. As it does not exhibit the suture-line, fig. 1c must have been drawn from another specimen; this we have not yet been able to identify in the collection.

The example in the same collection numbered C. 7675b is the original of pl. xix, figs. 2a, b; both figures have been reversed and restored; part of the matrix has been omitted, the first part of the outer whorl is now absent, and the peripheral terminations of the ribs are represented much too strong. The suture-line has been painted in and was evidently copied in fig. 2c, but this specimen does not exhibit the portion of the suture-line on the inner area of the whorl at all clearly; this portion of the line, however, is well shown and has been marked on the example No. C. 7684. It is concluded, therefore, that figs. 2a, b were drawn from the example No. C. 7675b, and that fig. 2c was taken chiefly from the same specimen, but partly also from the fossil No. C. 7684. Although there is no record that this specimen originally belonged to the Strachey Collection, there is, as we have already stated, good evidence for believing that such was the case.

Blanford (p. 106) regards Oppel's *A. Mörikeanus*³ as a synonym of this species.

16. AMMONITES ROBUSTUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: Palæont. Niti, 1865, p. 85, pl. xvi, figs. 1a-c.)

Professor Blanford figured two specimens which he referred to this species; they are both in the British Museum collection

¹ Other specimens are similarly numbered. Thus, *A. medea* [C. 5047], pl. xix, figs. 5a, b, is marked "18"; *A. Wallichii* [C. 7675a], pl. xix, figs. 1a, b, is marked "12"; and *A. Wallichii* [C. 5041], pl. xv, figs. 1a-c (which is also one of Gray's type-specimens), is marked "10."

² G. C. Crick: op. cit., p. 288.

³ A. Oppel, "Ueber ostindische Fossilreste aus den secundären Ablagerungen von Spiti und Gnari-Khorsum in Tibet": Pal. Mittheil., iv (1863), p. 281, pl. lxxx, figs. 2a, b.

[Nos. C. 5050 and C. 5046]. They were regarded as of Jurassic age, but they are much more probably Triassic fossils, and have been elsewhere described as such by the present writer.¹

17. AMMONITES GRIFFITHII (R. Strachey MS.), H. F. Blanford.
(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, p. 86, pl. xx, figs. 1a-c.)

This species was founded upon a single specimen, which, as described by Professor Blanford, "is an imperfect shell, and bears the remains of three-fourths of another whorl. The figure is three-fourths of the real size of the specimen." This fossil is now in the British Museum collection [No. C. 5038]; it was transferred from the Museum of Practical Geology, labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites Griffithi. Coll. by Col. Strachey." The specimen is entirely septate; the suture-line (fig. 1c) seems to have been taken from quite close to the anterior end of the fossil, where it has been traced in white paint.

According to Blanford (p. 106) this species is a synonym of *A. Theodorii*, Oppel,² a name which claims priority of publication.

18. AMMONITES STRIGILIS, H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, p. 87.)

Professor Blanford refers to an example in the Strachey Collection in the following terms:—"A single specimen (cut in half and polished) of this Ammonite (without specified locality) only differs from the original Spiti specimen in its somewhat larger size. Diameter of shell, 2½ in. Diameter of outer whorl, 1½ in."

I have not been able to identify an example of this species in the Strachey Collection in the British Museum, but the National collection contains the specimen [39,797], to which, when describing this species in 1863 (*Journ. Asiatic Soc. Bengal*, vol. xxxii, 1863, p. 126) from the half of a cut specimen, Blanford refers as possibly the fellow of the type-specimen. It is labelled "Himalaya"; but its history and exact locality are unrecorded.

19. AMMONITES ACUCINCTUS (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, p. 87, pl. xviii, figs. 1a-c; pl. xix, figs. 4a-d; var. *a* (*A. mundus*, R. Strachey MS.), pl. xviii, figs. 2a, b.)

