TYPE AMMONITES
VI
There are two kinds of people in the world—those who pioneer and those who plod. The plodders always attack the pioneers

*Henry Ford*

'Today and Tomorrow,' 1926, p. 2
TYPE AMMONITES—VI

BY

S. S. BUCKMAN

With contributions, photographs and/or MS., from

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CHELTENHAM
TERMINOLOGY

Dr. F. A. Bather, F.R.S., of the British Museum (Nat. History) writes: "I have been reading [Type Amm., Vol. V] with deep interest. But I wish you would make it clearer that a genotype or lectogenotype is a species, not a specimen. I really think that this is of some importance. There are passages and especially legends to plates which tend to confusion."

Strictly speaking, Dr. Bather is perfectly correct—the genotype is a species; but as there always can be differences of opinion as to whether certain specimens belong to a species or should be separated, the actual specimen to which the generic name was first applied becomes, when it is positively known as such specimen, the only example about whose identity there can be no dispute. Such original specimen is thus the actual type of reference for determining the characters of the genus. So I have always quite deliberately pinned the genotype species down to the basis of one original specimen. When authors have given a generic name to species without definite fixing on one, I have chosen first one species and then one specimen—a lectogenotype, as Dr. Bather writes, or a genolectotype, as I have written, to be the one definite standard. Thus for the genotype or the genolectotype species there is one and only one actual standard of reference. I have used the term genotype for short instead of writing 'the ultimate standard of reference whereon the genotype species rests, and by which it has to be determined.'

The generic name does not follow the cited species, it follows the cited standard specimen: it is the identity of the standard specimen which rules the genotype species, not the name of the cited species which rules the identity of the genotype standard. Oftentimes the attributing of the genotype standard to a given species may be incorrect.

For example, I have given the generic name Gigantites to a specimen supposed to be conspecific with Sowerby's Ammonites giganteus (T.A. III, CCLVI). This identity may be wrong. If so, the generic name Gigantites remains fixed on my giganteus, whatever that may be; it does not pass over to Sowerby's Ammonites giganteus, however often the genotype species of Gigantites may have been cited as being Gigantites giganteus, J. Sowerby sp. I have protected my specimen by definitely placing the word 'Genotype' in its legend. But, had I not done so, I hold that it should be taken as the 'genotype standard of reference.'

It is, therefore, in my opinion, imperative that in giving a new generic name, the author should not merely cite a given species by name, but should cite one definite specimen of that species for the type of his genus; because the species which he selects may contain many specimens: in his opinion these may be conspecific, but it does not follow that future observers will agree in that view. Then there is trouble as to which form is to be selected: all this is avoided by being
definite as to one example. Whatever be the species of that one example is then always the genotype species, while the one example always remains the genotype standard of reference.

The foregoing was submitted to Dr. Bather, who very kindly sent the following remarks, which he has given me permission to publish:

On Genotypes, by Dr. F. A. Bather. As C. Schuchert says, in his introduction to the Catalogue of Type specimens of Fossils in the U.S. National Museum, a genotype is a species, not a specimen. To this statement "strictly speaking" you agree.

This being admitted, certain difficulties may arise, as you have foreseen, and as is matter of frequent experience. They are generally due to a misreading of the genotype through failure to study its holotype. The way you have chosen to prevent those difficulties is, in my opinion, illogical. On such matters I am constantly consulted, and the following is the advice which I invariably give.

In establishing a new genus an author should fix on one species as the genotype (or genoholotype). The standard of that genotype is the holotype of the species. Therefore, if there be no holotype, it is his business to select one (lectotype). If possible, he should become personally acquainted with the syntypes, so that he will select an appropriate specimen. In any case, it is to be presumed that he does not venture to make any species the type of a new genus, unless he is familiar with its holotype, since it is by that specimen in the last resort that the genus must be judged. The holotype of the genotype is the ultimate standard of reference.

Now, if the author is prevented by inevitable circumstance or by laziness from doing this work, and if he has to leave others to do it for him—that is to say, if he thinks himself obliged to make a new genus without knowledge of its type-species, because such a course is suggested by a specimen or specimens that he refers to that species, then the following is the course of action to follow. He should select one of those specimens and say: "If it be found that the genotype or type-species is not what I imagine it to be, i.e., is not conspecific with the specimen before me, then it is to be understood that my new genus is to be interpreted by this specimen, which will be the holotype of, or will fall into, a new species, and that species will be the genotype of my genus."

The preceding, you will see, has in the end the same practical result as your action, but is not open to the same criticism. It is, in my opinion, preferable because it does not encourage slovenly work, but urges on the author the need, for studying the actual type-material.

I can see no radical difference between Dr. Bather's use of the word genotype and mine, except this: that I use the word 'genotype' quite short where it should be said 'the one standard of reference for the genotype species.' We are both agreed that it comes down ultimately to one specimen. But Dr. Bather has started another hare altogether—that is, the method to be used in choosing a genolectotype out of various examples of a species. He says, in effect, that if an author writes Ab, wherein A is a new generic name, then the holotype of b automatically becomes the genotype standard of reference for the generic name A. I dissent. I say that if Ab represents a multitude of species, as it really did in uncritical days, then all the species of these forms which are known as b prior to the giving of the name A are really genosyntypes,
and that if the author has not, by some means, made indication of selection, then a subsequent author has the right to choose a genolectotype out of those genosyntypes: to be precise, he should pin down one definite specimen as the standard of reference. For the holotype of Ab may never have been fixed; it may be obvious from the author's diagnosis of his genus that he has never seen the original material, so that it is equally plain that the author is giving his generic name to species erroneously identified with Ab. Or, again, if there be a holotype of Ab, it may be so poor a specimen that no one would wish to have it as a genotype standard, because it would give rise to so much diversity of opinion that the unfortunate A would be hunted from pillar to post, being found one day with one series of characters, and placed with one set of associate species; another day with quite other sets.

This case is different from that considered in my first notes (p. 5 above), which is concerned with an author giving a generic name to three or four distinct species, out of which he has not selected one species to be a genotype. Here a subsequent writer is free to choose a genolectotype species out of these genosyntypes; but, again, in the genolectotype species there may be several specimens, and, to avoid confusion, the method of choosing one of these as the genolectotype standard would be followed as noted above. Thus there would be one rule only—whether there be several species Ab, Ac, Ad, or only a series of specimens passing under one name Ab, there is freedom to choose, first one species and then one specimen of that species, as the genolectotype standard.

Dr. Bather's dictum that an author should always consult the holotype before giving a name is a counsel of perfection; but it is scarcely practicable. Types are scattered all over the globe. Lack of health and lack of means, two interdependent afflictions of many scientific men, would effectually bar the necessary travelling.

For just such reason I hold that the material which an author has under his hand, especially if he has used it in description or illustration, even without having actually mentioned it as genotypical, should take precedence. The genotype should go with what the author has seen, and not with what he may not have seen. If the author's b turns out to be a prior-named or a post-named c, then the genotype follows c, not b; but the author's specimen of c may not be the holotype of c: it may be a plesiotype, or it may be a paratype.

Therefore, with much regret, I differ from Dr. Bather's statement that 'the holotype of the genotype is the ultimate standard of reference.' In my opinion, the genotype standard of reference is by no means necessarily the holotype of the genotype.

If only students will in future be precise in stating which specimen is to be taken as the genotype standard of reference, much trouble would be saved. Unfortunately, such technical details are not impressed on them by their teachers, because the teachers themselves lack the necessary training. Editors, however, could do much by insisting that such details be given.

**Systematic**

_Suture-line:_ For the distinction of genera the relative length and development of the lobes of the suture-line is found to be of prime
importance. Hitherto where this has been recorded in the legend at
the foot of the plate, it has been placed in the following full form,
Sl. EL — , L1 — , L2 — , per cent. of whorl-breadth or more concisely
EL — , L1 — , L2 — of — (whorl-breadth understood). Yet it is
advisable, for the saving of space, to record for the future in another
manner, congruous with that used for giving proportions. Thus the
record will be made in four consecutive items: 1st, The breadth of the
whorl in millimetres, next the length of EL in so much per cent. of
such breadth, next that of L1, lastly that of L2. Thus a set of figures
preceded by Sl. and reading Sl. 20, 45, 54, 23 will indicate as follows:
The breadth (or height) of the whorl is 20 millimetres, the external lobe
(EL) is in length 45 per cent. of that whorl-breadth, the first lateral
lobe (L1) is 54 per cent. and the second lateral lobe (L2) is 23 per cent.
of the 20 mm. Beginning with this number (Part 56) the records will
be so made. When an item cannot be given, a — will be placed in
its position. More and more attention to these suture-line details
should be urged on those who desire to identify species of Ammonoids.

The whorl-breadth is given in the same way as it is taken in regard
to proportions, because where the suture-line is painted in on the specimen
and the figure of the specimen is reproduced with such line in place,
that is the easiest method for measurement. But when a suture-line
is traced off, and is reproduced with the full curve of a gibbous side
extended to a straight line, the necessary allowance must be made, for
the difference in length of a base-line from a straightened-out curve
beyond a base-line of mere length without the curve. The first base-line
should be reduced to the amount of the second, a feat easily accom-
plished by means of any of the little wheel-measuring instruments.

Other proportions may sometimes require to be given, and should
be provided for—the Auxiliary lobes and the Internal lobe: they may
be marked as A', A'' and so on and I, followed by their proportionate
figures.

A further proportion is important in the cases of Stepheocerates,
Perisphinctids and like forms—the length of what is known as the
retracted inner portion, or the suspensive lobe, or, as the Germans
concisely call it, the Nahtlobus, that is the seam lobe or the lobe by the
whorl-junction. Nahtlobe seems good to adopt, with the symbol N.
The proportion of this lobe when given will come as an item marked
by a preceding N.

The length of the Nahtlobe is the length of the whole series of lobes
which run down the inner part of the whorl inside L1. See, for instance,
Cymatosphinctes cymatophorus, CDLb. The length is measured from
the bottom of the lateral saddle SI, which, in fig. 1 of the plate referred
to, just touches the bottom line of the figure. From that point a line
is drawn towards the inner edge to run parallel with the guide-line.
Or the same result can be obtained in another way:—measure from
base of ES to the guide-line and then add any overplus below the
guide-line or deduct any minus quantity short of it. In the figure
referred to there is an overplus of not quite 6 mm., the full length of
N is 52 mm. The length of base-line is 49 mm., so the value of N reads
as N 103.

A good instance of the necessity of attending to the proportions
of suture-lines occurs in this work. Three species of Wheatleyites were
named, in one of which, _W. reductus_, the decrease in length of lobe was attributed to age (phylogerontism). Subsequently a more aged species of _Wheatleyites_ was found, _W. rarescens_, which showed that the length of lobe increased. About the same time a less advanced form, congruous in suture-line with _W. reductus_, was discovered, to be named _Shotoverites pringlei_. Obviously it is necessary to change _Wheatleyites reductus_ to _Shotoverites reductus_ (see below, p. 15). Table I, following, shows how 4 specimens (3 species) of _Wheatleyites_ agree in general proportions of suture-line and how the two species of _Shotoverites_ stand together distinct from them.

**Table I—Wheatleyites & Shotoverites (Suture line, Sl.)**

<table>
<thead>
<tr>
<th>Species</th>
<th>CCCL XV</th>
<th>71</th>
<th>—</th>
<th>60</th>
<th>39.5</th>
</tr>
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<tbody>
<tr>
<td>W. opulentus, CCCLXXXIII A</td>
<td>79</td>
<td>56</td>
<td>64</td>
<td></td>
<td>31.5</td>
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<tr>
<td>W. , CCCLXXXIII B</td>
<td>26.5</td>
<td>66</td>
<td>60</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>W. rarescens, DLXIA</td>
<td>45</td>
<td>69</td>
<td>71</td>
<td></td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>DLXII</th>
<th>48</th>
<th>40</th>
<th>46</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shotoverites pringlei, DLXII</td>
<td>89</td>
<td>39.5</td>
<td>37</td>
<td>[43 ?]</td>
<td>24</td>
</tr>
</tbody>
</table>

The length of _L_ in _W. reductus_ seems to have been understated: tested on the plate it gives 43 per cent.

A similar instance of the necessity of taking the proportions of suture-lines occurs in Dr. Neaverson’s lately-published work (Amm. Kimm. 1925). He makes a new genus _Sphinctoceras_ with genotype _S. crassum_ (II, 1). This is a most remarkably longilobate species. With it he associates _S. distans_ (IV, 3) of which he only gives suture-lines of young stage—practically useless. But I have before me, from a neighbouring brickyard, Mus. Pract. Geol. Collection, an adult specimen of his species: it gives a lobation about 30 per cent. less than _Sphinctoceras_. Another genus Dr. Neaverson names _Allovirgatites_, genotype _A. woodwardi_ (III, 1). He does not give the suture-lines at all clearly of this or of other species of his genus, except _A. versicostatus_ (p. 36, fig. B. 6), though, obviously, the specimens show the suture-lines clearly. But the deficiency can be supplied by examples collected by the Geological Survey and myself from various brickyards in the Oxford neighbourhood. The suture-line proportions are given in Table II:

**Table II—Sphinctoceras & Allovirgatites (Suture-lines)**

<table>
<thead>
<tr>
<th>Species</th>
<th>CCCL XV</th>
<th>71</th>
<th>—</th>
<th>60</th>
<th>39.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sphinctoceras crassum</em>, II, 1</td>
<td>38</td>
<td>82</td>
<td>76</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td><em>S. distans</em>, M.P.G. Coll.</td>
<td>47</td>
<td>52</td>
<td>53</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td><em>Allovirgatites woodwardi</em>, III, 1</td>
<td>21</td>
<td>—</td>
<td>55</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>, S.B. Coll.</td>
<td>29</td>
<td>52</td>
<td>52</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>, <em>versicostatus</em>, Fig. B. 6, p. 36</td>
<td>18</td>
<td>53</td>
<td>45</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>, III, 4</td>
<td>19.5</td>
<td>50</td>
<td>50</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>, <em>tutcheri</em>, M.P.G. Coll.</td>
<td>19</td>
<td>47</td>
<td>47</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>45</td>
<td>49</td>
<td></td>
<td>30</td>
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In these suture-line proportions _Sphinctoceras crassum_ stands out quite alone, as an exceptionally longilobate form, surpassing even _Wheatleyites_ (see Table I, above), which has quite a good record in this matter. Then all the examples of _Allovirgatites_ yield proportions of about 50 per cent. for _EL_ and _L_ both lobes being far shorter than those of _Sphinctoceras crassum_. The lobe-line of Neaverson’s _Sphinc-
toceras distans shows much disagreement with that of his S. crassum, but full agreement with those of species of Allovirgatites. On the first ground the conclusion is reached that, whatever else it may be, Dr. Neaverson's distans is not a Sphinctoceras, and, on the second, that unless there is some character other than suture-line to weigh heavily in the balance, it belongs to the genus Allovirgatites.

The slight differences in the proportions of Allovirgatites are easily accounted for. There are, first, indistinctness in the illustrations and, secondly, differences in the base-line. Thus the base-line in a compressed-whorled species like A. tutcheri departs little from the base-line which would be yielded on a curve; but the base-line of a gibbous-sided species like A. woodwardi is much shorter than would be a base-line measured over the gibbous curve. Therefore a base-line of 26 mm. in A. tutcheri is relatively longer than is a base-line of 26 mm. in A. woodwardi. Therefore the proportions of the lobes in A. tutcheri, since they are reckoned in regard to a relatively longer base-line, would come out shorter than those of A. woodwardi.

These figures of sutural proportions are a good illustration of their reliability in the detection of generic affinity. They show, also, how dangerous it is to assign a species to a given genus without taking note of its suture-line. The eye alone is not to be trusted—compass-measurement is essential.

Nomen nudum: This term is used sometimes quite incorrectly. Mr. C. H. Crickmay speaks (Proc. California Acad. Sci., (4) xiv (3), 1925, p. 77) of "a vast assemblage of nomina nuda—chiefly names applied with no, or with incomplete, description by Alpheus Hyatt." Dr. L. F. Spath (Yorksh. Amm.; Naturalist, 1925, 359, footnote 1) remarks "Simpson's names must be considered to be nomina nuda as much as Hyatt's unfigured Liassic species recently referred to by Crickmay." Dr. Spath's dictum is wholly incorrect so far as Simpson's names are concerned, and Mr. Crickmay's is mainly wrong. Only those names can be called nude which have no covering description of any kind. So long as a name has a covering description, however insufficient it may be, the name cannot be called naked. The covering description may be as exiguous as the fig-leaf aprons credited to Adam and Eve, or as the bathing-drawers which were considered right in the days of my early manhood, but are condemned by the present decadent age; yet so long as there is a covering, there is not nudity. Hyatt's and Simpson's names, when covered by any description, are not nomina nuda, any more than are the names of Linné, Bruguière and others. In natural history a description alone is sufficient to establish priority in the naming of a species. Ammonite workers are not a law to themselves: they must conform to the laws of natural history nomenclature. Insufficiency of description cannot be urged as ground for the rejection of a name—insufficiency is a relative term, and would lead to endless argument. It might be urged that no description is ever sufficient.

Of course, figures are desirable. It was to supply the lack of figures which obtained so widely in regard to Yorkshire Ammonites, and were really a stumbling block in the way of their proper study, that this work was commenced. It can, at least, claim to have been successful in figuring a large number of species, which before were only known from descriptions. It can claim to have placed the majority of Yorkshire
Liassic species on the surer footing of pictorial representation; but there is still much to be done. Rejections of names because their types lack illustration is easy, but it is not correct work. Mr. Crickmay took a satisfactory course, that of hunting out Hyatt’s types and illustrating them. It is to be hoped that he will continue that good work.

However, the possession of a figure of a species does not necessarily end all troubles. A bad figure may cause more worry than no figure at all. Figures may be synthetographs, drawn purposely from more than one specimen, or depicted by oversight of the artist from more than one example. This is the case, presumably, with Young & Bird’s figures of Ammonites redcarensis, which now has to be considered.

A. redcarensis: Young & Bird’s original description (1822, p. 248) is as follows:—“No. 13, Pl. XIV, has also [like a maculatus] sharp ribs, and has a sharp keel running along the back. It occurs in the lowest shale at Robin Hood’s Bay, and other places. A large shell, generally found imperfect, but apparently of the same species, occurs in the Redcar rocks. The a. Bucklandi of Sowerby, Tab. 130, seems to be a cast of this species. We would prefer naming it A. Redcarensis.”