Of this species the British Museum collection contains five more or less incomplete examples [Nos. C. 7360a-e] that belonged to the Strachey Collection and were transferred from the Museum of Practical Geology, labelled with one of that Museum's labels "Oolitic: Niti Pass. Ammonites acucinctus (Stra.). Coll. by Col. Strachey"; also two other examples [Nos. C. 7361a, b], with a plain

¹ G. C. Crick: *Proc. Malac. Soc.*, vol. v, No. 4 (April, 1903), pp. 290 et seq.

² A. Oppel, "Ueber ostindische Fossilreste aus den secundären Ablagerungen von Spiti und Gnari-Khorsum in Tibet": *Pal. Mittheil.*, iv (1863), p. 280, pl. lxxxviii, figs. 3a-c (and pl. lxxxiii, figs. 2a, b).

label bearing in pencil the words "A. acucinctus. Spiti shal[es]," that were also transferred from the same Museum, but there is no record whether they belonged to the Strachey Collection or not. Amongst the specimens that undoubtedly belonged to the Strachey Collection there is no single specimen from which all the figures 1a-c on pl. xviii could have been drawn. Allowance must, however, be made for the illustrations, for in his description of the species Blanford says "The figure of this species given in plate 18 is, in some respects, erroneous. The ribs in fig. 1a should conform to the shape of the mouth, instead of being but slightly flexuous, and the periphery should be ornamented with minute sharp teeth, instead of crenulations."

The specimen registered C. 7360a appears to be the original of fig. 1b, the figure being reversed; its size agrees also with fig. 1a, but its sculpture is much less distinct, and its suture-line is not visible. The sculpture of the species is best shown upon the fragment registered C. 7360d, and numbered in ink "1840," which at one time appears to have another piece attached to it; this fragment also exhibits traces of the suture-line, but these are quite insufficient to have furnished the drawing of the suture-line given by Blanford (fig. 1c). The form of the peristome indicated in fig. 1a appears to have been drawn from the example No. C. 7360b, which is, however, only about one-half of the size of the figure. The sculpture could not possibly have been taken from this specimen, the surface of which is nearly smooth; nor the suture-line, for although feebly indicated it is not sufficiently preserved to have formed the original of fig. 1c.

Of the two other examples of this species [C. 7361a, b] which were also transferred from the Museum of Practical Geology, and which most probably belonged to the Strachey Collection, although direct evidence of this is wanting, one [C. 7361b] exhibits the suture-line very clearly, and there is every probability, not only that these specimens originally formed part of the Strachey Collection, but that the specimen C. 7361b furnished the original of the suture-line represented in fig. 1c.¹

With regard to the figures of this species in the "Palæontology of Niti," I conclude, therefore, that fig. 1b has been drawn from the specimen No. C. 7360a; that fig. 1a has been drawn in part from the example No. C. 7360b, and possibly in part also from the specimens C. 7360a and C. 7360d; and that fig. 1c has been taken from the specimen C. 7361b. I have not been able to recognize in the collection the original of figs. 4a-d on pl. xix.

The species was originally described by H. F. Blanford in 1863 (Journ. Asiatic Society of Bengal, vol. xxxii, 1863, p. 126, pl. i, figs. 3, 3a). He considered (p. 106) *A. Lymani*, A. Opper (Pal. Mittheil., iv (1863), p. 272, pl. lxxvi, figs. 3a-c), to be a synonym.

¹ F. Stoliczka (Mem. Geol. Surv. India, vol. v, pt. 1, 1865) says (p. 93), "Fig. 1c in Strachey's Pal. pl. 18 gives no good idea of the true form of the lobes and saddles. The figure was evidently taken from a specimen with a very much eroded surface."

Var. *a* (= *Ammonites mundus*, R. Strachey MS.).