The figure then given by Young & Bird (photographic copy reproduced T.A. DCVIII, 1) shows in its south-west corner a crinkly line on the periphery. Such crinkly line would not represent the carina of a species like Am. bucklandi or obtusus; rather, it seems to have been drawn from the crinkly edge shown by ribs on the further side of a ventrally-furrowed specimen—the space in the south and south-west of the figure, between the crinkly line and the line bordering the periphery, representing the ventral furrow.

In the second edition (1828, p. 258) the description is very considerably altered:—“No. 10, Pl. XIV, from the same beds [as A. Bucklandi in the lowest shale at Redcar, and in Robin Hood’s Bay] is obviously a different species [from A. Bucklandi], which we have named A. Redcarensis. It is a flatter shell, with the aperture more oblong; and an imperfect keel, where the ribs, which are bent forward, regularly meet in pairs, at a sharp angle, in the form of arrow-heads. It nearly corresponds with Sowerby’s A. Turneri, Tab. 452.”

The figure which is given in this edition differs considerably from that of the first. The periphery has been altered from a crinkly line to a uniform curve, and the whole appearance is that of a carinate-bisulcate like Am. obtusus.

Therefore in the first edition the description is that of a carinate-bisulcate; but the figure is, in part, that of a ventrally sulcate; in the second edition the description, all except the last sentence, is that of a ventrally sulcate without any doubt, but the figure is that of a carinate-bisulcate. It is a remarkable muddle.

What seems to have happened is this. Young gave the name redcarensis to a ventrally-sulcate specimen like that sent from Whitby Museum (No. 314) as the original of the species. Bird drew the outline of such a shell, but he filled in other details, partly, at any rate, from a carinate-bisulcate, in error. Then Young, not noticing the substitution, drew up his description from the shell which Bird placed before him.

In the second edition author and artist, or the two authors, seem to have been again at variance. Young gave a description which would fit a ventrally sulcate, Bird amended his figure so as to depict a carinate-bisulcate.
This theory of substitution, with consequent confusion, is not in the least unreasonable, for it is fully borne out by what Bird did in regard to A. clevelandicus and A. elegans, as already noticed in this work, Vol. II, No. 109.

The figure in the first edition is, therefore, a synthetograph—the specimens which have been used in the drawing of it become syntypes of the species: they are presumed to be the ventrally sulcate, a Schlotheimian and the carinate-bisulcate, an Asterocerate—which should be chosen as lectotype? The evidence of subsequent authors who have had opportunity to study Young & Bird’s material may be given.

Simpson, M., 1843, A Monograph of the Ammonites of the Yorkshire Lias.

"[P. 55] IV. With a dorsal furrow only.
" 107. A. Redcarensis, Y. & B.
" Depressed; volutions 5 or 6, inner ones \( \frac{1}{2} \) concealed, outer whorl rather more than \( \frac{1}{2} \) the diameter; radii prominent, diverging, straight along the sides of the whorl, then suddenly bend towards the aperture near the back, where they are terminated by a narrow, smooth space or furrow; aperture triangular, or sub-quadrate; diameter 3 inches.

"The radii proceed from the inner margin of the whorls, and have the appearance of coarse plaits; the prominent angles on the back, and the absence of a keel, render this a highly characteristic species; the sides of the whorls are slightly convex, and the inner edge quickly rounded. From the appearance of the matrix I judge it to be from the ironstone series; I have a fragment of this species from the oolite of Filey: the flat space on the back is very narrow, and the radii are much more numerous and slender than in the lias specimens."


"[P. 100] IV. With a dorsal furrow only.
" 187. A. REDCARENSIS, Y. & B—Volution 5 or 6, [p. 101] inner ones \( \frac{1}{2} \) concealed, outer whorl rather more than \( \frac{1}{2} \) the diameter; radii prominent, diverging, straight along the sides of the whorl, then suddenly bend towards the aperture near the back, where they are terminated by a narrow smooth space or furrow; aperture triangular, or sub-quadrate; diameter 3 inches.

"The radii proceed from the inner margin of the whorls, and have the appearance of coarse plaits; the prominent angles on the back, and the absence of a keel, render this a highly characteristic species; the sides of the whorls are slightly convex, and the inner edge quickly rounded."

"I have now got Young’s original Redcar specimen, and I see no difference between it and A. anguliferus, Ph. It is a very variable species. In some the outer whorl is narrower, and the ribs on the back are so depressed as to shew the flat space as a keel; in others they are so prominent as to form a narrow channel. Some specimens are much inflated, whilst others are much depressed. Mr. Bird’s figure is entirely erroneous, and must be intended to represent A. obtusus, Sow.

"I have a fragment of a specimen, twice as thick as some, and with coarse and irregular radii. I leave it at present as a variety.—L.L."
Oppel, A., Die Juraformation, 1856, pp. 75, 76, writes: "In Yorkshire erhielt ich Amm. angulatus in mehreren Exemplaren. In den dortigen Sammlungen liegt er entweder mit dem Phillip'schen Namen: Amm. anguliferus, oder nach Young und Bird: Amm. Redcarensis bezeichnet. Letzteres mag auf Irrthum beruhen, denn die Young'sche Angabe (pag. 248), dass Amm. Redcarensis einen scharfen kiel trage, stimmt mit der äussern Form des Amm. angulatus nicht überein."

Blake, J. F., (Cephalopoda, in Tate & Blake, The Yorkshire Lias, 1876, p. 271), says of Aegoceras angulatum Schlotheim:—"This was first recognised by Young and Bird [as A. Redcarensis], but the figure given is erroneous. It was identified by Oppel as belonging to the previously described species of Schlotheim. There are two varieties: (a) most involute, the outer whorl being more than \( \frac{3}{4} \) the diameter—the common Redcar fossil; (b) less involute, with outer whorl \( \frac{1}{4} \) the diameter, occurring chiefly in the southern area. The largest known is about 3 inches in diameter."

The types of Young & Bird's two editions came to the Whitby Museum, so Martin Simpson, the Curator, was in the best position to know the specimens. He is quite positive that Amm. redcarensis is a suture. The example now figured (T.A. DCVIII) is presumably that which Simpson called "Young's original Redcar specimen"—Simpson's measurements were often only approximate. If so, it will be best to accept the suture specimen and to call it the lectotype. Its locality would then be Redcar: Young & Bird seem to have been in the same confusion about the locality as about the specimen.

PALLASICERAS, Spath MS. cit. by Lamplugh, Kitchin & Pringle (Concealed Mesozoic Rocks in Kent; Mem. Geol. Surv., 1923, p. 222): "Pallasiceras 'pallasianum'" and footnote 2 "Ammonites pallasianus as hitherto understood by British geologists. Dr. L. F. Spath permits us to say that, in a work now in the press (to be published by the Geological Survey of India), he proposes for this group the generic name Pallasiceras: genotype Ammonites rotundus J. Sowerby, 'Mineral Conchology,' vol. iii, pl. 293, fig. 3; 1821. The genus does not include A. pallasianus of d'Orbigny."

This is the first published mention: it fixes the genotype definitely on Sowerby's specimen. Unfortunately, this is only a body-chamber fragment, much worn, and giving little indication of suture-line. This holotype is figured in T.A. DXC, 1925. Topotypes show that the suture-line is short-lobed, and that the inner whorls are multicostate, somewhat of virgatite pattern, not dissimilar from those of young Lydistratites (T.A. DCVII). So far as can be at present ascertained, the difference of Pallasiceras from the prior-named Lydistratites is that in Pallasiceras the species remain comparatively small and the suture-line comparatively simple with short lobes. Pallasiceras would appear to be the phaulomorph of Lydistratites, having about the same relation to that as Otoites has to Emiteia.

Pallasiceras rotundum occurs in the Nodule Bed of the so-called Kimmeridge Clay of Chapmans Pool, Isle of Purbeck, Dorset (T.A. DXC)—this Nodule Bed being about fifteen feet above the shore, and
quite different in date from the Kimmeridge Clay Nodule Bed of Oxfordshire. _P. lydianites_ (T.A. DCIV) is from the Lower Portland Pebble Bed, Hartwell, near Aylesbury, Bucks.

The forms figured by Dr. Neaverson (Amm. Upper Kimm.; Geol. Dept., University of Liverpool, 1925) as _Pallasiceras_, from Chapmans Pool are, by the suture-lines which he has given, _Lydistratites_. Of those for which he has not given suture-lines it is impossible to say whether they are _Pallasiceras_ or _Lydistratites_. His _Pallasiceras ultimum_ from Hartwell, near Aylesbury, has neither the suture-line of _Pallasiceras_ nor of _Lydistratites_, and possibly it has no relation to either genus. No evidence of any connection is given.

_Lydistratites_, S. Buckman, 1922, Genotype, _L. lyditicus_, T.A. IV, CCCLIllA. A serpenticone biplicate developed from a virgatite. The inner whorls of the holotype show traces of approximate parvicostation. The suture-line is more longilobate than that of _Pallasiceras_ and L1, L2, increase in length with age; ES also increases, but not so rapidly. _Lydistratites lyditicus_ has been figured in T.A. (CCCLIllA-d) from the Pebble Bed at the base of the Portland-Stone series of Long Crendon, Bucks, from [Upper Lydite Bed of Swindon, Wilts], from Nodule Bed of Chapmans Pool, Isle of Purbeck, Dorset. Forms figured by Dr. Neaverson (Amm. Kimm. 1925), with suture-line, as _Pallasiceras_ from Chapmans Pool belong to _Lydistratites_, see _Pallasiceras_ (p. 13). _Lydistratites biforis_ and _L. cunctator_ are figured (T.A. DCV, DCVI) from Lydite Pebble Bed of Hartwell, near Aylesbury, Bucks.

_Holcosphinctes_, Neaverson, (Zones of the Kimmeridgian; Geol. Mag. lxi, 1924, p. 149). "_Holcosphinctes pallasioides_ gen. et sp. nov. (= _Am. bipek_ H. B. Woodward, Middle and Upper Oolites: Mem. Geol. Surv., p. 156, fig. 72, 1895), of which specimen No. 30721 Coll. Geol. Surv. is genotype and holotype."

The genus differs from _Lydistratites_ and _Pallasiceras_ in that its primary ribs are short, and the secondary ribs commence well on the lateral area, while in the other genera the primary ribs extend nearly to the peripheral border before bifurcating. The suture-line also differs from _Pallasiceras_ in being more lobate and from _Lydistratites_ in EL < L1 instead of EL > L1.

_H. pallasioides_ has been figured (T.A. DLXIX) from the Crendon (Hartwell) Clay of Long Crendon, Bucks. Dr. Neaverson (Amm. Kimm., 1925) depicts _H. pallasioides_ and _H. flexicostatus_ (Pl. iii, 5, 6) from Hartwell Clay, of Hartwell, near Aylesbury, Bucks.

_Paravirgatites_, S. Buckman, 1922, T.A., IV, CCCVIII, Genotype _P. paravirgatus_. Somewhat like _Pallasiceras_ in ribbing, only that the furcation-point is much nearer the umbilical edge. The venter is well rounded off, not flattened, as in _Pallasiceras_. The suture-line is short-lobed, and in this respect agrees with topotypes of _Pallasiceras_ from the Nodule Bed of Chapmans Pool.

_P. paravirgatus_ (Pl. CCCVIIIa) is from the coarse grit of the Shotover Grit Sands of Shotover, near Oxford; that of Pl. CCCVIIIb is, by matrix, from the Cemetery Beds of Swindon, Wilts; _P. desideratus_ is from Long Crendon, Bucks, among sands (Hudleston label and Collection), that is, from Thame Sands; _P. infrequens_ (Pl. DCIII) was obtained in place from the hard layers of sandrock at the top of the Thame Sands of Thame, Oxfordshire.
The species figured by Dr. Neaverson as *Paravirgatites kimmeridgensis* (Amm. Kimm. 1925) is unlikely to be a *Paravirgatites*: the ribs are much too straight and regular, as may be seen by comparison with *P. paraviragus*, T.A. CCCVIIIb; but as Dr. Neaverson has given no suture-line, the right genus cannot yet be determined.

*Shotoverites*, S. Buckman, 1925, T.A. DLXII. Like *Whealleyites*, but with decidedly shorter lobes and with more distinct tricostulation in the magnicostate stage. *Shotoverites reductus* should replace *Whealleyites reductus* (CCCLXXXIV), whose date would probably be later than *Whealleyites*, namely *pringlei*, on the evidence of *S. pringlei* and its locality.

**Kerberites**. T.A. V, 1924, DXX, Genotype *Kerberites kerberus*. Heavy-ribbed, with, frequently, truplicate secondaries, whence the name, from the three-headed dog Kerberus. The whorl-section is obovate, that is, somewhat convergent. Specimens have been figured from [Chicksgrove, Tisbury], and from the Cockly Bed of Swindon, Wiltshire. Poor examples are known from Long Credon (North-West pit), Bucks, which, by their matrix and the extent of quarry opened, come from about the Rubbly Limestone Bed, Behemothan 7, (T.A. IV, 1922, 26). The matrix shows that they cannot be lower, and the extent of the quarry that they might only be a little higher.

The noticeable point about the example now figured, Pl. DXXa, b, (T.A. VI, 1926), is the preservation, in the inner whorls, up to a diameter of about 35 mm., of the small and close-set costate or virgatite stage. Yet there seems to be no other difference, neither in suture-line nor in plotted proportions, from the holotype (T.A. V, 1924, DXX), which has well-costate inner whorls. Either the holotype has accelerated the oncoming of magnicostation—precedentive palingenesis, or the plesiotype has retarded it unduly—cunctative palingenesis.

The phenomenon of the plesiotype's inner whors may justify two statements. First, that the magnicostate Gigantids are the descendants of multi-parvicostates—either of virgatites, in which secondary ribs are bundled into a primary, or of pectinates, in which the ribs are like those of a fine tooth-comb, only not always single, sometimes bifurcate. Second, that it is dangerous to make a distinct species, let alone a different genus, on account only of dissimilarity of the early stages, for such dissimilarity may be only the result of differential acceleration or retardation along a given line of development.

The phenomenon of the inner whors of the holotype, as well as of the inner whors of other Gigantids, teaches that the change over from parvicostation to magnicostation in such forms could be so rapid that the parvicostate stage was practically omitted from the recapitulation: as soon as ornament began to be formed, magnicostation started.

*Lydistratites* shows magnicostation arrived at after a virgatite stage; *Whealleyites* exhibits magnicostation developed after a pectinate stage: in these two cases the difference of inner whors would justify differentiation into genera. Because the two forms of inner whors are not sequent to one another; they are parallel developments even when not strictly synchronous. Rapid acceleration of the magnicostate stage in species of either of these two genera would yield inner whors looking very
unlike the prior virgatite or the pectinate respectively; but as the magnicostate character is sequent to the respective parvicostate stages, it would not justify generic separation of magnicostates from parvicostates.

**Kosmocerates.** There has now been figured a sufficient number of genera, which have hitherto come under the designation of Kosmoceratidae, to make possible analyses of their characters in tabular form. This is by far the most concise method of showing how genera differ one from another, and what progression or regression they make in the matter of development. This method is preferable to that of describing single genera promiscuously; but its disadvantage is that time must elapse before a sufficient number of genera have been illustrated.

The subsequent Tables III—V give analyses under the following headings:

**Shape of Venter**—runcinate, or subsulcate, or sulcate: these are the progressive stages—towards greater heterogeneity; then follow reverse stages—to homogeneity or less heterogeneity—subsulcate, runcinate, rounded.

**Ornament of Venter**—progressive—ribs, tubercles on the end of single ribs, tubercles into which there flow 2, 3, 4 or possibly more secondary ribs; then the reverse, 4, 3, 2, 1, to none, and finally to smoothness—loss of ribs.

**Ornament of lateral area**—progressive—costate, one median row of tubercles, two rows of tubercles, one being median and the other inner marginal (umbilical); then the reverse—back to one row of tubercles after having had two rows, costate merely, after loss of all tubercles, and a singular development in a limited series—back to smoothness, but retaining and even enlarging the inner marginal tubercles; this is a singular phenomenon, because in most cases the rule is 'the last character to come is the first to go': this departs from that rule.

There are other characters which might be used in analyses: strength of primary ribs, number of secondary ribs to primary—from one to perhaps seven and back again; and all the various details of suture-line—relative length of EL, L1, L2, characters of, say, L1 from the simple trefoil or clover-leaf pattern to the long, elaborate, thin-stemmed cruciform. All such characters have to be utilized in the naming and distinguishing of genera, but their analysis is not regarded as necessary now.

However, in the analyses of the characters which are made it will be obvious that there is often a difficulty in saying whether a given character is in a pre- or a post-condition: for instance, a runcinate venter is obviously post-round; but is it pre-sulcate or post-sulcate? Have the members of a given genus, which show a runcinate venter, been through a sulcate stage and returned to the runcinate? Or is a runcinate venter the highest development to which they reached, so that the next move is back, to rounded again?

Ontogenetic studies may sometimes answer these questions; but not always—for there is ever the possibility of a stage being skipped. Then runcinate pre-sulcate and runcinate post-sulcate merge one into the other.
Table III—Morphic Development—Venter (shape)

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<th>Genera</th>
<th>R unicinate</th>
<th>Subulate</th>
<th>Sulcate</th>
<th>Subulate (post-sulcate)</th>
<th>R unicinate (post-sulcate)</th>
<th>Rounded</th>
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## Table V—Morphic Development—Lateral Area (ornament)

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<th>Tuberculate 2 rows</th>
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The genera in the Tables III—V are placed approximately in chronological order, the latest above, the earliest below; but in those cases where several genera belong to the same date, their individual order has no chronological signification. Of the others, the exact sequence is not known for certain in one or two cases, like that of Kosmoceras: its date may be a little later, less likely any earlier. Otherwise, on the whole, the evidence for the chronology of the genera is fairly clear. They are distributed among South English strata in the following manner:

Kosmoceratan . . . . North Oxford Clays Christian Malford and Calvert Beds
Reineckeian . . . . Almost no deposit
Proplanulitan . . . . Kellaways Rock Kellaways Clay
Macrolephtalian . . . . Upper Cornbrash

But the genera Kepplerites and Toricelliceras are unknown in England, and may represent a time between the deposition of Upper Cornbrash below and of Kellaways Clay above—a non-sequence in England.

It is obvious from these Tables that the old family Kosmoceratidae has become too unwieldy, and that some lines of separation should be adopted. The following scheme is, therefore, proposed:

Superfamily KOSMOCERATACEAE, nov.
Kosmoceratidae, as used in this work—see T.A. III, p. 53.

1. Family Gowericeratidae, nov.
Genera which barely rise beyond the runcinate ventral stage, and drop back, sometimes quite early, to rounded. Macrolephtalian and Proplanulitan Ages.

2. Family Gulielmiceratidae, nov.
Genera which reach ventral sulcation and ventral tuberculation, but decline to smooth venter. Laterally bituberculate, with final preservation of inner marginal nodes. Proplanulitan and Kosmoceratan Ages.

3. Family Parapatoceratidae, nov.
Genera of uncoiled forms—Criocones and Toxocones. Proplanulitan Age

4. Family Kosmoceratidae, Hyatt
This family name is now much restricted.
Genera which reach ventral sulcation with strongly developed bordering tuberculation, and considerable decline therefrom, but not to smooth stage. Well-developed lateral tuberculation, with decline to costation. Kosmoceratan Age [and into early Vertumniceratan].
The ventral tubercles are septate spines, which are frequently lost, only the septate base remaining: this base carrying the septum, or the mark of the septum, is sometimes elongated to bridge two or more ribs— it then resembles a clavus.
The foregoing genera may be noted in more detail.
Gowericeratidae. The genera of this family barely pass beyond costate runcination, the venter is devoid of bordering tubercles, and
there is, in most cases, quick return to venter rounded. In order of increasing persistence of runcination the genera may be placed as follows: Cerericeras, Galilaeiceras, Gowericeras, Galilaeites, Galilaeamites, Kepplerites, Catasigaloceras, Sigaloceras. In Cerericeras the runcination is feeble and quite transitory; in Sigaloceras the runcination is marked and persistent.

A broken example of Sigaloceras, S.B. Coll. 4122, shows, in the interior, the impression of the periphery of a whorl about 7 mm. in diameter: this has the Parkinsonian, or rather Bigotiitan venter (T.A. III, 29, 53)—ribs not quite opposite, with a median interruption. Later the venter becomes rounded, with crossing ribs; later still, feebly runcinate, with the runcination becoming more and more definite, while the ribs pass over with a slight sag. At about 75 mm. diameter there are signs of rib-failure on the distinctly runcinate venter—the sign of an oncoming smooth stage.

Two genera, Toricelliceras and Toricellites, have to be placed provisionally with those mentioned above, yet they seem almost to be more like forerunners of Kosmoceratidae—at any rate, Toricellites does. Both differ from Gowericeratidae in having attained more than runcinate venter. Both, however, resemble Gowericeratidae in rapid decline to rounded venter—differing in this respect from Kosmoceratidae.

The point now comes for consideration—do these two genera represent, in the attainment of certain characters, stages through which the other Gowericeratids have passed, but have in the main lost by 'skipping,' or do they represent stages to which the other Gowericeratids tried to attain, but in the main failed to achieve, and so dropped back again to lower stages?—some of them making feeble efforts to remain, for instance, runcinate, others making a prolonged effort in runcination, presumably on the road to subsulcation. In this view Cerericeras has only very transitory attainment of runcination, while Sigaloceras shows a very prolonged stage, but has no sign of attaining subsulcation.

Gulielmicerasidae: The order of development appears to be as follows:—Runcinate venter, Gulielmina; subsulcate venter with bordering tubercles gaining in strength as the ventral ribs fail, Gulielmiceras, Gulielmites, Anakosmokeras: these three genera end by becoming smooth, except for retaining, or perhaps rather, it might be said, re-developing, inner marginal nodes. A smooth, or nearly smooth, venter and well-developed lateral bituberculation are other features.

There is one peculiarity in the date of these genera: Gulielmina and Gulielmiceras belong to the middle Proplanulitan Age: then there is a time, the Reinecekeian Age, when no Kosmocerataceae seem to be found; later, in early Kosmoceratan, are two genera remarkably like Gulielmiceras, namely Gulielmites and Anakosmokeras.

Parapatoceratidae: There are, as yet, only two genera—criocone with curved whorls just out of contact, Criocoonites—and toxocone, with whorls curved, just short of straight, Parapatoceras.

There seems no reason to suppose that forms of this family are an independent development perhaps of the later family Reinecekeidae (Spaeth, Blake Coll.; Pal. Ind. ix (1), 1924, 12); but, rather, that the origin is to be sought in penecontemporaneous forms allied to Toricellites. In Toricellites the cadicone coronate stage of the inner whorls is but feebly involute. Economic disturbance to such a form might produce rapid acceleration in two ways—in shape, from serpenticone to criocone, in ornament, from tuberculate to costate, that is, costate post-tuberculate.
This would make the Parapatoceratidae an aberrant off-shoot of primitive Kosmocerataceae. A similar theory would make the Stepheoceratan-Parkinsonian uncoiled forms, Spiroceras and others, aberrant developments of primitive Parkinsoniidae.

Such a theory receives some support from the existence in the Kosmoceratan of a small unnamed Kosmoceratid with polygyral serpenticone whorls barely in contact. Such a form is, presumably, a rather primitive Kosmoceratid, which, with a very little disturbance, might easily become an uncoiled form. A similar, little-in-contact form in the Proplanulitan Age, congruous with young Toricellites, may be imagined as ancestral to the Parapatoceratidae.

Uncoiled forms of widely-separated dates are obviously polyphyletic. Uncoiled forms of approximately similar date are not necessarily monophyletic. So the family Parapatoceratidae may not be systematically correct: it may be only a convenience. Aberrantism may be looked upon as somewhat of a disease, which may have attacked more than one of the genera of Kosmocerataceae to produce forms like Crioconites and Parapatoceras.

Kosmoceratidae. Most of these genera are remarkable for length of lateral and ventral tuberculation, truly spinosity, and for the number of ribs which may be collected to join to one ventral tubercle (spine). In the order of declining collection of ribs the genera seem to stand as follows:—Kosmoceras, Spinikosmokeras, Hoplikosmokeras, Lobokosmokeras, Katakosmokeras, Bikosmokeras, and the supposed decadent genera, Zygokosmokeras and Kuklokosmokeras. Kosmoceras and Spinikosmokeras stand at what may be called the acme of rib-collection to one ventral tubercle, 3 or 4 or even more ribs flowing into one ventral tubercle, while the genera placed after them in the foregoing sentence show decline, in steps, down to unity, with final loss of ventral tubercles.

The Kosmoceratidae are distinct from the Gulielmiceratidae in attaining a rounded venter without losing costate ornament.

The genera and families of the Kosmocerataceae show the following phenomena:—1, Faunal repetition: they come in as independent waves not only during two Ages, but during the successive hemeræ of those Ages, then they disappear for an Age—Reineckeian—not only from this country, where their absence might be explained by loss of Reineckeian deposits, but, so far as is known, from other places where Reineckeian deposits are well-developed. Then in a later Age, Kosmoceratan, they re-appear in abundance, show very flourishing stages of high development—heterogeneity—gradually fading away to less heterogeneity of characters, but not attaining the simplification—loss of ornament and other features—of even the Gulielmiceratidae. Recognisable Kosmoceratids continue into early Vertumniceratan (Professor A. Morley Davies’s finds), and then perhaps all die out; but there is a possibility that genera like Kuklokosmokeras have given rise to forms whose Kosmoceratid affinity would not be readily suspected.

The phenomena shown by genera of the Kosmocerataceae in regard to evolution of characters and the times at which they appear seem to be congruous with those noted for the Oppelaceae (T.A. V, pp. 7 et seqq.). It is the later forms which show the greater amount of acmic characters or high elaboration; while it is the earlier forms which reveal the larger amount of paraemic or declining characters—none of the
forms showing, as adults, the epamic or anagentic characters. Therefore the earlier forms cannot be regarded as ancestral to the later forms, which is the same as was found in the Oppelaceae; so geological order is, in the main, the inverse of biological order, and the successive waves are only related, not directly to one another, but indirectly as constantly originating from some unknown but persistent common ancestor. Such ancestor may reasonably be conjectured to have arrived at the Teloceras-Stepheoceras stage of cadicone coronate, and to have abided in this form in its unknown locality. Perhaps occasionally it branched out into the Parkinsonian broken-venter stage. But the Parkinsonian biological stage has only unituberculation—on the side; while the Kosmoceratids have bituberculate side and unituberculate venters—trituberculation. So there are two stages between Parkinsonians and Kosmoceratids, bituberculation and trituberculation. The Kosmoceratids pass through trituberculation before declining: there is no evidence that the early Kosmocerataceae—the Gowericeratidae—all passed through the trituberculate, or even the bituberculate stage before declining: it is possible that they were aiming in such directions, but failed in attainment. In such case there is only a kind of Parkinsonian biological history before the advent of the cryptogenetic Cerericeras: in the case of attainment there would be a long Kosmoceratid kind of history before it, involving a far greater series of missing forms.

An interesting problem is presented by the disappearance of Kosmocerataceae during the Reineckeian Age; but it is paralleled to a certain extent by the sporadic appearances and disappearances of Lytocerates and Phyllocerates in the seas of northern Europe. Partly, but not completely, such gaps in their continuity are filled by records from more southerly areas. It is possible to understand that denizens of cold-water areas would invade warm-water areas and suddenly flourish; because this is in accordance with usual biological phenomena. But it is not easy to understand the inhabitants of warm seas invading cold seas, except on the postulate that the cold seas became temporarily warm owing to climatic or physical changes. In any case, however, there seem to be long gaps in continuity of record, for which the only explanation would appear to be that comparatively primitive forms lay, more or less dormant, in unknown or untapped areas, ready to take advantage of favouring recurrent conditions to spring into flourishing development—such development necessarily nearly parallel to what had gone before. But the degree of such parallelism depended on the degree of development of the dormant forms. If they were more or less developed along a given line they would produce somewhat close parallelism; but if they were decidedly primitive they would not be set on a given course, but would be more capable of launching out into quite new directions.

Some such theory is necessary to account for the reappearances after temporary absence of forms which, from their essential similarity, appear to be actually related, as distinguished from those forms which are superficially alike, but are obviously not related.

A few examples of the re-appearance of presumably related forms, after a more or less prolonged absence, may be given. For the timescale see T.A. V, pp. 71-78.

Haplopleuroceras in Sonninian
Palipaleuroceras in Amaltheian
Fontannesia in Sonninian
Dumortieria in Dumortierian

\{ Euadmetoceras \} in Sonninian
\{ Parammatoceras \} in Ludwigian
Hammatoceras in Dumortierian

Defossiceras in Liparoceratan
Euagassiceras in Agassiceratan

Angulaticeras in Oxynoticeratan
Schlotheimia in Schlotheimian

The re-appearance of oxynotes in the Polymorphitan Age, after absence during the Deroceratan and presence in the prior Oxynoticeratan Age, is not necessarily congruous with the above cases. The genera involved are highly catagenetic; their general similarity in shape indicates degeneration along similar lines of decline (convergence), not necessarily intimate relationship. More strikingly is this brought out in the Cretaceous species of oxynotes, which have for long been placed in the genus Oxynoticerata, as if they were actually related to the Lower Lias (Oxynoticeratan Age) genus. Such relationship is quite out of the question—the gradual decline of distinct and quite unrelated forms to a general oxynote shape is now recognised as a usual phenomenon of extreme senile decay.

Ammonoid Species Named "pringlei": During the last two years the trivial name "pringlei" has been applied independently by three different authors to three different Ammonoids of the Portlandian-Kimmeridgian deposits. The first in order of date is Wheatleyites pringlei, Pruvost, 1924 (Pringle and Pruvost, Série portlandienne du Boulonnais; Comptes rend. Acad. d. Sciences, clxxviii, pp. 399, 400): this, however, is a nomen nudum, for there is neither description nor figure.

The next name is Shotoverites pringlei, S. Buckman, April, 1925 (Type Amm., Pl. DLXII), the holotype of which is a fairly large specimen obtained by Mr. J. Pringle at Shotover Brickyard, near Oxford.

Then in June, 1925, are published figures and descriptions of Wheatleyites pringlei, Pruvost (Ann. Soc. géol. du Nord, xlix, p. 209, Pl. II, figs 1-7).

The last in date is Pallasiceras pringlei, Neaverson, 1925 [Jan., 1926 ?], Amm. Upper Kimm. Clay; University of Liverpool, p. 20, Pl. 1, f. 10).

Shotoverites pringlei has a suture-line formula as follows: 48, 40, 46, 22, L1 being decidedly trilobulate and narrow-stemmed.

Wheatleyites pringlei, Pruvost. The author has not selected any holotype, and, as seven specimens are concerned, which may or may not be conspecific, it is necessary to choose one. Therefore as lectotype is taken the example depicted in figs. 1, 1a-1c, concerning which there is most pictorial information. The suture-line formula of this form comes out, from the lobe-line depicted, as Sl. (fig.) 32, 44, 42, 22. The difference between this formula and that of Shotoverites pringlei is not great, but L1 is different in shape—it is not markedly trilobulate and is broad-stemmed, somewhat oblong. There might reasonably be hesitation in
excluding it from the genus *Shotoverites*; but there can be no hesitation in saying that its Sl.-formula shows it not to be *Wheatleyites*—for its EL and Lr are some 20 per cent. too short (see this Vol., p. 9). Therefore Pruvost’s *pringlei* runs considerable danger of clashing generically with *Shotoverites pringlei*, with which, however, it is not conspecific. The likeness is sufficiently strong to suggest that the La Rochette phosphate bed of the Boulonnais may be isochronous with a lower part of the Shotover Sands (Paravirgatitan). This is, in spite of all that has been written about the correlation of English and Boulonnais Portlandian strata, one of the very few points where the Ammonoid fauna, as at present known, suggests synchronism.

By the kindness of Dr. Dutertre, Boulogne Museum, I have been able to examine a considerable series of Ammonoids from the Portlandian-Kimmeridgian strata of the Boulonnais. Striking is the lack of identity between the fossils of the Boulonnais and the English areas—those of the Midlands and Dorset coast. But more agreement may be found when the Ammonoid faunas of the two countries are better illustrated and better understood—especially may the south-east English area (Kent coalfield) be expected to help. But at present the Boulonnais area seems to have the largest number of gaps, lacking many of the Ammonoid elements so conspicuous in England. On the other hand there are Boulonnais Ammonoids not yet seen in England, though some may be expected from certain English beds where specimens are badly preserved.

No surprise need be felt at this lack of identity, when the same phenomenon is to be seen in closely contiguous Portlandian-Kimmeridgian areas in England. For instance, the Hartwell Clay Ammonoid fauna, *Holcosphinctes, Aposphinctoceras* and *Episphinctoceras* have only been found very locally in England, and no trace of them has yet been seen among the Ammonoids of the Boulonnais.

Lastly, Dr. Neaverson’s *Pallasiceras pringlei* is a species quite distinct from *Shotoverites pringlei* or from “*Wheatleyites*” *pringlei*. It is of later date, coming from the beds of Chapmans Pool (Paravirgatitan, *lyditicus*); but the author does not give a suture-line to enable the reader to decide whether the genus be *Pallasiceras* or *Lydistratites*. However, the Officers of the Geological Survey have most kindly sent me their examples of his types, and it can be said the Neaverson’s *Pallasiceras pringlei* is generically correct, possessing the short lobes of the genus.

In regard to the species attributed by Dr. Neaverson to the genus *Aposphinctoceras*, mentioned above as from Hartwell Clay, there is much trouble. The genotype is a species from the Littleworth Lydite Clay (Paravirgatitan 8. T.A. III, 26) of Chippinghurst, near Chislehampton, Oxfordshire (M. Healey, Jur. Amm.; Q.J.G.S., lx, 1904, 61, Pl. xxi, *Olcostephanus pallasianus*; Neaverson, Geol. Mag. lxi, 1924, 149, *Aposphinctoceras decipiens*, name given to Healey’s figures), and it is doubtful if it is generically different from the prior-named *Lydistratites*. But the Hartwell-Clay species, which, I contend, are of much earlier date (Pseudovirgatitan 3. T.A. III, 33), Dr. Neaverson has put into his *Aposphinctoceras* (op. cit ii, 3-5—*Ap. allesburyense, hartwellense, variabile*). These Hartwell species are not claimed by Dr. Neaverson as conspecific with the Chippinghurst species, and it is obvious that
they are not congeneric: the style of ribbing is different—the point of bifurcation much nearer the periphery in *A. decipiens* than in the other species.

This introduces a question of chronology which is intimately bound up with a question of the systematic position of species. Faunal similarity of two deposits well separated in point of time has misled observers into saying that the two deposits are isochronous. This is an important point, about which a separate statement must be made below.

**The date of Dr. Neaverson's memoir:** In p. 24 above I have given a query as to the date of this publication. Dr. Neaverson has since kindly written to say that "the exact date of publication is 22nd Dec., 1925."

**The species called pseudogigas:** The propriety of selecting as a neotype of Blake's *Ammonites pseudogigas* a specimen from the Creamy Limestones of Buckinghamshire has been questioned. It seems advisable to make the position clear. In the stratigraphical part of his paper on the Portland Rocks (Quart. Journ. Geol. Soc., xxxvi, 1880), Blake cites the species from 3 or 4 horizons:—1, Shell Bed of Portland (p. 192); 2, Creamy Limestones of Bucks (p. 216); 3, Rubbly Beds of Bucks (p. 218); 4, Shotover and glauconitic sands (p. 225). No. 1 is of Behemothan Age, No. 2 Gigantitan, No. 3 Behemothan, but not, perhaps, isochronous with No. 1; while No. 4 is Paravitragititan of my Chronological Scheme, T.A. III, 26. It is obvious that the name was quite uncritically applied to several different species. Blake's types cannot, it seems, be identified, so the selection of a neotype is governed by the following principle—a specimen from one of Blake's cited localities and horizons agreeing with the details which he gives in his palaeontological description (p. 228). There he says:

"**Ammonites pseudogigas**, spec. nov. I confer this name on "certain specimens which have in the inner half of the whorl "large knobby ribs which bi- and trifurcate. It has the whorl "as much inflated as in *A. gigas*; but the ribs are more "numerous than the knobs in the latter species, and are "more truly ribs."

The statement about the inflation settles the species to be chosen—*Am. gigas* at a diameter of 221 mm. has an inflation of 47 per cent.; the species from the Creamy Limestone figured by me as neotype of *Am. pseudogigas* has at 215 mm. an inflation of 48 per cent. My experience of Portlandian Ammonites shows that the species from the Creamy Limestones of Bucks must be the one from which Blake took this detail of the inflation, and that no other species from other Portlandian beds attains such thickness and has at the same time the stout ribs which Blake mentions.