In his description (p. 88) of this variety Professor Blanford states that "the two fragments in the [Strachey] collection are those of larger shells than any of the normal form." Amongst the examples forming part of the Strachey Collection which was transferred from the Museum of Practical Geology, this variety is represented by a single imperfect specimen [No. C. 5035] enclosed in a portion of a nodule in association with a part of the phragmocone of a Belemnite (probably the form which Blanford referred to Miller's *B. sulcatus*), and a fragment of a thick-whorled biphicated Ammonite (like *A. torquatus*); it is labelled with a Jermyn Street Museum label "Oolitic: Niti Pass. *Ammonites acucinotus* (Stra.), *Ammonites biplex* (Sow.), *Belemnites sulcatus* (Mill.)." The specimen comprises only about the last third of the outer whorl; this seems to have formed part of the body-chamber, as no septa are visible; of the rest of this whorl and of the earlier whorls there is an impression on the nodule that shows clearly the character of the ornaments of the test. This fossil is most probably the figured example, the figure having been reversed and very much restored. The direction of the striæ has been indicated on the fossil in pencil, probably to assist the artist. The dimensions of the specimen appear to have been:—diameter of shell, about 53 mm.; radius of shell, 31 mm.; height of outer whorl, 24.5 mm.; thickness of outer whorl, 14 mm.; width of umbilicus, 12 mm.

The following are figured among the Jurassic Cephalopoda, but are not referred to in the text of the work:—

20. *AMMONITES BATTENI* (R. Strachey MS.), H. F. Blanford.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, pl. xi, figs. 2*a-c*.)

These figures are placed among the illustrations of Jurassic Ammonites, and are named at the foot of the plate "*Am. Batteni*," but the species appears not to be referred to in the text. The original of the figures is in the British Museum collection [No. C. 4867]; it was transferred from the Museum of Practical Geology labelled with one of that Museum's labels "Oolitic: Niti Pass. *Ammonites Batteni*. Coll. by Col. Strachey"; but I think there can be no doubt about its being, as has already been pointed out, a Triassic species referable to the genus *Gymnites*.¹ It will therefore be more fully dealt with among the Triassic species belonging to the Strachey Collection.

21. *AMMONITES*, sp.

(H. F. Blanford, in J. W. Salter & H. F. Blanford: *Palæont. Niti*, 1865, pl. xix, figs. 3*a-c*.)

The original of these figures—fig. 3*a* representing the specimen of the natural size—is in the British Museum collection [No. C. 7677]. It is not referred to in the text. The specimen was transferred

¹ See C. Diener: *Mem. Geol. Surv. India, Pal. Indica*, ser. xv, vol. ii, pt. 2: (1895), p. 53 et seq.

ALPHABETICAL LIST OF THE STRACHEY COLLECTION OF JURASSIC CEPHALOPODA
figured and described by Professor H. F. Blanford, in *Salter & Blanford's Palaeont. Niti*, 1865.