Therefore, *Ammonites pseudogigas*, or, as it is now, *Trophonites pseudogigas*, cannot be quoted as a species of the lower portion of the Portlandian stone-beds (Behemothan Age); but it is a species of the upper portion of these stone-beds (Gigantititan Age) just earlier than *Gigantites*. The species which may take the place of *pseudogigas* as a zone-fossil for a portion of the lower stone-beds is *Kerberites kerberus*, possibly not one of the species which Blake called *pseudogigas*. 
THE DATE OF HARTWELL CLAY: For some years, in successive publications, the Officers of the Geological Survey have correlated the Hartwell Clay with the rotundum beds of Chapmans Pool, Isle of Purbeck, Dorset, with the Swindon Clay of Swindon, Wiltshire, with the clay above the Shotover Grit Sands of Shotover, Oxfordshire, and therefore with the clay above the Wheatley Sands of Wheatley, Oxfordshire—this clay being what I had named Littleworth Lydite Clay.

There is no objection taken to the correlation of the rotundum zone of Chapmans Pool with the Swindon Clay and with the Littleworth Lydite Clay; but when they also correlate these deposits with the Hartwell Clay of Hartwell, near Aylesbury, serious protest must be made, because the stratigraphical sequence of the beds is quite opposed to it. Their statements are in the following publications:—Chatwin & Pringle, Zones of Kimm. & Portl., Mem. Geol. Surv., 1922, 103; Lamplugh, Kitchin & Pringle, Concealed Mesozoic Rocks in Kent; Id., 1923, pp. 222 et seqq., Pl. II; Pringle, Geol. Oxford, Ed. 2, Id., 1926, p. 73. Also Pringle & Pruvoost, Portl. Boulonnais; Compt. rend. Ac. Sci. clxxviii, 1924, 399; Pruvoost & Pringle, Geol. Boul.; Geol. Assoc., xxxv, 1924, pp. 44 et seqq. No surprise need be felt at the correlation put forward by the Survey, because till a few years ago the Portlandian-Kimmeridgian Ammonoids of this country had received very little critical attention, the many species possessed few, if any, names, and the strata could not be properly studied. The likeness of the Ammonoids of the Hartwell Clay and of Chapmans Pool is admitted; but it is a deceptive likeness: it is misleading faunal repetition similar to that which for more than fifty years caused the Gravesia-beds of the Middle Kimmeridgian to be confused with the Gigantitid beds of the Portlandian, because of the general likeness of their respective Ammonoids. Of recent years, however, Dr. E. Neaverson has studied the Ammonoids of some of the beds concerned (Zonal Nom. Kimm. Clay; Geol. Mag. lxi, 1924, p. 145; Amm. Up. Kimm. Clay; University of Liverpool, 1925). He supports the contention of the Survey as to the practical isochronism of the two clays in question; but only by the misidentification of Aposphinctoceras dealt with above (p. 25) and by a stratal correlation which is easily shown to be erroneous.

In my Chronology T.A. IV, 26, I placed the Littleworth Lydite Clay as another form of the Lydite Bed, and associated both with the Swindon Clay, placing them above the Shotover Sands, the Thame Sands and the Wheatley Sands, while I placed Hartwell Clay and Crendon Clay as below these Sands.

To make this clear, the following sequences in Bucks may be given:

A. AYLESBURY AREA

8. Creamy Limestones
7. Sands
6. Glauconitic Beds
5. Lydite Bed
3. Upper Hartwell Clay
2. Lower Hartwell Clay

B. LONG CRENDON

8. Creamy Limestones
7. Sands and Rubble Beds
6. Glauconitic Beds
5. Lydite Bed
4. Thame Sands
3. Hartwell Clay
2. Crendon Clay
These may be compared with those in Oxfordshire.

C. Wheatley

7. Littleworth Sands
6. Hidden
5. Littleworth Lydite Clay
4. Wheatley Sands
1. Mild Clay

D. Shotover Brickyard

7. Littleworth Sands
6. Glaucnitic Beds
5. Littleworth Lydite Clay
4c Shotover Grit Sands
4b Shotover Fine Sands
4a Wheatley Sandrock
1. Mild Clay

It will be noticed that there are two gaps in these sequences, and that really they cause all the trouble—one is the absence of Sands (No. 4) from Aylesbury area, and the other is the absence of Hartwell Clay (3, 2) from the sections of Wheatley and Shotover. But such non-sequences are a well-known phenomenon in geology, for which the investigator should always be prepared.

These sequences may now be combined and dated as follows. For further details see T.A. IV, 26-33 and T.A. V, 71.

**Table VI—Chronology**

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Hemerae</th>
<th>Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Several</td>
<td>Gigantitan</td>
</tr>
<tr>
<td>7.</td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td><em>lyditicus</em></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><em>paravirgatus</em>,</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>pectinatus</em>, etc.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><em>pallasioides</em></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><em>inflatum</em> (Episphinctoceras inflatum, Neav.)</td>
<td>Pseudovirgatitan</td>
</tr>
<tr>
<td>1.</td>
<td><em>grandis</em> (Virgatosphinctoides grandis, Neav.)</td>
<td></td>
</tr>
</tbody>
</table>

Dr. Neaverson (op. cit., 1924, 145) accepts the identity of Crendon Clay with Lower Hartwell Clay, but places the Crendon Clay (2) as equivalent to the Littleworth Lydite Clay (5), and then supposes that the Littleworth Sands are the equivalent of the Thame Sands, which makes the Thame Sands not of the same date as the Shotover Sands. But this reading is disproved by the sequence shown in about the middle of the Shotover Brickyard (D), where the Littleworth Sands are seen overlying the Glaucnitic Beds. Now the Glaucnitic Beds, with characteristic Ammonoids, are a most persistent and easily-recognized stratum throughout the whole length of the Portlandian Lower Stone-Beds (Behemothan) of Oxfordshire and Buckinghamshire. The Glaucnitic Beds overlie the Lydite Bed, which caps the Thame Sands. The Hartwell (Crendon) Clay of the disused brickyard of Long Crendon, which has yielded *H. pallasioides* and *E. inflatum*, underlies the Thame.
Sands: at Hartwell the clay (or clays) with the same species underlies the Lydite Bed.

Further objections to the Survey contention are that no species of Hartwell-Clay ammonoids have been produced from the *rotundum* clays of Chapmans Pool, from the Swindon Clay, nor from the Littleworth Lydite Clay of Wheatley and Shotover: these clays yield *Lydistratities* and *Pallasiceras*, which have not yet been produced from the Hartwell Clay, but have been produced from the Lydite Bed of Hartwell and Long Crendon (T.A. CCCLIII, DCV, DCVI). Then the isochronism of the Thame Sands, of Thame and Long Crendon, with a part of the Shotover Grit Sands is attested by the species of *Paravirgatites* (T.A. CCCVIII, CCLXXXII, DCIII).

An interesting observation may be made about the Paravirgatitan strata (Shotover Sands) of Shotover. Working from south to north there are three exposures seemingly on the same general level—two in the brickyard and one beyond the waterworks. These exposures yield different ammonoids and are presumably distinct in date, there being distinctions also in lithic character of the sands and of the contained doggers. On the south is the earliest with *Wheatleyites*, in the middle come *Pectinatites*, *Keratinites* and *Shotoverites*, while from the northern pit came *Paravirgatites*. It is only *Paravirgatites* which has yet been found in the Thame Sands to the eastward: one specimen was in place and came from sandrock near the top (T.A. DCIII).

The true thickness of the Shotover Sands of Shotover may, therefore, be much greater than the apparent thickness—there may be oblique bedding.

Reference has been made above (p. 25) to the difference, in so-called *Aposphinctoceras*-species, in regard to the length of the primary ribs: those of Hartwell-Clay species being short—the division into secondaries taking place about the middle of the lateral area; those of the Littleworth Lydite-Clay species being long—the division taking place near the ventral border. There is a certain alternance in date in respect of showing this character, as the following Table illustrates.

**Table VII — Ribbing**

<table>
<thead>
<tr>
<th>Strata</th>
<th>Species</th>
<th>Primary ribs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubbly Beds</td>
<td><em>Crendonites</em> and various forms of <em>goerei</em> aspect</td>
<td>Long</td>
</tr>
<tr>
<td>Glauconitic Beds</td>
<td><em>Hydrostratites</em>, see</td>
<td>Short</td>
</tr>
<tr>
<td>(part)</td>
<td>Pl. DCLXXVI</td>
<td></td>
</tr>
<tr>
<td>Waterstone</td>
<td><em>Paravirgatites</em>, etc.</td>
<td>Short</td>
</tr>
<tr>
<td>Lydite Bed</td>
<td><em>Holosphinctes</em></td>
<td>Short</td>
</tr>
<tr>
<td>Shotover Sands</td>
<td><em>Epsiphinctoceras</em></td>
<td></td>
</tr>
<tr>
<td>Hartwell Clay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In regard to long and short primary ribs, a warning should be given about side-view figures reproduced from photographs. If a short-focus lens be used, the length of the primary rib in relation to the secondary rib is enlarged, because the true length of the secondary rib is unduly reduced. It is easy to see why; but it is a point that may be overlooked in comparing figures. Also, care has to be taken in judging the
comparative length of primary and secondary ribs in specimens which are crushed flat.

Until these various faunal and stratigraphical statements can be refuted, not by mere surmise, but by quite definite evidence, one must decline to accept the conclusions of the Survey or of Dr. Neaverson that the similar-looking biplex ammonoids of Chapmans Pool and Hartwell are specifically identical or even sufficiently approximate to warrant the statement that their respective deposits are isochronous. My visit to the Dorset Coast this summer (1926) has shown that the claims of Dr. Neaverson, as to how the upper part of Hartwell Clay is to be correlated, and what the Dorset Portland Sands represent, are far too hasty. The visit has enabled considerable advance to be made in the correlation of the Upper Jurassic strata, as will now be detailed.

DORSET COAST STRATA: During a visit this summer to the Isle of Purbeck I had the good fortune to meet Mr. C. H. Waddington, who had commenced a study of the Portland Sands of Hounstout Cliff, Kingston. Mr. Waddington's assistance I most gratefully acknowledge: owing to the short time at my disposal, and my limited capacity for the fatigue of climbing, his help was extremely valuable. He showed that the cliff of Hounstout was quite readily climbable, especially just west of the shoulder seen to the left in Fig. 1, and he was able to prove positions in situ and confirm my surmises as to the beds from which had come specimens collected from various fallen blocks. He is continuing his researches, and there is every reason to suppose that he will be able to make important additions to the more exact correlation of Portlandian-Kimmeridgian strata of Dorset.
Hounstout Cliff is 501 feet above mean sea-level, its base being the perpendicular cliffs, which form the northerly rim of Chapmans Pool—the clays with \textit{rotundum} nodules. As the nodules are about 15 feet up, while the top of Hounstout consists of some 50 feet of the lower part of Portland Stone Beds, some 70 feet may be allowed, leaving 430 feet for Portland Sands and so-called Kimmeridge Clay of Hounstout-Chapmans Pool. Then, if the \textit{rotundum} nodule-layer is correlated with the Littleworth Lydire Clay, and that with the Lydite Bed of Long Crendon, Bucks, while the basal Portland Stone of Hounstout is correlated with late Behemothian, which is fairly obvious from Mr. Cox’s researches at Portland (Shell-Bed; Proc. Dorset F.C., xlvi, 1925, p. 113), there are some 430 feet of strata in the Isle of Purbeck representing the same interval of time as only 15 feet of strata do in the north-west quarry of Long Crendon, Bucks. In both cases it may be surmised that the amount of strata actually preserved is less than the amount of strata originally deposited; but it is fairly obvious that the actual amount deposited in the Isle of Purbeck was far greater than that deposited in Bucks. But, again, it may be assumed that in Bucks the amount removed was far greater in proportion to the amount deposited, for in Bucks there are rapid lithic changes, signs of redeposition and erosion; while in the Isle of Purbeck the lithic changes are fairly gradual. But suppositions of a far greater deposition in the Isle of Purbeck, and of far greater denudation of less deposits in Bucks, do not altogether explain the difference—ammonoids and other fossils collected in Dorset suggest a whole series of episodes not found in Bucks: whether the strata of such dates were never deposited in Bucks, or whether they were deposited in an attenuated condition and removed by penecontemporaneous erosion, may wait further evidence.

E. HOUNSTOUT AND CHAPMANS POOL. (Blake’s numbers cited below, in brackets, refer to his section of St. Albans Head, about one mile to southward—Q.J.G.S., xxxvi, 1880, 193. For the letters marking beds, see Summary, sequence F—page 34).

v. Portland Stone, Flinty Series [with Shell Bed at base?] (Blake’s 10).

Portland Sands—Cement Stone Series (Blake’s 11, 12 and perhaps 13, for which he gives 85 feet):—

14. \textit{p}. “Two blocks of sandy cement stones” show as two prominent parallel bands beneath the stone series of Hounstout (Fig. 1, page 30) and in the west-facing cliff running towards St. Albans Head.

13. \textit{n}. A strong band of white argillaceous cement stone stands out prominently in Hounstout, towards the lower part of the Cement-Stone series. It yields many of the fallen blocks lying on the ledge about the level of the old road (Fig. 1, B), and it is the home of specimens of \textit{Leucopetrites} (Pl. DCLXXVII).

II. \textit{l}. Below is a less prominent cement-band (Blake’s 13?) of a bluish colour, from which Mr. Waddington reports \textit{Thracia}; it is possibly the home of a bippicate Ammonoid (No. 4650, S.B. Coll.).

Portland Sands—Sandy Series:

9. \textit{h}. A little below \textit{II} there stands out as a prominent band in Hounstout Cliff a massive yellow and blue sandstone bed, some 5 feet in thickness (Fig. 1, \textit{h}): this is the most prominent datum-line in the cliff, and blocks which have fallen on the ledge and shore below can be easily identified: they yield bippicate ammonoids which have a great
likeness in ribbing to the outer whorl of *Virgatites pallasi*, Michalski sp. (1890, iv, 1), in that the spaces between the primary ribs are wide, while the secondary ribs are approximate—making only a narrow V.

Fig. 2. *Rhynconella portlandica*, Blake x 0.98
An area of about 7½ square inches shows some 20 specimens of the Rhynconella with examples of a rugose Exogyra at N. and in N.W. corner. From [bottom of] a large fallen block of Massive Bed (h)

Fig. 3. Portion of Fig. 2 enlarged, x 1.5
["The Exogyra may be compared with *E. spiralis*, Goldfuss" J.W.T.]

In a fallen block in the little bay immediately west of Chapmans Pool my eldest daughter called my attention to an ammonoid which turned out to be the only English specimen that I have yet seen with satisfactory virgatite, quadruplicate ribbing. It is crushed and otherwise
defective, but its likeness to *Virgatites scythicus* is so great that it is figured in Pl. DCLXXV. Its matrix is a blue sandy stinkstone—that is, smelling when struck—which, however, may be a character of more than one of the Portland-Sand beds. It is judged to have come from the base of the Massive Bed (h).

From a large fallen block of the Massive Bed, on the beach which forms the western side of Chapmans Pool, and presumably from what is its base, I obtained a considerable series of *Rhynchonella portlandica*, Blake, (all crushed), mixed with a curiously rugose *Exogyra* (Figs 2, 3, p. 32). Subsequently Mr. Waddington found this *Rhynchonella* in the Massive Bed in situ, but not abundant.

7. *f*. A few feet lower is another indurated sandy block, about two feet thick, but no fossils were obtained. (This and the Massive Bed appear to correspond to Blake's 14, 15, except in the matter of thickness. Blake's 16 is below: it can be divided more than he has done.)

6. (16[a]). *e*. Blue Sandy Marls, with more or less of stinkstone bands: these are 40 or 50 feet in thickness, and extend down to about the old road. According to the colouring of the Geological Survey Map, No. xvi, 1855, this is the base of the Portland Sands. H. B. Woodward (Ool. Rocks, v; Mem. Geol. Surv., 1895, p. 191) makes Lower Portland Beds (= Portland Sands) end with the Massive Bed. Blake carries the beds 80-100 feet lower.

Kimmeridge Clay:—

5. (16[b]). *d*. Dark clays, no fossils found, perhaps 30 feet.

4. (16[c]). *c*. Rhynchonella marls: they yield a *Rhynchonella*, small Lamellibranchs, *Cidaris* spines and Belemnites: they are perhaps 15-20 feet in thickness. Mr. Waddington discovered the bed with this fauna, and I confirmed it. The *Rhynchonella* is like *R. subvariabilis*, Davidson, but is doubtful, because the specimens lack the longitudinal striation mentioned by him: his original specimens came from the Kimmeridge Clay of Potterne, Wilts.

3. (16[d]). *b*. *Lingula* shales. Light-coloured arenaceous shales with many *Lingulae*. Blake mentions the *Lingulae* as about 40 feet above Kimmeridge Clay, and that the line of separation from that clay is "more or less arbitrary" (p. 195). The cliffs on the north rim of Chapmans Pool seemed to show above the *rotundum* beds a line of demarcation, as if there were a non-sequence; but this would be far lower than what Blake calls the top of Kimmeridge Clay.

The Beds 16[b--l] were examined on the valley-side south of the stream, between the stream and the Coastguard Station. The *Lingula* is not *L. ovalis*, Sowerby, which is doubtfully a Kimmeridgian species; but the Chapmans-Pool *Lingula* is little, if any, different from other so-called *Lingula ovalis* found in quite other horizons of Portland Sand and Kimmeridge Clay. As a dating fossil it is, probably, useless, but must serve for the present.

2. *a'*. Rotundum Clays, with nodules. A line of ammonoidiferous nodules which is, under Hounstout, about 15 feet above the beach, dipping to about 10 feet or less southwards, near the boat-house, yields *Lydistratites* and *Pallasiceras* uncrushed, but the large specimens often imperfect.

1. *a*. Crushed Ammonoid Shales: The base of the cliffs and the pavement of the beach show a multitude of crushed ammonoids, some of quite large size. It is possible that they are neither *Lydistratites* nor *Pallasiceras*, but *Paravirgatites*. The differences between these genera,
all of which have rather similar bifurcating ribbing, with periodic swollen ribs parted by deep constrictions, may be given as follows:—

- Lydistratites—primary ribs long, lobes long
- Pallasiceras—primary ribs long, lobes short
- Paravirgatites—primary ribs short, lobes short

A summary of the Isle of Purbeck sequence may now be given. It seems to disclose a quite unexpected result, namely, that the position of a part of the Volgian Stage of Russia is in the Portland-Sands series of Dorset and is lacking from any sequence of the Buckinghamshire beds. Therefore it will be necessary to interpolate a Virgatitan Age in the chronological scale.

**F. SUMMARY — ISLE OF PURBECK**

<table>
<thead>
<tr>
<th>Strata</th>
<th>Fauna</th>
<th>Age &amp; Hemera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Stone:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>s. Building Stone, etc.</td>
<td></td>
<td>Gigantitan</td>
</tr>
<tr>
<td>r. Flinty Series</td>
<td></td>
<td>Behemothan</td>
</tr>
<tr>
<td>q. Shell Bed</td>
<td>Kerberites</td>
<td>kerberus</td>
</tr>
<tr>
<td>Cement Stone Series:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p. Parallel Beds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o. Marl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n. White Cement Stone</td>
<td>Leucopetrites</td>
<td>leucus</td>
</tr>
<tr>
<td></td>
<td>(Pl. DCLXXVII)</td>
<td></td>
</tr>
<tr>
<td>m. Marl</td>
<td>Biplicate Amm.</td>
<td></td>
</tr>
<tr>
<td>l. Blue Cement Stone</td>
<td></td>
<td>aquator?</td>
</tr>
<tr>
<td>k. Marl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portland Sands: Sandy Series:</td>
<td></td>
<td>Virgatitan</td>
</tr>
<tr>
<td>h. Massive Bed</td>
<td>Rhynch. portlandica,</td>
<td>scythicus</td>
</tr>
<tr>
<td>g. Sandy Marl</td>
<td>Virgatites</td>
<td></td>
</tr>
<tr>
<td>f. Thin Sandstone Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Blue Marls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kimmeridge Clay:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Dark Clays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Rhynchonella Marls</td>
<td>R. subvariabilis?</td>
<td></td>
</tr>
<tr>
<td>b. Lingula Shales</td>
<td>Lingula “ovalis”</td>
<td></td>
</tr>
<tr>
<td>a’. Rotundum nodules</td>
<td>Lydistratites,</td>
<td></td>
</tr>
<tr>
<td>a. Crushed Ammonoid</td>
<td>Paravirgatites?</td>
<td></td>
</tr>
<tr>
<td>Shales</td>
<td>Paravirgatitan</td>
<td></td>
</tr>
</tbody>
</table>

A provisional correlation and dating of the strata of Long Crendon, Bucks (compare T.A. IV, 26, V, 71), of Swindon, Wilts (T.A. IV, 28), and of the Isle of Purbeck may now be presented. Opportunity has been taken to give the thicknesses of the Long-Crendon beds; not that thickness is of any importance in chronological work, especially when, as in Bucks-Oxon, there is rapid variation in a few miles.

The names printed in capitals of the beds of the Isle of Purbeck were given to me by the manager of the Worth Stone Quarries; others are from Blake and Woodward. Those below the Shell Bed are a rough synopsis of my researches in company with Mr. Waddington.
Beds which bear the same number as a hemeral term may be considered as dated on fairly satisfactory evidence: those not numbered, but placed more or less on the same level, are suggested as possibly isochronous, but the suggestions require further proof.

**Table VIII — Chronology and Correlation**

<table>
<thead>
<tr>
<th>Age &amp; Hemera</th>
<th>Long Crendon</th>
<th>Swindon</th>
<th>Isle of Purbeck</th>
</tr>
</thead>
<tbody>
<tr>
<td>gigantitan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. glottodes</td>
<td>39. Upper Witchett (3')</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. hippocæphaliticus</td>
<td>38. Osses Ed (2' 6&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. Briareites</td>
<td>Sandstone (1' 7&quot;) (37, 36, of Hadendenham, Bucks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Titanites</td>
<td>35. Hard Lime (1' 3&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Gigantites</td>
<td>34. Soft Rock (9&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. faciger</td>
<td>33. Lower Witchett (1')</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32. Hard Stone (1' 3&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31. Waste (7&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hemothan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. vau</td>
<td>30. Hard Brown (1' 2&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29. Crendon Sands (bluish)—(c.5')</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28. Sandy Marl (1' 6&quot;)</td>
<td></td>
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<tr>
<td></td>
<td>27. Shelly Rubble (1' 5&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. leptolobatus</td>
<td>26. Blue Shelly (2')</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25. Sand &amp; Stone (8&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24. Specked (7&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23. Dirt (5&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. kerberus</td>
<td>22. Rubbly Lime- stone (2')</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. polypreon</td>
<td>Green specked (9&quot;)</td>
<td></td>
<td>21. Sandy Limestone</td>
</tr>
<tr>
<td>19. lecus</td>
<td>20. Brown layer (3&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19. Green marl (8&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18'. glaucolithus</td>
<td>18. Building Stone, 3'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. megasthenes</td>
<td>17. Waterstone, 10&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. aquator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gigantitan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. scythicus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. subvariabilis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Lingula</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1926 SYSTEMATIC 35

Creamy Limestone Roach

37. **Blue Bed** (Briareites ?)

CAP SPENGL
WHIT BED OR (U)PON FREE- STONE
CHERT VEIN
LISKY BED (white, soft)

CAP BASE BED, OR BOTTOM FREE- STONE

Chert Beds

Blue Cement Stone

16. Marls

15. Massive Bed
14. Sandy Marl
13. Thin Sandstone
12. Blue Marls
11. Dark Clays
10. Rhynchonella Clays
9. Lingula Shales
### Table VIII—continued

<table>
<thead>
<tr>
<th>Age &amp; Hemera</th>
<th>Long Crendon</th>
<th>Swindon</th>
<th>Isle of Purbeck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paravirgatitan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. lyditicus</td>
<td>8. Pebble or Lydite, (5&quot;)</td>
<td>8'. Upper Lydite</td>
<td>8. Rotundum nodules</td>
</tr>
<tr>
<td>7. paravirgatus</td>
<td>7. Thame Sands (80')</td>
<td>8. Swindon Clay</td>
<td>Crushed Amm. Shales</td>
</tr>
<tr>
<td>6. pectinatus</td>
<td></td>
<td>6. 5. 4'. Sands &amp; Clays</td>
<td></td>
</tr>
<tr>
<td>5. pringlei</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4'. Wheatleyites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holcosphinctean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. pallasioides</td>
<td>3. Hartwell Clay</td>
<td>Sands with Doggers</td>
<td>White Septarian Band</td>
</tr>
<tr>
<td>2. inflatum</td>
<td>2. Crendon Clay</td>
<td>Clays above Brickyard of Kings Hill</td>
<td></td>
</tr>
<tr>
<td>1. bivius &amp; grandis</td>
<td></td>
<td>Clays in Brickyard of Kings Hill (Hill’s Brickyard)</td>
<td>Oil Shales</td>
</tr>
</tbody>
</table>

The thickness of the Thame Sands was measured, by use of a level, up Barrel Hill, Long Crendon, with the assistance of Mr. Waddington. Besides the named sands—Thame Sands, Crendon Sands, a new term, and Littleworth Sands(= 25)—other Crendon beds develop as sands locally in Bucks-Oxon; so correlation by lithic character cannot be trusted: to avoid criss-cross correlation, position in regard to other beds and faunal contents must be carefully noted.

The age-name Holcosphinctean is introduced in place of Pseudovirgatitan, as *Pseudovirgatites* may not belong to this age.

There are several interesting points in the above correlation:—

*Leucopetrites leucus* (T.A. CCCVII, 1922) received its name because its chambers were filled with a white (Afuxot) matrix, although the specimen itself was embedded in a particularly green marl. In Hounstout the matrix of *Leucopetrites* is a white cement stone. This may be only a coincidence; but it may mean that the white cement-stone deposit once extended much further northwards.

Prof. A. Pavlov (Class. Strata; Q.J.G.S., lii, 1896, 542), shows, in his correlation-table (facing p. 548), at certain localities in Russia, *giganteus* beds, consisting of glauconitic sands and sandstone, overlying beds with *Virgatites*. The lithic likeness to the deposit of Long Crendon and the position similar to that obtaining in the Isle of Purbeck, with regard to the Cement Stone ammonoids and *Virgatites*, may be only coincidences; but they certainly prompt the query whether the "large ammonites of the *giganteus*-type," which Professor Pavlov quotes for these beds from Syrzan, Simbirsk and Moscow, may not be species of the Buckinghamshire glauconitic beds—*Behemoth, Glaucolithites* and *Leucopetrites*; for the nomenclature at the time he wrote would allow such forms only his given designation, since they are large and they resemble *giganteus*, but had no precise names.
In addition to Leucopetrites in the Cement Stone of Hounstout, there is some reason to think that Behemoth lapideus may be found in the cliff, judging by large, much-battered relics lying on the shore among fallen blocks.

A few years ago, during a visit to Ringstead Bay, Dorset, I discovered the position of Rhynchonella portlandica in the faulted mass of Portlandian by Holworth House. The following section was noted, but the thicknesses are only guess-work, as I did not climb much above the Rhynchonella seam.

G. Holworth

5. Portland Limestone, Flinty Series
4. Limestone below Flinty Series, about 30'
3. Limestone, more or less sandy, about 10'
2. Brown earthy sands, about 8'
1. Marl to clayey seam with Rhynchonella portlandica, Orbiculoidea "humphriesiana," Orbiculoidea smooth (cf. O. glabella, S.B., T.A. DXXXIVb) and Lingula "ovalis." This seam is about two inches thick, and these fossils were not found above or below.

This section may be checked by the lower part of that given by H. B. Woodward, op. cit. p. 104. It may be assumed that the Rhynchonella horizon is about that of the Massive Bed of Hounstout.

The horizon of Rhynchonella portlandica is thus noted particularly because it is so remarkably like Rhynchonella loxia, Fischer, of the Volgan of Russia. Both are cynocephalous species associated with ammonoids having virgatite ribbing; but R. loxia is capillate (striate)—S. Buckman Brach. Burma; Pal. Ind. iii (2), 1917 (1918), p. 57, Pl. xviii, 30, 31; while no such character has been detected in R. portlandica. On the other hand, R. subvariabilis is capillate, and might be considered near to R. loxia both in this character and in position; but the specimens which have been found by Mr. Waddington and myself so remarkably like R. subvariabilis, and apparently much in the same position as the species from Potterne, do not seem to show any capillation.

The position of Orbiculoidea is thus noted because it has now been found in beds which seem to work out as practically on the same horizon in Dorset and Bucks. This, too, may be only a coincidence. The very distinctive little Orbiculoidea humphriesiana; Blake sp., is quite possibly not the same as Orbicula humphriesiana, J. de C. Sowerby, except in being ribbed. It and a smooth form are minute, no bigger than a large pin's head; they are unattached and very difficult to find: the Orbiculoidea glabella at Crendon is larger and attached.

If the rotundum beds of Chapmans Pool are correlated with the Littleworth Lydite Clay, a point wherein the Geological Survey, Dr. Neaverson and myself are agreed, and if the Littleworth Lydite Clay be correlated with the Long Crendon Lydite (or Pebble) Bed, which, in face of the ammonoid and stratigraphical evidence, it will be difficult to dispute, then there is a big non-sequence at Long Crendon above the Lydite Bed—all the Virgatitan beds of Hounstout, or all the beds from the top of the Massive Bed to the top of the rotundum beds—according to Blake, about 160 feet—are missing. There is a bigger gap at Swindon, since the Glaucinitic Beds of Crendon are absent from
these, so that the gap is from the Shell Bed to the *rotundum* beds—in the Isle of Purbeck, according to Blake, some 240 feet.

Dr. Salfeld (Jura Nordwesteuropa; N. Jahrb. Beil.-Bd. xxxvii, 1913, p. 208) says: "Im 'White Septarier-Band' fand sich ein partiell verdrückter *Perisphinctes* aus der Gruppe des *P. Pallasianus* D'ORBIGNY." This gives a hint as to where to look for the equivalent of the Hartwell Clay fauna, for quite possibly this is near to *Ammonites kimmeridianensis*, Seebach, which must be noticed.

*Ammonites kimmeridianensis*, Seebach, 1864, (Hannoversche Jura, p. 157). The author gives this name to *Am. biplex*, "Damon Suppl. to the geol. of Weymouth Taf. 10, Fig. 9"—a misprint for Taf. 9, fig. 9. Damon's figure, which is thus protograph of Seebach's species, is now reproduced in T.A. DCLXXIII. Damon says it comes from Portland Stone and Kimmeridge Clay, so that two species are involved—one of which is, possibly, akin to "*Perisphinctes*" gorei. Seebach says (p. 156) that it is only known to him from the Kimmeridge; but, as his Kimmeridge strata are beds below the *gigas*-schichten (p. 157), evidently a third species is involved. This shows how unreliable for correlation are these so-called biplex ammonoids, unless they are very critically determined.

It is now suggested that Damon's form, which obviously has not *gorei* ribbing, is actually from Kimmeridge Clay, and is what Salfeld calls a *Perisphinctes* of the *P. pallasianus* type from the White Septarian Band (see above, p. 37)—that it is, in fact, a *Holocephalites*, possibly little different from the later-named *H. pallasioides*, Neaverson.

Had Damon said that this species came from the Portland Sand, it might have been suggested that it came from the Blue Cement Stone, and was very near to a Crendon specimen (T.A., Pl. DCLXXVI) from the Waterstone, which should be about the horizon of the Hounstout bed. This Crendon specimen is a fourth complication and fourth date for the so-called biplex forms. It is distinct from *Lydistratites*, *Pallasiceras* and other forms by lacking the periodic thick ribs which border constrictions: it shows neither character.

A biplex ammonoid, presumably by matrix from the Blue Cement Stone, is quite like *Ammonites skidegalensis*, Whiteaves (Mes. Foss. i (1); Geol. Surv. Canada, 1876, p. 34, Pl. 1x, i, not Pl. vii), in outer whorl, but the Hounstout specimen (No. 4650, S.B. Coll.) has more crowded ribbing in the inner whorls.

The White Septarian Band is some 200 feet below the top of the *rotundum* beds, and about another such amount above the 'Oil Shales,' judging by Blake (Kim. Clay; Q.J.G.S., xxx, 1875, p. 198). It has been claimed that the Oil Shales represent the Shotover Grit Sands of Oxfordshire, but they have not yet yielded the necessary evidence of characteristic ammonoids, many of them giants not easily overlooked—*Paravirgatites*, *Shotoverites*, *Whealleytes*. All the evidence given is small forms of very uncertain characters, and the biplex ammonoids have shown how similar forms can be repetitive. But if the claim were made good, it would be equivalent to saying that at Shotover there is a gap of something like 300 feet between the Shotover Grit Sands and the immediately overlying Littleworth Lydite Clay.

The present correlation scheme, which suggests that there is no important non-sequence at Shotover at such place, that the Littleworth Clay succeeds the Shotover Sands without noticeable break, while the representatives of the Shotover Sands and the Hartwell Clay are to be sought between the *rotundum* beds and the Oil Shales of the Dorset
Coast—thus filling up the 300-foot gap to about the extent which the relative rates of deposition in the south and the midlands would suggest (above p. 31)—has, at any rate, a deal of probability to recommend it.

The results of this investigation seem to be working out in a manner analogous to that which nearly forty years ago I demonstrated to be the case with the Lias-Oolite (Cotteswold etc. Sands; Q.J.G.S., xlv, 1889, 440)—in the South of England clay conditions lasted later than north of the Mendip axis, sand also commenced there later, and so did the limestone.

The same phenomena obtain, in a broad sense, in regard to Kimmeridge-Portland deposits, and may be shown by the following Table, with the introductory remark that the use of the terms Portland Stone, Portland Sand and Kimmeridge Clay, as if they connoted sequent rocks of the same date right across country, is to be deprecated. These terms are now coming into popular use in connection with economic questions of agriculture, quarrying, building, drainage and water-supply. Then the usual local sequence—Stone, Sand, Clay, as

Portland Stone
Portland Sands
Kimmeridge Clay

is quite easily remembered and appreciated. But if the statement is made that thick beds of what have been called Portland Sands in Bucks-Oxon for about a century are Kimmeridge Clay, because they happen to lie below beds equivalent to the rotundum clays of Kimmeridge, confusion is the result. It has now to be recognized that the old stratigraphical terms are useless in a strict scientific sense, but are satisfactory as lithic designations when used with geographical qualifications—if, for instance, it be known that the Portland Sands of the Midlands are much earlier in date than the Portland Sands of the South Coast. For it is lithic constitution that is important in economic questions.

For strict scientific work the Age names are available.

The following Table IX shows the strict scientific Age terms and the variation in dates of lithic conditions according to locality.

<table>
<thead>
<tr>
<th>Age</th>
<th>Bucks</th>
<th>Swindon</th>
<th>Dorset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behemothan</td>
<td>Lower Portland Stone</td>
<td>Lower Portland Stone</td>
<td>Lower Portland Sands</td>
</tr>
<tr>
<td>Virgatitan</td>
<td>absent</td>
<td>absent</td>
<td>Lower Portland Sands</td>
</tr>
<tr>
<td>Paravirgatitan</td>
<td>Portland Sands</td>
<td>Upper Portland Sands</td>
<td>Kimmeridge Clay</td>
</tr>
<tr>
<td>Holcosphinctean</td>
<td>Kimmeridge Clay</td>
<td>Lower Portland Sands</td>
<td>Kimmeridge Clay</td>
</tr>
<tr>
<td>Allovirgatitan</td>
<td>Kimmeridge Clay</td>
<td>Kimmeridge Clay</td>
<td>Kimmeridge Clay</td>
</tr>
</tbody>
</table>

This table is only a broad view of the case, for there are temporary local lithic anomalies; but it gives, in a general way, the sequences of lithic events in the chosen areas.
In regard to what has been said above (p. 29) about the dogger beds in the Shotover (Grit and Fine) Sands of Shotover and the differing Ammonoid faunas which they yield: there is an excellent photograph of the middle exposure mentioned—the northern of the two exposures in the brickyard—given in Geol. Oxford, 2nd Ed., by J. Pringle (Mem. Geol. Surv., 1926), Pl. iv, fig. A. It shows the different levels at which the doggers lie. From the lowest level displayed in this photograph has come Wheatleyites fauna—better developed at the southern exposure of sands in the brickyard, and still better seen at Wheatley brickyard. From the middle layers, hard, bluish grit except where weathered, has come the fauna of Shotoverites, Pectinalites, Keratinites, with large Pernas and other lamellibranchs.