No. in Paper.		Page.	Plate.	Figure.	Location and registered number of specimen.
19	<i>Ammonites acucinctus</i> (R. Strachey MS.), H. F. Blanford	87	xviii	1a	B.M. { C. 7360b ? C. 7360a ? C. 7360d
	"	87	xviii	1b	B.M., C. 7360a
	"	87	xviii	1c	B.M., C. 7361b
	"	87	xix	4a-d	?
	" var. α (<i>A. mundus</i> , R. Strachey MS.)	88	xviii	2a, b	B.M., C. 5035
2	" <i>alatus</i> (R. Strachey MS.), H. F. Blanford ...	76	xviii	3a	B.M. { C. 7364a ? C. 7365
	"	76	xviii	3b	?
20	" <i>Batteni</i> , H. F. Blanford	xi	2a-c ¹	B.M., C. 4867
7	" <i>biplex</i> , J. Sowerby ...	79	xi	1a	B.M., C. 5033
	"	79	xi	1b, c	?
	"	79	xii	1a-c	?
17	" <i>Griffithii</i> (R. Strachey MS.), H. F. Blanford	86	xx	1a-c	B.M., C. 5038
6	" <i>guttatus</i> " "	79	xiii	2	B.M., C. 7358
13	" <i>Hookeri</i> " "	83	xvii	1a	B.M., C. 5048
	"	83	xvii	1b-d	B.M., C. 5049
11	" <i>jubar</i> " "	82	xx	2a, b	B.M., C. 5043
	"	82	xx	2c	B.M., ? C. 5043
	"	82	xx	2d	?
	"	82	xxi	1a	B.M., C. 5044
	"	82	xxi	1b, c	B.M., C. 5030
	" var. α , <i>multiradiatus</i> (R. Strachey MS.), H. F. Blanford	82		no fig.	? B.M., C. 7366
14	" <i>medea</i> " "	84	xix	5a, b	B.M., C. 5047
	" <i>multiradiatus</i> " v. <i>A. jubar</i> , var. α				
	" <i>mundus</i> " v. <i>A. acucinctus</i> , var. α				
3	" <i>Nepalensis</i> , J. E. Gray ...	77	xiv	1a, b	G.S.M., R. 10116
12	" <i>octagonus</i> (R. Strachey MS.), H. F. Blanford	83	xii	2a, b	B.M., C. 5032
16	" <i>robustus</i> " "	85	xvi	1a, c ¹	B.M., C. 5050
	"	85	xvi	1b ¹	B.M., C. 5046
10	" <i>scriptus</i> " "	81	xvi	2a-c	B.M., C. 5045
18	" <i>strigilis</i> , H. F. Blanford ...	87		no fig.	?
4	" <i>temistriatus</i> , J. E. Gray ...	78	[xiv	2?]	B.M., C. 5039
	"	78	xv	2a	B.M., C. 5036
	"	78	xv	2b, c	B.M., C. 5051
	"	78	xv	2d ²	B.M., C. 5051
9	" <i>torquatus</i> , J. de C. Sowerby ...	80		no fig.	
8	" <i>triplicatus</i> , J. Sowerby ...	80	xiii	1a, b	B.M., C. 5042
	"	80	xiii	1c	B.M., C. 5031
5	" <i>umbo</i> (R. Strachey MS.), H. F. Blanford ...	78	xvii	2a-d	B.M., C. 5040
15	" <i>Wallichii</i> , J. E. Gray ...	84	xv	1a, b, 2d ³	B.M., C. 5041
	"	84	xix	1a, b	B.M., C. 7675a
	"	84	xix	1c	?
	"	84	xix	2a, b	B.M., C. 7675b
	"	84	xix	2c	B.M. { C. 7675b ? C. 7684
21	" sp.	xix	3a-c	B.M., C. 7677
1	<i>Belemnites sulcatus</i> , J. S. Miller ...	76	x	1	B.M., C. 2566
	"	76	x	2	B.M., C. 2567
	"	76	x	3	B.M., C. 2568
	"	76	x	4	B.M., C. 2569
	"	76	x	5	B.M., C. 2570
	"	76	x	6	B.M., C. 2571
	"	76	x	7	G.S.M., R. 10252
	"	76	x	8	B.M., C. 2572

¹ Triassic specimens.

² This figure has been wrongly lettered; it belongs to *A. Wallichii* and should be 1c.

³ This figure should have been letter 1c, since it belongs to *A. Wallichii* and not to *A. temistriatus*.

from the Museum of Practical Geology apparently with the rest of the Strachey Collection, although there is now no information with the fossil. There is, however, a loose Jermyn Street Museum label, without any specimen, to the following effect:—"Oolitic: Niti Pass. *Ammonites orbiculatus*. Coll. by Col. Strachey." I have not met with this specific name in any descriptions of Himalayan fossils, but the form of the present specimen would most likely suggest such a specific name, and I therefore think there is every probability of this label having belonged originally to this example, although direct evidence of the fact is wanting. If, however, the name *A. orbiculatus* has been used in connection with any Jurassic Cephalopod from the Himalaya, it probably refers to this specimen.

V.—THE ZONE OF *HOPLITES INTERRUPTUS* (BRUGUIÈRE) AT BLACK VEN, CHARMOUTH.