**The Hartwell Clay:** Since the remarks about the Hartwell Clay and its correlation were published (T.A., part 60, Oct. 1926), Dr. F. L. Kitchin has reiterated a statement of his views (Lam. Upper Kimm. Clay and position of Hartwell Clay; Ann. Mag. Nat. Hist. (9) xviii, Nov. 1926). His table, p. 453, adds nothing new, and makes the mistake of correlating Portland Sands of Buckinghamshire (Paravirgatitan) with Portland Sands of Dorset (Behemothan). In p. 454 he says: “It is difficult to understand, assuming his [my] interpretation to be sound, how we can account for the absence of the *pallasioides*-fauna [Hartwell Clay] below these sandy beds *pectinatus* at Wheatley, Shotover, and Swindon, and below the *Saccocoma*-horizon in Dorset. In the first place, the Hartwell Clay should be above the *Saccocoma*-horizon; in the second place there are, at Swindon, below the *pectinatus* beds, a thick series of sands (Lower Cemetery beds) above some feet of clay, whose ammonoid faunas are quite unknown; these beds are where the Hartwell Clay faunas should be sought (p. 36); in the third place, local absence of strata is too common a phenomenon to cause any trouble. It is no more difficult to imagine that the Hartwell Clay, some 20-30 feet thick at Hartwell, should be quite absent from Wheatley, some 15 miles to the westward, than to see that the Thame Sands, some 80 feet thick at Long Crendon, separating the Lydite Bed above from Hartwell Clay below, has totally disappeared at Hartwell, where Lydite Bed and Hartwell Clay are in contact—Hartwell being only some 7 miles to the eastward of Crendon.

Dr. Kitchin wishes to show in his paper that the Hartwell Clay and the *rotundum* beds are synchronous by producing an Astartid (*Hartwellia hartwellensis*) from both; but without showing that Astartids are sufficiently restricted in range for such purpose. Considering that there are abundant ammonoids both in the Hartwell Clay and in the *rotundum* beds, and that ammonoids are known to be very restricted in vertical range, it is surely reasonable to ask for isochronism of these deposits to be proved by them.

There is little to be gained in reiterating statements of correlation without figuring the ammonoid evidence. I have figured such evidence for my correlations of the beds concerned. Though there is still more to be done, this evidence of the figures should be sufficient for judgment on my conclusions. Further evidence may need to be sought at Long Crendon and Brill in Buckinghamshire and at Swindon in Wiltshire, but special excavations will be required.
Dactylioceratidae. Generic names in use for this family have long been known as unsatisfactory. Now a series of specimens from the Upper Lias of Barrington, Somerset, gives the opportunity to put them on a surer basis. These specimens are superior for the purpose to those coming from Whitby; because they were carefully collected by Mr. A. Templeman, bed by bed, and almost inch by inch, whereas the Whitby specimens are only known generally as from Upper Lias, though in a few cases there may be three or four smaller divisions—Grey Shales, Jet Rock and so on; but these do not compare with some twenty-six divisions of Mr. Templeman for Barrington Upper Lias. Then the Barrington specimens show good suture-lines, whereas, in Whitby specimens, too often the suture-lines cannot be seen, or if shown are difficult to mark on the black matrix.

In the following short generic diagnoses the phrase EL = Lr does not here refer to the actual length of the lobes, but is to be read in reference to the guide-line—that the external lobe (EL) and the superior lobe (Lr) both come down to the guide-line. So EL < Lr means that Lr comes below the guide-line issuing from end of EL; and EL > Lr, that EL is longer than Lr, so far as guide-line is concerned, Lr not reaching to guide-line; then EL > > Lr or EL < < Lr means much longer or much shorter respectively. The phrase ‘similar species’ indicates those which may be compared to the genotype species, but are not necessarily congeneric—so many forms being figured without suture-line. Cited species having the same trivial name as the genotype are not necessarily conspecific with it.

For the beds of the Barrington Upper Lias, see S. Buckman, Jurassic Chronology; Q.J.G.S. lxxviii (1922), pp. 449 et seqq.


Sl. somewhat florid, EL = Lr, L2 long and aux. 1 well developed.

Oligogyral, parvicoostate, without nodes. Similar species: *Am. equistriatus*, Zieten, 1831, xii, 5; *Am. communis*; Quenstedt, 1885, xlvi, 1, 2.

**Tenuidactylites**, nov.; G. T., S.B. Coll. 4712, identified with *Am. tenuicostatus*, Young & Bird, 1822, xii, 8; cf. Dactylioceras* tenuicostatum*, T.A., 1920, CLVII.

Polygyral, parvulicoostate, some ribs entire, versiradiate, parvulinoideate, ribs slightly arcuate over venter; EL > Lr, L2 unident; Lr short and broad. Septate costae with thick septum raising ribs above cast.

Yorkshire, Upper Lias [Grey Shales].

Similar species: *Am. annulatus*; d'Orbigny, lxxvi, 1, 2; *Stephanoceras annulatum*; Wright, lxxxiv, 7-9.

**Xeinodactylites**, nov.; G. T. Museum of Practical Geology Coll., No. 38013; Barrington, Upper Lias, Bed 6, identified with *Dactylioceras helianthoides*, Yokoyama, 1904, iv, 4-6.

EL > Lr; L2 narrow, trident.

Similar species: *Coeloceras maritum*, Lissajous, 1906, iii, 4.

**Anguidactylites**, nov.; G. T., *A. anguiformis*, nov., M.P.G. Coll. No. 38014; Barrington, Upper Lias, Bed No. 11; somewhat between *Am. raristriatus*, Quenstedt 1885, xlvi, 4 and 6, in ribbing, also like *Nautilus anguinus*, Reinecke, but more prominent ribbing [finer-ribbed forms possible]; polygyral, multi-subparvicoostate, ribs straight over gibbous venter; EL nearly = Lr, L2 long, narrow, subtrident.

Similar species: *Coeloceras (Dactylioceras) anguinum*; Hug, 1898, vi, 2.
Nodicoeloceras, nov.; G. T. N. crassoides, M.P.G. Coll., No. 31616; Barrington, Upper Lias, Bed 18/19. Button and loop ornament, EL = L1, L2 strongly bident, L1 rather slender; identified with Am. crassoides, Simpson sp., T.A. 1913, LXXXIX.

Similar species: Am. acanthus, d'Orbigny; Coeloceras foniculatus, T.A. LIX; Coel. crossleyi, T.A. LX; Stephanoceras raquinianum; Wright, LXXXVII, 7, 8.

Crassicoeloceras, nov.; G. T., C. pingue, nov.; M.P.G. Coll. 38015; Barrington, U.L. Bed 18/19; like Am. crassus, (Coeloceras crassum, T.A. 1918, cxix), but with smaller, closer ribbing; EL = L1, L2 large: suture-line rather florid.

Similar species: Coeloceras foveatum, Simpson sp., T.A., 1913, LXIX; Am. crassus; Meneghini, Pal. Lomb. xvi, 3.


Similar species: Am. subarmatus, Young & Bird, 1822, xiii, 3; Am. subarmatus; d'Orbigny, LXXVI; Hauer, 1856, xv, 6, 7; Meneghini Pal. Lomb., xiv, 5; Dumortier, iv, xxviii, 6—9; Stephanoceras subarmatum; Wright, LXXXV, 1; Steph. crassum; Wright, LXXXVI, 1, 2; Ammonites acanthopsis, d'Orbigny, 1850; Collina lineae, Parisch & Viale, 1906, x, 9, 10; P. verticosum, P. vorticellum, T.A. [Barrington, Upper Lias, Bed 18/19].


Ribs arcuate over venter; EL = L1, L2 almost to guide-line, bident.

Leptodactylites, nov.; G. T., L. leptum, M.P.G. Coll. No. 38018; Barrington, U.L., Bed 23; a leptogyral form like Am. rari striatus, Quenstedt, 1885, xlvi, 5 (lectotype as having fewest ribs), but is more costate.

Spinicoeloceras, nov.; G. T., S. spicatum, nov., M.P.G. Coll., No. 38019; Barrington, U.L., Bed 23. Somewhat like Am. dayi, Reynès, 1868, v, 7, but different proportions and s.l. more florid; EL < L1; L2 trident; ribulate ornament passing to spinous and then to costate.

Similar species. Am. annuliferus, Simpson, T.A. LXIII; Am. desplaci; Meneghini, Pal. Lomb., xvi, 5, 7, 8, (7, 8 = Coeloceras annulatiforme, Men. 1809).

Lobodactylites, nov.; G. T., L. lobatum, nov.; M.P.G. Coll. No. 38020; Barrington, Bed 24; somewhat similar to Am. crassus, but less cadiconic and with highly complex suture-line: EL = L1 = L2.


Similar species: Am. holandrei; Dumortier, iv, xxvii, 1.

Multicoeloceras, nov.; G. T., M. multum, nov.; M.P.G. Coll., No. 38022; Barrington, U.L., Bed 26. Like Am. crassus, but
less cadiconic, with approximate ribbing, slightly arcuate backwards over venter; fibulate ornament in inner whorls. \( EL = L_1 > L_2 \), all subcomplex.

Similar species: *Am. crassus*; Meneghini, Pal. Lomb., xvi, 2.

**Athlodactylites**, nov.; G. T., *Dactylioceras athleticum* (Simpson), S. B., T.A. Pl. LIB. Like *Orthodactylites* with approximate elevated ribs, but they curve forward over the venter; Whitby, Upper Lias, *athleticum*.

Similar species: Barrington, Somerset, Upper Lias, Bed 2a; *Dactylioceras crassulosum*, (Simpson), T.A. LVIII; *Am. annulatus*; Dumortier, iv, xxvi, 3, 4.

**Simplidactylites**, nov.; G. T., *simplicicosta*, nov., M.P.G. Coll. 38304; Barrington, Somerset, Upper Lias; another example, Barrington, U.L., Bed 22; M. P. G. Coll. 38303. Subcadicone passing to serpenticone. Somewhat thick ribs, often simple or undivided, recalling something of *Am. ragazzonii*, Hauer, (Amm. Medolo; Sitz. d. k. Akad. d. W. math. naturw. Cl. xlv (1), 1861, 415; 1, 16, 17), but with too many divided ribs to allow of any real connection. The ribs of *Simplidactylites* pass over the venter with a forward sweep; on sides they are straight without nodes at furcation.

Similar species: *Porpoceras crassiusculum* (Simpson), T.A. CCIX; *Koinodactylites*, nov.; G. T., S.B. Coll., No. 4713; Whitby, Yorkshire, Upper Lias, [Alum Shale]; identified with *Am. communis*, J. Sowerby, M.C. cvii, 2. \( EL > L_1, L_2 \) bident—all lobes short.

Similar species: *Am. angulatus*, Sowerby, cvii, i; *Stephanoceras commune*; Wright, lxxxiv, i—3.

**Nomodactylites**, nov.; G. T., *Nomod. temperatus*, nov., S.B. Coll. No. 4714; Whitby, Yorkshire; Upper Lias [Alum Shale]; \( EL > L_1, L_2 \) short, subtrident; identified with *Am. communis*, J. Sowerby, M.C. cvii, 3, (not 2). Differs from *Koinodactylites* by stouter habit of growth and longer lobate suture-line.

Similar species: *Am. raquinianus*, d’Orbigny, cvi, i, 2.

**Curvidactylites**, nov.; G. T., *Curvid. curvicosta*, nov., S.B. Coll. No. 4724; Whitby; Upper Lias, [Alum Shale or Cement Shale]. Like *Am. communis* (*Koinodactylites*), but with smaller, more numerous ribs, which are slightly curved forward, both laterally and ventrally. \( EL > L_1, L_2 \) unident; \( L_1 \) and \( L_2 \) long and slender.

Similar species: *Stephanoceras commune*; Wright, lxxxiii, 3, 4. This shows similar size of ribs, but they lack the curvature, while its suture-line is of *Koinodactylites* style.


**Mucrodactylites**, nov. G. T., *Ammonites mucronatus*, d’Orbigny, (Ter. jur. Céph.; Pal. franç., 1845, p. 328; cv, 4, 5, 8); serpenticone, paucicostate; bi- (or trifurcate); on venter loop-like ribs medianly broken; \( EL >> L_1 \); \( L_2 \) short, bident, from d’Orbigny’s figures.

Similar species: *Am. mucronatus*; Dumortier, iv, xxviii, 3, 4.

**Dactylioceras**, Hyatt, 1867. See T.A. i, 1911, p. v. [*D. annulatum*, Barrington, Bed 18/19; M.P.G. Coll. 38302; T.A. Pl. DCC; \( EL > L_1 \); \( L_2 \) short, trident].

Similar species: Ammonites armatus; Young & Bird, 1822, xiii, 9; Am. turriculatus (Simpson), T.A. xxx; Am. despliaci; Dumortier, iv, xxvii, 4; Stephanoceras fibulatum andreae; Wright, lxxxv, 8; Peronoceras praepositum, S.B., T.A. DCCI.

COLLINA, Bonarelli, Boll. Soc. geol. It. xii, 1893, 13; Genoholotype (only species figured) Collina gemma, Bonarelli; serpenticone, pauci-costa, arrow-shaped ribs on a bisulcate, medianly cariniform venter. (Bonarelli's figure.)

CATACOECERAS, S.B., G.T., T.A., 1923, CDXIII, C. confectum, S.B., North Nibley, Glos, grandis n.; EL > Li; L2 unident; all lobes short.

Similar species: Am. crassus; Dumortier, iv, xxvii, 5—7; 10, 11; xxviii, 1, 2; Quenstedt, Amm. Schwäb., xlvi, 19-21, 23; Stephanoceras raquiniunum; Wright, lxxxvii, 1-3; Coeloceras puteolus (Simpson) T.A. LXI.

ORTHODACTYLITES, S.B., 1926, T.A. DCLIV; G.T., O. directus, S.B., Middleton Cheney, Northants; Upper Lias, Transition Bed; versusectiradiate. EL > Li; sl. simple.

Similar species: Stephanoceras commune; Wright, lxxxvii, 9, 10.

MICRODACTYLITES, S.B., 1926; G.T., M. attenuatus, (Simpson), S.B., T.A., DCLV; Peak, Yorkshire; Upper Lias, Jet Rock. Hair-like ribs arcuate over venter.

ARCIDACTYLITES, S.B., 1926, T.A. DCLVII; G.T., A. arenus, S.B., Kings Sutton, Northamptonshire; Upper Lias, "subcarinatum." Ribs fairly strong, arcuate over venter. EL > Li; L2 very small, unident.

Similar species: Am. holandrei; d'Orbigny, cv, 1-3.

ZUGODACTYLITES, S.B., 1926, G.T., Z. braunianum, (d'Orbigny), T.A., DCLVIII. Northampton, Upper Lias, braunianum. Forewardly-curved paired ribs (yoke-like) on subangulate venter [which may become rounded]; continuously subspinous on ventral edge; [EL < Li; L2 long, subtrident; all lobes well developed—d'Orbigny's figure, cv, 3].

Similar species: Am. braunianus; Dumortier, iv, xxviii, 5.

Postscript. Anquidactylites, p. 41. Add, as a similar species, Dactylioceras delicatum (Simpson), T.A. DCLVI.

An analysis of the genera of Dactylioceratidæ may now be given. This could be carried further, even without touching the important point of sutural differences. For instance, 'Costate' obviously includes two phases, (1) pre-tuberculate, (2) post-tuberculate. Some forms entered as costate may, therefore, rightly belong to tuberculate, for they might show tuberculation in inner whorls. Also degenerate tuberculation may be overlooked because of its feebleness, or because of bad preservation. The analysis will, however, show which genera come together in similarity of ornament.
Table X—Dactylioceratidae (Generic Analysis)

<table>
<thead>
<tr>
<th>I. Costate</th>
<th>II. Tuberculate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguidactylites</td>
<td>d. Tubercles feeble,</td>
</tr>
<tr>
<td>Koinodactylites</td>
<td>venter subangulate</td>
</tr>
<tr>
<td>Leptodactylites</td>
<td>Toxodactylites</td>
</tr>
<tr>
<td>Nomodactylites</td>
<td></td>
</tr>
<tr>
<td>Orthodactylites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Tuberculate</td>
</tr>
<tr>
<td>I. Costate</td>
<td>e. Ribs broken on venter</td>
</tr>
<tr>
<td>A. Ribs small</td>
<td>Microdactylites</td>
</tr>
<tr>
<td>Kryptodactylites</td>
<td></td>
</tr>
<tr>
<td>Vermidactylites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. Fibulate ornament</td>
</tr>
<tr>
<td>I. Costate</td>
<td>a. Post-costate</td>
</tr>
<tr>
<td>b. Ribs arched over venter</td>
<td>Peronoceras</td>
</tr>
<tr>
<td>Arcidactylites</td>
<td></td>
</tr>
<tr>
<td>Athlodactylites</td>
<td></td>
</tr>
<tr>
<td>Curvidactylites</td>
<td></td>
</tr>
<tr>
<td>Microdactylites</td>
<td></td>
</tr>
<tr>
<td>II. Tuberculate</td>
<td>b. Pre-costate</td>
</tr>
<tr>
<td>a. Tubercles persistent, regular</td>
<td>Multicœloceras</td>
</tr>
<tr>
<td>Zugodactylites</td>
<td>Nodicœloceras</td>
</tr>
<tr>
<td>II. Tuberculate</td>
<td>Porpoceras</td>
</tr>
<tr>
<td>b. Tubercles intermittent</td>
<td>Spinicœloceras</td>
</tr>
<tr>
<td>Parvidactylites</td>
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</tr>
<tr>
<td>Tenuidactylites</td>
<td>IV. Cadicone</td>
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<tr>
<td>Xeinodactylites</td>
<td>Cataceloceras</td>
</tr>
<tr>
<td>II. Tuberculate</td>
<td>Crassiceloceras</td>
</tr>
<tr>
<td>c. Tubercles feeble</td>
<td>Lobodactylites</td>
</tr>
<tr>
<td>Dactylioceras</td>
<td></td>
</tr>
<tr>
<td>Peridactylites</td>
<td>V. Venter carinatiform</td>
</tr>
<tr>
<td></td>
<td>Collina</td>
</tr>
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A geological sequence of the Dactylioceratid genera follows. The numbers given (under 'Date') refer to the Barrington Beds, see S. Buckman, 1922, jam cit., and T.A. v, pp. 75, 76.

Table XI—Dactylioceratidae (Geological Sequence)

<table>
<thead>
<tr>
<th>Genus</th>
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<th>Age</th>
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<tr>
<td>Cataceloceras</td>
<td>variabilis (grandis)</td>
<td>Hildoceratan</td>
</tr>
<tr>
<td>Murodactylites</td>
<td>Upper Lias [late ?]</td>
<td></td>
</tr>
<tr>
<td>Collina</td>
<td>Upper Lias [late ?]</td>
<td></td>
</tr>
<tr>
<td>Zugodactylites</td>
<td>braunianum</td>
<td></td>
</tr>
<tr>
<td>Peronoceras</td>
<td>Cement Shale</td>
<td></td>
</tr>
<tr>
<td>Multicœloceras</td>
<td>Barr. 26</td>
<td></td>
</tr>
<tr>
<td>Parvidactylites</td>
<td>[B. 26 ?]</td>
<td></td>
</tr>
<tr>
<td>Arcidactylites</td>
<td>subcarinatum [B. 26 ?]</td>
<td></td>
</tr>
<tr>
<td>Nomodactylites</td>
<td>Alum Shale</td>
<td></td>
</tr>
<tr>
<td>Koinodactylites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curvidactylites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lobodactylites</td>
<td>B. 24</td>
<td></td>
</tr>
<tr>
<td>Peridactylites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptodactylites</td>
<td>B. 23</td>
<td></td>
</tr>
<tr>
<td>Spinicœloceras</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simplidactylites</td>
<td>B. 22</td>
<td></td>
</tr>
<tr>
<td>Toxodactylites</td>
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<td></td>
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TABLE XI (contd.)

<table>
<thead>
<tr>
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<td>Vermidactylites</td>
<td>B. 20</td>
<td>Hildoceratan</td>
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<tr>
<td>Crassicoeloceras</td>
<td>B. 18/19</td>
<td>Harpoceratan</td>
</tr>
<tr>
<td>Nodicooloceras</td>
<td>B. 18/19</td>
<td></td>
</tr>
<tr>
<td>Porpoceus</td>
<td>B. 18/19</td>
<td></td>
</tr>
<tr>
<td>Dactylioceras</td>
<td>B. 18/19</td>
<td></td>
</tr>
<tr>
<td>Anguidactylites</td>
<td>B. II</td>
<td></td>
</tr>
<tr>
<td>Xeinodactylites</td>
<td>B. 6</td>
<td></td>
</tr>
<tr>
<td>Microdactylites</td>
<td>Jet Rock</td>
<td></td>
</tr>
<tr>
<td>Kryptodactylites</td>
<td>Grey Shales</td>
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<tr>
<td>Tenuidactylites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athlodactylites</td>
<td>B. 2a</td>
<td></td>
</tr>
<tr>
<td>Orthodactylites</td>
<td>Transition Bed</td>
<td></td>
</tr>
</tbody>
</table>

The position of the Yorkshire Alum Shale in relation to the Barrington Beds is uncertain; but as the *communis*-like forms are more or less associated in Yorkshire with *bifrons* and *subcarinatum*, the position may be about as here stated. On the other hand, the Alum Shale beds may be spread over a wider series of the Barrington Beds.

The following is an alphabetical list of the genera of Dactylioceratidae mentioned in the foregoing pages, with references to their positions in the Analysis.

TABLE XII—DACTYLIOCERATIDÆ (Generic list)

| 2. Arcidaeactylites | I, B | 17. Nomodactylites | I     |
| 3. Athlodactylites | I, B | 18. Orthodactylites | I     |
| 5. Collina         | V    | 20. Peridactylites | II, C  |
| 6. Crassicoeloceras| IV   | 21. Peronoceras    | III, A |
| 7. Curvidactylites | I, B | 22. Porpoceus      | III, B |
| 8. Dactylioceras   | II, C| 23. Simplidactylites | IV, A |
| 11. Leptodactylites | I   | 26. Toxodactylites | II, D  |
| 12. Lobodactylites | IV   | 27. Vermidactylites | I, A  |

*Emileites* nov., Genotype, E. *malenotatus*, nov., T.A., Pl. DCCII. A race of small sphaeroceratoid cadicones differing from *Emileia* in suture-line—L1 barely comes to the guide-line, while L2 ends well away from it; in primary ribs being curved, rather small, ending in a small tubercle; in secondary ribs being curved forward slightly over a well-arched venter and as numerous—4 primaries give 22 secondaries—as in large examples of *Emileia*, but more numerous than in small cadicones of *Emileia*. The place of junction of primaries and secondaries is in S2.

The example figured as genotype is of considerable historical interest, It is one of the two specimens relied on by H. B. Woodward (The Jurassic
Rocks of Britain, iv, The Lower Oolitic Rocks of England; Mem. Geol. Surv., 1894, p. 111) as proving, in opposition to my statements, the presence of the *humphriesianus* zone in the Cotteswolds, it being an example of *Ammonites humphriesianus* recognized by Professor Tate, who said it came from near Stroud. In later years H. B. Woodward most kindly gave me this specimen from Tate's collection. It bears Tate's label "Ammonites humphriesianus, Rodboro," the well-known locality near Stroud, Gloucestershire. But the matrix shows that Tate must have been wrong in his locality, for it is the unmistakable matrix of the Lower White Ironshot of Dundry, Somerset—a matrix which occurs nowhere else and is quite distinctive. Rodboro' is altogether out of the question. But, even if Tate had been correct in his locality, the specimen would quite fail to prove the presence of the *humphriesianus* zone in the Cotteswolds, for it is a Sonninian Age form, not a species of the Stepheoceratan (=*humphriesianus* zone, s.l.). There are no Stepheoceratan strata in the Cotteswolds, and very little of late Sonninian—only at one locality, Cleeve Cloud, near Cheltenham, is there anything later than the date of *Witchellia* prior to the Parkinsonian (see Table VIII, T.A. v, 74). Tate's specimen is certainly earlier than *Witchellia*, which equals Upper White Ironshot of Dundry.

*Emileia*, S. Buckman, 1898, Jur. Time; Q. J.G.S., liv, 456, "Type *Emileia Brocchi* (Sow.)." L1 comes below guide-line and L2 comes nearly to it. Primary ribs are straight, broadly rounded and club-shaped, without tubercles; secondary ribs, in large specimens like *E. brocchi*, are about 5 to 1, but in smaller cadicones are only about 3 to 1. Ribs run nearly straight over a flatly-arched venter. The junction of primaries and secondaries is situated on L2, slightly inside of its median line.

*Emileia* shows a remarkable series of species from cadicone to flattened serpenticone. The two extremes are represented by *Emileia crater*, S.B., T.A. CLXIV, and *E. catamorpha*, S.B., T.A. CDXIV, so unlike that there would seem to be little connexion between them. But about midway lies *E. brocchii*, J. Sowerby, M.C. ccr, large figure. Less robust is *Am. brocchi*; Waagen, Geogn.-Pal. Beitr., 1867, iii (1), xxiv, 3. Further advance towards serpenticone is shown by *Sphaeroceras polyschides*; (Waagen) Greppin, (Bajoc. sup.; Mém. Soc. Pal. Suisse, 1898, xxv, Pls. i-iii, i, 2), possibly more than one species. More decline is seen in *Am. polymerus*, Waagen (op. cit, p. 605), name given to *Am. brongniarti*; d'Orbigny, cxxxvii, i, 2. Near is *Am. brongniarti*; J. Buckman (Amm. I.O.; Q. J.G.S., xxxvii, 1881, p. 64, fig. 5). All these forms which belong to the genus *Emileia* indicate how *E. crater* passes to *E. catamorpha*.

Also may be noticed *Emileia macrocephala*, Quenstedt sp. (Amm. Schwäb. J. LXIV, 13), a very spheroidal form with small umbilicus—its thickness, at 117, being 74% or about 20% more than that of *E. brocchii*. *Am. gervillii grandis*, Quenstedt (id., LXIV, 9), appears in proportions to come between *E. brocchi* and *E. polyschides* of Greppin, but bears rather heavy primary ribs and a suture-line—incompletely shown—which looks somewhat suspicious; it is not elaborate enough for *Emileia*.

Similar, not sufficiently elaborate suture-lines are shown by forms figured by Gottsch from the Argentine (Geol. Pal. Argent.; Palaeontographica, Sup. iii, Lief. 2, Heft 2, 1878) as *Sphaeroceras multiforme* (Pls. ii, iii). They have a remarkable likeness in shape to forms of
Emileia from Sherborne and Dundry, which are in the sphaeroceratoid stage; but the suture-lines of the Argentine forms suggests caution as to definite placing of the South American specimens in Emileia.

Also possibly not an Emileia is the Sphaeroceras brocchii figured by Bayle (Explic. Carte, 1878, lii, 1), which, with heavy primary, almost nodate-ending ribs and rather few secondaries, would seem to belong to another stock.

In Part LXIII of this work (Plates DCCXa-d) are given figures of Sowerby's original example of Am. brocchii and, in further illustration, of a specimen from my collection. Sowerby's specimen is almost without test, my example has mainly test. The figures of the Sowerby specimen are from a lithograph plate drawn by Mr. F. H. Michael—intended for the second volume of my 'Monograph of Inferior Oolite Ammonites.' The figures were drawn under my supervision and measurements were carefully checked by me with the original: the suture-line, prepared by me, was placed on stone by Mr. Michael from my tracings and delineations. It is not sufficiently intricate in its inner portion, where the specimen is somewhat worn.

The locality of his specimen is not given by Sowerby in his description of the shell (M.C. ii, 233); but it is to be found in the 'Supplementary Index to Vol. II,' by John Farey, p. 250: it is stated as "Sherborne, [Dorset], presented by the Rev. Mr. Racket." My specimen is from my father's collection. It is marked only "Sh." [Sherborne]: it has the distinctive matrix of the middle part of the Sandford Lane Fossil Bed—see S.B., Bajoc.; Q. J. G. S., xlii, 1893, pp. 492-494.

Emileia brocchii is the genotype species of the genus. Both these specimens were the original material studied for naming the genus; but, as it is now necessary to choose one particular example as a standard of reference, the Sowerbian specimen is taken as that standard—the genolectotype—while my specimen thus remains a genosyntype.

It is difficult to delineate the suture-lines of specimens of Emileia an account of their great complexity: it is still more difficult to prepare them adequately for photographing. Not only are the lobules of one suture-line so interlocked that there is danger of running off from one lobe to another, but there is also the danger of passing from one suture-line on to its predecessor or successor—so involved are the patterns.

The results given in Pls. DCCXb and d are not so satisfactory as could be wished.

The colomorph, Emileia subcadiconica (DCCXI), is figured (1) because of its close agreement, if not specific identity with Sowerby's paratype—his small figure—of which it is a syntopite; (2) for comparison with Emileites malenotatus. Pl. DCCII, p. 46.

The two species of Emileia have been dated as brocchii hemera. This is simply for recording purposes: it does not intend to imply that the brocchii hemera is necessarily distinct from other hemerae, like Witchellia, molitis, hebes and, possibly, Shirbuirnia; but that the evidence fails to say which date should be given. It is not certain that the Sherborne species, E. brocchii, and the Dundry species, E. subcadiconica, are of the same date; but from the matrices of E. subcadica and Emileites malenotatus, it may be surmised that the former is one bed higher than the latter—the former is § 1, 5 in Q.J.G.S., lii, 1896, 676, the latter § 1, 6.

Emileia, or forms which are like Emileia, have a considerable range in time—they, like Witchellia and Witchellia-forms, range through most of the later Sonninian from about Shirbuirnia to sauzei: to work out
the identities and dates of such forms may be one of the tasks for the next volume.

**Chronology**

(See Vol. v, p. 78)

In the concluding portion of Vol. v two promises were made for Vol. vi—to present a further study of the strata of the Perisphinctean-Cardioceratan Ages (p. 70) and a detailed section of the Thornford Beds (p. 74). Other matters, however, have claimed attention: the first promise can only be carried out in the present volume, so far as the two following notes on certain clays; but there is space enough to redeem the second.

**Amphill Clay.** The clay of this name around Amphill, Bedfordshire, which yields *Dichotomoceras variocostatum*, Buckland sp., is not Corallian as usually stated—that is to say, it is later than Perisphinctean Age. It is of Prionodoceratan Age—towards the lower part of the Kimmeridgian as generally understood. The *Dichotomoceras* sp. of the North Ferriby Boring—Prionodoceratan i (T.A. iv, 1923, p. 35)—and *Dichotomoceras variocostatum* are quite possibly the same species.

In connexion with Prionodoceratan may be mentioned something further. Phillips gave Minety as the locality for his *Ammonites superstes* (Geol. Oxford, 1871, p. 332). This was a lapse for Marston, near Swindon, Wiltshire, which is the locality of his type. In Type Ammonites, Vol. iv, p. 35, line 22 from bottom, ‘Minety’ should be corrected to ‘Marston.’

**Oakley Clay.** In the vale east of the Stanton St. John ridge and west of Brill, Bucks, is a clay or clayey marl which has been called Amphill Clay and correlated with the Corallian. It is of earlier date than Amphill Clay, but is rightly correlated with Corallian rocks; for it contains many examples of the small *Exogyra* characteristic of the limestones of Stanton St. John and of Holton, near Wheatley, Oxon. This clay is, and has been exposed in ponds and wells around Oakley, Bucks. It should be distinguished from Amphill Clay; therefore may have the name Oakley Clay. Its date is Perisphinctean, *antecedens*.

**Fullers’ Earth Rock; Thornford Beds:** These strata are shown in a quarry at Troll, which lies in the triangle formed by the Great Western Railway with the road north from Yetminster: it is 6 furlongs south-west of Thornford Church, and 1 mile 2 furlongs north of Yetminster Church. The name is spelt Troll in the 1 inch Survey Map, sheet xviii; it is sometimes pronounced Trull and sometimes written Trill. The following section was obtained in 1921, with some additions in 1927:
§ I—TROLL QUARRY, THORNFORD, DORSET
(Fullers' Earth Rock = Great Oolite, pars, Thornford Beds, Tulitan Age)

Strata

1. Top stone and marl: stone pale straw colour, somewhat hard. (This bed visible only about the middle of the west face of the quarry). \([Tulophorites]\]

2. Pholadomya Bed: impersistent stone bed mixed with marl: stone rather hard, whitish, with occasional pinkish tinge, especially when bruised by the hammer. Large Pholadomyæ; Belemnites occasionally in base. \([Madarites]\)

3. Marl and stone, mostly marl

4. Fairly persistent stone-band

5. Rhynchonella Bed: Stone-band, hard, light straw coloured, shelly; many Rhynchonellas and broken shell-fragments. \([Rugiferites]\)

6. Marl and stone, mostly marl

7. Prominent band of blue-hearted stone, light brown outside. \([Pleurophorites]\)

8. Marl

9. Hardish, blue-hearted stone, brownish outside \([Pleurophorites]\)

(Beds 7-9 form one prominent blue-hearted band at north-west corner of the quarry: it is about 1 foot 3 inches in thickness)

At north-west corner of quarry, small temporary excavation:—

10. Marl

11. Hard bluish, somewhat argillaceous stone, perhaps the bed for \(Sphaeromorphites\)

12. Marl.

Samples of the matrices of various stone-bands were brought away and were compared with the matrices of the figured specimens. The result was to give the following possible sequence:

\begin{align*}
&\text{Tulophorites} \\
&\text{Madarites} \\
&\text{Rugiferites} \\
&\text{Pleurophorites} \\
&\text{Sphaeromorphites}
\end{align*}

which differs from the sequence given in Vol. iii, Table iii, p. 51, only in the transposition of the two upper terms of the Thornford Beds. But, of course, the sequence now given is based on no more than these comparisons of matrices; and, as the matrices do not differ sharply and distinctly as in so many other cases—for instance, beds of Inferior Oolite—but are unlike only in minor details, these comparisons may be faulty. Short of being able to be present when the quarry is in work, and then being prepared for days of attendance with very little result, not much more can be done. The beds are very poorly fossiliferous so far as ammonoids are concerned; there was not a single ammonoid to be seen in all the long quarry face, and there were only a few fragments lying about. The dozen or so specimens which I had got together were
the result of some twenty years' collecting by various people—local residents. It is a pity the specimens are so rare, for the ammonoid fauna yielded by Troll quarry is almost, if not quite, unique in England.

The last paragraph was written prior to a visit in 1927. Then I found a body-chamber fragment (S.B. 4751) of Tulophorites aff. procluans (T.A. CCCLXVII) about the middle of the west face of the quarry at the top of the section, close under the soil. My eldest son, who accompanied me, picked up, loose, lying on a bed about the middle of the section, a body-chamber fragment (S.B. 4745) of an Oppelid, somewhat suggesting Ammonites serrigerus; de Grossouvre (Bathonian; Bull. Soc. Géol. France, (3) xvi, 1888, iii, 3). Its matrix is a sandy marl, light straw-coloured, darker where it has been weathered. It may possibly have come from bed 3 or 4. Its preservation is poor, but it is valuable as being a new find for the beds of Troll, or even for any English Great Oolite strata.

With regard to the highest bed of the Troll section, this seems to thicken southwards, where the quarry is grass-grown, and there appear to be traces of a clay above it.

Zigzagiceratan. On the way by road to the Troll quarry, at the south-west corner of Clifton Road, where it branches off from the Bradford Abbas-Yetminster road (Clifton Maybank parish), about one furlong south of Bradford Abbas Vicarage, a small road-widening showed yellowish stone-beds with a Zigzagicerate (S.B. 4746). There is reason to suppose, owing to dip of strata and that like beds are not shown in the Bradford Abbas quarries, that these roadside beds are higher than those of the Vicarage Quarry, Bradford (Q.J.G.S., xl, 1893, p. 486, § 111). Therefore the reason why the Zigzagicerate fauna, so characteristic for the top beds of Inferior Oolite of Crewkerne Station, Somerset, Broad Windsor and Bridport, Dorset, had so very rarely been obtained from Bradford, was that the true bed of Zigzagicerates failed in exposure at any of the Bradford quarries: they were all too low. It is necessary to cross the river into Clifton Maybank parish to strike them.