By W. D. LANG, B.A., F.Z.S., British Museum (Nat. Hist.).

L YING unconformably upon the well-known Liassic beds of Black Ven, the cliff which overhangs the sea-shore between Lyme Regis and Charmouth, occur beds of Cretaceous age, representing the Gault and Upper Greensand of other localities. The lower beds consist of loams, dark and almost black where the clay predominates over the sand, and lighter where the sand is present in larger quantities. Above these loams are yellow sands containing indurated nodules called 'Cowstones,' which, with the 'Foxmould' sands above them, have been considered to represent the zone of *Schloenbachia rostrata* (Sowerby).¹ The dark loams below them represent, therefore, the zone of *Hoplites interruptus* (Bruguière).

Of this zone some account has been given in the Survey Memoir;² but as the section given, measured in 1895, agrees only generally with those measured by the author in 1901 and 1902, differing conspicuously in the absence of the hard shales to be described later; and as the two last-mentioned sections, though separated for some distance, are obviously continuous, it may not be out of place to describe the sections that are exposed at the time of writing. For the cliff frequently falls, causing the covering up of old sections and the exposure of new. And though, until it was measured in detail, the western section was thought to be that described in the Survey Memoir and measured in 1895, the author now thinks that a new section is exposed, showing three bands of hard shaly loam unrecorded before.

Concerning the eastern section, which shows the junction with the Lias, it may be that described as having been found by Mr. C. Reid in 1875.³ At present, however, it is not at all obvious, being covered by some thickness of 'rainwash,' so that to expose the junction some amount of digging has to be performed.

¹ A. J. Jukes-Browne: "The Gault and Upper Greensand of England," 1900, p. 183.

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ORIGINAL ARTICLES.

I.—A RETROSPECT OF PALÆONTOLOGY IN THE LAST FORTY YEARS.

(Continued from the February number, p. 56.)

POLYZOA, ETC.—Among our early contributors stands the well-known name of George Busk, author of a "Catalogue of Polyzoa in the British Museum" (1852-54) and a most valuable monograph on the "Polyzoa of the Crag" (Pal. Soc., 1859). Busk sent a paper (in 1866) to this Magazine on "Polyzoa from the London Clay of Highgate," describing three genera and species new to science. Professor H. A. Nicholson wrote on *Callopora in crassata* from the Devonian of Canada; on *Heterodictya* from the Devonian of Ontario; and on the geological distribution of *Solenopora compacta* (1885). Professor Dr. Ferdinand Roemer (in 1880) recorded the genus *Caunopora* in the Devonian of South Devon. Robert Etheridge, jun. (1873), figured and described *Carinella*, a new genus from Carlisle, Lanarkshire, and *Ramipora* from the Caradoc Beds of Corwen, North Wales. G. R. Vine discoursed on Carboniferous Polyzoa (in 1880); F. D. Longe on Oolitic Polyzoa (in 1881); and Dr. J. W. Gregory on some Jurassic species of Cheilostomata (in 1894).

BRACHIOPODA.—The historian of the Brachiopoda, Dr. Thomas Davidson, who finished his great work in 1885, and who was equally facile with pencil and pen, was a large contributor to the pages of our journal for twenty years. His great monograph on British Brachiopoda, published by the Palæontographical Society, fills five large quarto volumes, illustrated by over 200 plates drawn by the author's own hands. He was author of the article *Brachiopoda* for the "Encyclopædia Britannica," and monographed the specimens collected by the "Challenger" expedition. He wrote in this Magazine on the genus *Thecidium* (1864); on perforate and imperforate Brachiopoda (1867); on the earliest forms of Brachiopoda in British Palæozoic rocks (1868); Italian Tertiary Brachiopoda (1870); Tertiary species from Belgium, and on the genus *Porambonites* (1874); Scottish Silurian Brachiopoda, and on "What is a Brachiopod?" (1877); on those of the Boulonnais (1878); on Lower Llandeilo forms from Brittany (1880); on