The Clifton-Road beds are to be dated as Zigzagiceratan, pollubrum. Therefore the Bradford "top beds" are presumably pre-pollubrum, not fusca. The Clifton beds are about a mile north of Troll quarry, and some 20 feet lower, according to ground level, with something more to be added for dip. What the intervening beds are like may be gathered from a faulted piece of "Fullers' Earth" on the west end of the cutting of the Southern Railway, east of Bradford, and from beds of Lenthay Common about two miles to the east.

Acknowledgment

To the subscribers for their continued kind support and to those who have helped this work by contributions of MS. or illustrations, by loans of specimens, books etc., by giving facilities for study, and in numerous other ways, the author desires to express his heartfelt thanks.
**TYPE AMMONITES—VI**

### Publication Details

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### Addenda, Corrigenda

Page 25, line 27, for 'fauna' read 'faunas'

..., l. 37, for 'the' read 'that'

..., l. 10, for 'correlate' read 'correlate'

..., l. 18, for 'Pruvoest' read 'Pruvoest'

..., l. 18 up, for 'has' read 'have'

..., l. 5, for 'acanthus' read 'acanthus'

Plate CCCLIV, heading, to number add 'A'

..., DXXVIIIa, l. 5, for 'Sonnites' read 'Sonnites'

..., DLXXX (part 61), to number add 'C'

..., DXCIIa, l. 3, for 'pres' read 'pres.'

..., DCII (Part 57), to number add 'A'

..., DCXVIIa, b, l. 3, for 'ES' read 'EL.'

..., DCXXIIIa, l. 3, for '24 X' read '24+'

..., DCXXVIIa, b, l. 4, for '(ES, O), ES, O' read '(EL, O), EL, O'

..., DCXXXV, l. 1, for 'X 56' read 'X 0.56'

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Plates LXVIIIA, CXXXV, CXXXVIIIC, CLVIIA, CCCLIIIc, d, CCCLIVA, CDXII*, CDLXXXII*, DIIA, DVIIA, DXA, b, DXXVIIA, DXXVIII*, DLXIIIA, b, DLXXVII-DCCXVII, b (DLXXVI-c, DXCA, b, DCIa, b, DXCIa, b, DXCIIa, b, DXCIIIA, b, DXCIVa, b, DXCVIIA, B, DCIa, b, DCXVIIA, b, DCCXIa, DCCXIIB, DCXXVIIA, b, DCCXXVIIA, b, DCCXXVIIIa, b, DCCXXIXAB, DCCXXIA, B, DCCXXIA, b, DCCXXIA, b, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCLXXVIIA, B, DCCXIVa, b, DCCXIVa, b, DCCXIVa, b, DCCXIVa, b)

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By

S. S. BUCKMAN

Part LIV
20 Plates

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TYPE AMMONITES—VI

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PARAMMATOCERAS RUGATUM, nov.
Ludwigian, planiforme; Holotype. See DLV
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**Brasilia decipiens**

[Ambers Knoll], “Sherborne, Dorset; I.O.,” [ringens bed]
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**Witchellia platymorpha**, nov. Sonninian, *Witchellia*; Holotype. See DLVI
Witchellia sp., S. Buckman, 1889, S.I. figured
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In fig. 1 and in Pl. DLXXXA the arrows mark portions, mostly terminal
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Witchellia Platymorpha, nov.
Sonminian, Witchellia; Holotype. See DLVI
Fig. 1a

Fig. 1

Fig. 2

Ammonites baculatus
[Frogden Quarry], "Oborne, Dorset; I.O.," [Up. part Roadstone]
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"Burton Bradstock, Dorset; Inferior Oolite"
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S.B., ex Darell, Coll. 890

PLAGIAMITES CYPHUS, nov.
Parkinsonian, garantiana; Holotype. See DXXXIX
ANCYLOPERAS sp.

"Burton Bradstock, Dorset; Inferior Oolite"

[Astarte Bed, Q. J. G. S., lxvi, 1910, 73, § II, 4]
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Strigoceras gracile, Quenstedt sp.
Parkinsonian, truellei. See CDLXXII
AMMONITES GULIELMI

"Kellaways, Wiltshire; Kellaways Rock," [basal part]
Purplish grit; J.W.T. Coll.; smooth to coronate inner whorls
S. 23, 43, 32, 30; 49, 41, 26.5, 32; ribs (1) 31, (2) 151

GULIELMINA QUINQUEPLICATA, nov.
Proplanulitan, gulielmi; Genotype, Holotype. See CXCIV
"Ammonites eudoxus?"

"Chippenham, [Wiltshire]; Kellaways Rock"; buff grit
M.P.G. Coll. 25683; (Reineckeia multicostata Petitclerc, 1915, xii, 2)
S. 33, 35, 44, 39; 55, 37, 36, 40; size 60; max. c. 80

Kellawaysites multicostatus, Petitclerc sp.
Reineckeian, fraasi? Genotype. Cf. DXXII
Cardioceras suessi? S. Buckman, 1925, cit. spec.
T.A. V, 65, § xx, 6; Ham Cliff, Osmington, Dorset
Ham Cliff Grit, suessi; S.B. Coll. 4296
S. 70, 43, 16? 23; 100, 43, 14? 18; max. c. 104
EL, V; L1, V; tubercles lacking; L1, c. 42, at 31 mm.

PARACARDIOCERAS PERSECANS, nov.
Cardioceratan, persecans; Genotype, Holotype. See CCCLXXV
Ammonites decipiens

"[Wootton Bassett, Wiltshire; Kimmeridge Clay]"
J.W.T. Coll. S. 64, 39, 31, 33; 110, 38, 26.5, 34
S.l. 40, 40, 29 of 26; 36, 36, 25 of 40 mm. whorl-breadth

Ringsteadia frequens, Salfeld 1917, (ix, 2, lectot.)
Ringsteadian, brandesi. See DLX
Ammonites rotundus, J. Sowerby, 1821, Holotype
M.C. iii, 169; CCXCVIII, 3; "from Purbeck, prob. fd. in Kim. Clay"
Brit. Mus. N.H. 43899; S. 74, 26, 28, 50; 84, 26, 29, 50

Pallasiceras rotundum, J. Sowerby, sp.
Paravirgatitan, lyditicus ; Genotype. Cf. CCCLIII
Ammonites bononiensis
Okus Quarry, Swindon, Wiltshire; Soft Bed below Cockly bed
[Basal part of C. & P.'s Cockly Bed—T.A. IV, 29, § III, 6]
S.B. Coll. 4108. Thick, with many feeble ribs; L2 long

Polymegalites polypreon, nov.
Behemothan, polypreon; Genotype, Holotype. Cf. CCLVII
Ammonites bononiensis
Swindon; Portl. St.; S.B. Coll. 4108; Term. part. crushed in S. 320, 31, 36, —; 424, 31, 35, 46; size c. 496; max. c. 550 EL, 53; L1, 50; L2, 41 per cent. of 100 mm. wh.-breadth.

Poly meg alites polypeon, nov.
Behemothan, leucus Kerberites; Genotype, Holotype. Cf. CCLVII
Ammonites giganteus
Haddenham, Bucks; Qy. in cutting N. of Ry. Sta.; Portl. Stone
Blue bed; S.B. Coll. 4352, pres Mr. Frederick Merrick
S. 290, 32, 48, 45; 422, 32, 47, 44; ribs 45

Gigantites pachymeres, nov.
Gigantitan, Gigantites; Holotype. See CCLVI
AMMONITES GIGANTEUS
Haddenham, Bucks; S.B. Coll. 4352; size 460; max. c. 560
One side eroded; thickness est.—double of half-whorls
L2 long, c. 45 % of 94 mm. whorl-breadth

GIGANTITES PACHYMERES, nov.
Giantitan, Gigantites; Holotype. See CCLVI
Witchellia aff. sutneri, S. Buckman, 1893, cit. spec. Q.J.G.S., xlix, 492-4, § ix, 6c; Sandford Lane Quarry, Sherborne, Dorset; Fossil Bed, lower part S.B. Coll. 2699. Test inside a enlarged, Pl. DXCIII b, fig. 3

Gelasinites Gelasinus, nov. Sonninian, Shirburnia; Genotype, Holotype. Cf. CCCXLI
Witchellia aff. sutneri, S. Buckman, 1893, cit. spec. Sherborne, Dorset; S.B. Coll. 2699
S. 52, 42, 27, 32; 128, 40, 20, 34; max. c. 170
Fig. 3 shows test (enlarged) with rows of punctae

Gelasinites gelasinus, nov.
Sonninian, Shirbuiiitia; Genotype, Holotype. Cf. CCCXLI
WITCHELLIA, spinous, S. Buckman, 1889, cit. spec. Q.J.G.S., xlv, 658; "[Frogden Qy.], Oborne, Dorset; I.O."
Green marl (Id. xlix, 1893, 500, § xv, 9); S.B. Coll. 2258
S. 35, 40, 28.5, 31.5; 66, 49, 24, 27; max. c. 75

WITCHELLIA GLAUCAL, nov.
Sonninian, Witcheslia; Holotype. See DLXXX
'Stephanoceras' clausiprocerum, S. Buckman, 1892, Holotype Q.J.G.S., xlvi, 449; xiii, 5; "[Grange Quarry], Broad Windsor, Dorset"
"Inf. Ool., [upper beds]; Manchester Mus., L. 11422," ex S.B., ex Darell C.
Mark of continuation of whorl for another 3/4 volutions

Zigzagiceras clausiprocerum, S. Buckman sp.
Zigzagiceratan, pollubrum. See 'CCCXXXV
Fig. 1
Fig. 2

'Stephanoceras' clausiprocerum, S. Buckman, 1892, Holotype
"[Grange Quarry, Broad Windsor, Dorset; Manchester Mus., L. 11422"
S. 74, 42, 38, 28; 130, 43, 32, 25; size c. 135; max. c. 225

Zigzagiceratans, pollubrum. See CCCXXXV
Perisphinctes patina

"Hanborough Qy., (northern pit), Long Hanborough, Oxon"
"Combrash [Middle Cornbr.]; Mus. Pract. Geol. 37364"
S. 93, 31, 30, 45; 188, 28.5, 28, 44; max. c. 340
S.l. 56, 58, 29 of 52 mm. whorl-breadth

Loboplanulites longilobatus, nov.
Macrocephalitan, Homoeoplanulites; Genotype, Holotype. Cf. DXV
"Ammonites sedgwickii"

"Gosford Hill Farm (well-sinking), N. of Oxford; Oxford Clay"

"About 12 feet down; Mus. Pract. Geol. 37499"

S. 57. 47. 25. 15.5; 112. 40. 23. 21.5; max. c. 130

ANAKOSMOKERAS EFFULGENS, nov.
Kosmoceratan, stutchburnii; Holotype. See DXXXI
"Ammonites sedgwickii"
"Gosford Hill Farm (well-sinking), N. of Oxford; Oxford Clay"
"About 12 feet down; Mus. Pract. Geol. 37499"
Lacks lineation of A. sedgwickii, and is more lobate

ANAKOSMOKERAS EFFULGENS, nov.
Kosmoceratan, stutchburii; Holotype. See DXXXI
AMMONITES SEDGWICKII, PRATT, 1841, "Holotype?"
Ann. Mag. N.H. viii, 163, 165; v, i; "Christian Malford, [Wilts]
"Oxford Clay; Mus. Pract. Geol. 30518, pres. S. P. Pratt"
S. 45, 51, —, 19; 68, 48, —, 19; 100, 44, —, 22

GULIELMITES SEDGWICKII, PRATT SP.
Kosmoceratan, obductus. See DLIX
Cardioceras cf. excavatum (thin), S. Buckman, 1924, cit. spec. T.A. V, 48, § ix, 4; "Ardassie Point, Brora, Sutherland, Scotland" Ardassie Beds; "Geol. Surv. Scotland, M. 1069 b;" L1 cruciform S. 71, 49, —, 14; 103, 55, 15', 14', ?; size c. 139; max. c. 160

* SCOTICARDIOCERAS SCOTICUM, nov. Cardioceratan, scoticum: Genotype, Holotype. Cf. DLXXXVIII
Ammonites vertebalis
Headington Quarry (Magdalen College Pit), Oxfordshire
"Bottom Course" [derived ?], see V, 50, § x, 2; S.B. Coll. 3840, purch.
S. 49, 43, 57, 30; 83, 37, 42, 34; 21 ribs; max. c. 83

Sagitticeras moderatum, nov.
Cardioceratan, Sagitticeras; Holotype. See CCLXXX

S.S.B.
**Ammonites pectinatus**

Wheatley, brickyard, Oxon; Wheatley Sands; S.B. Coll. 3838
S. (49, 39, 22, —) ? (73, 40, 28, —) ? Horn crumbled in extraction
Length of horn now preserved, 11; complete, about 18 mm.

**Keratinites keratophorus, nov.**
Paravirgatitan, *pringlei*; Genotype, Holotype. Cf. DLXVIII
Ammonites pectinatus

"Swindon, [Wilts]; Lower beds of the Portland Oolite"
["Upper Cemetery Beds; upper part"], glauconitic grit with Serpulae
"Mus. Pract. Geol. 30757, Cunnington Coll."
S. 88, 40, 24, 30. Length of horn complete, 22 mm.

Keratinites cornutifer, nov.
Paravirgatitan, pringlei; Holotype. See DCI
Ammonites biplex
Sandpit near smallpox Hospital, Moreton Farm, Thame, Oxon
Hard layers of sandrock near top of Thame Sands
S.B. Coll. 3997, pres. Mr. Dick Liddington
S. 42, 38? 31, 36; 72, 30, 28, 43; c. 31 ribs

Paravirgatites infrequens, nov.
Paravirgatitan, *paravirgatus*; Holotype. See CCCLXXXII
Ammonites rotundus

"Hartwell, [Bucks]; Lower Portland, Pebble Bed; Hunt Coll."
Blue-grey stone with rather large lydites; "Bucks C. Mus. 108/25"
S. 53, 33, 32, 36; ribs 32; 68, 32, 32, 40; ribs 29, biplicate, zigzag
S.l. 40, 37, 17 at 17.5. Diff. *A. rotundus*, arcuate, zigzag per. ribs

Pallasiceras lydianites, nov.
Paravirgatitan, lyditicus; Holotype. See DXC
Ammonites tripexus; W. H. Smyth, 1851, Fig. Spec.
Ædes Hartwellianæ, p. 24; "Brick Pit, Field 151
"Hartwell Estate, Bucks; rubble above clay" (Lee's Catalog)
Buff stone with small lydites; Bucks County Mus., Lee Coll., 2060/H

Lydistratites biforis, nov.
Paravirgatitan, lyditicus; Holotype. See CCCLIII
Ammonites triplex; W. H. Smyth, 1851, Fig. Spec.
"Hartwell Estate"; Bucks County Mus. 2060/H; Virgatite stage
S. 13, 46, 42, 23; c. 27 ribs; 29.5, 41, 37, 18; c. 32 ribs
S. 62, 33, 34, 40; 26 ribs; S.I. 63, 48, 22, at 14 mm.

Lydistratites biforis, nov.
Paravirgatitan, lyditicus; Holotype. See CCCLIII
**Perisphinctes devillei**

"Brick Pit in field 151, Hartwell Estate, Bucks" (Lee’s Catalog)
Matrix as 2060/H (DCV); Bucks C. Mus. (Lee Coll.) 2061/H
S. 24, 46, 33, 21; c. 30 ribs; 43, 42, 30, 31; c. 31 ribs
S.l. 54, 41, 21 at 14'5 mm.; delay in showing biplic. stage of DCV

**Lydistatites cunctator, nov.**
Paravirgatitan, *lyditicus*; Holotype. See DCV
"Perisphinctes devillei"
[Hartwell, Bucks, Brickpit in field 151]; "Portland Stone"
Matrix as 2061/H (DCVIa); "Bucks C. Mus. (Z. D. Hunt Coll.) 107/25"
S. 16, 47, 40, 28; 33, 41, 35, 30; c. 38 ribs; colomorph

Lydistratites cunctator, nov.
Paravirgatitan, lyditicus; Paratype. See DCV
Ammonites rotundus

"Aylesbury, Bucks, (Museum yard, loose); Portland Stone"
Grey shelly oolite with oysters; "Bucks County Mus. 38/19"
S. 78, 34, 37, 44; 136, 29, 34, 51; S.L. 67, 59, 33 at 27 mm. wh.-b.
Ribs 32, biplicate near peripheral edge

Crendonina subrotundata, nov.
Behemothan (??), leptolobatus. Genotype, Holotype. See CDI
Ammonites redcarensis Young & Bird, 1822, Holotype?
Geol. Yorksh. 248, 327; xiv, 13, "Robin Hood's Bay, Yorkshire,"
"Lowest Shale, [Lower Lias]; Whitby Museum, 314"
S. 42°5', 40, 35, 30; 60, 42, 33, 31°5. Fig. 1, Protograph (copy)
Figs. 2, 3, sent as orig. of fig. 1. Qy., several origs. of fig. & descr.?

Schlotheimia redcarensis, Young & Bird sp.
Schlotheimian, marmorea. See CCCXCV
"ECHIOCERAS sp."

"Stonebarrow, Charmouth, Dorset (Cliff-foot); Raric. Clays, Bed 98
A few inches below 99 (Watch Am. Stone); W. D. Lang Coll. 6671"
S. 27, 20, 24(25), 62; 37, 20, 24(25), 61; max. c. 70"

HOMECHIOCERAS SIMILE, TRUeman & WILLIAMS, NOV.
Deroceratan, simile; Genotype, Holotype. (T. & W.). Cf. DLIV
"Ammonites murchisonæ"
"Chideock, [Quar Hill], Bridport, Dorset; Inferior Oolite"
"Murchisonæ zone [Wild Bed]; J. W. Tutcher Coll."
"S. 81, 39, 27, 25; 135, 41, 26, 32"; max. c. 138

Kiliania depilata, nov.
Ludwigian, murchisonæ; Holotype. Cf. CDIX
SONNINIA mammillate, S. Buckman, 1898, cit. spec.
Q.J.G.S., liii, 680, § IV, 5; "N. main-road Quarry, Dundry, Somerset " Bajocian, Ironshot, suaei ; S. B. Coll. 296”
S. 100, 40, 24, 32; 179, 37, 24, 35; max. c. 340
Spines smaller and central coiling slower than P. mesacanthum

PAPILLICERAS MICRACANTHICUM, nov.
Sonninian, propinquans; Holotype. See DLVII
Cosmoceras parkinsoni var. rarecostatum, S.B., 1881, Paratype Q.J.G.S. xxxvii, 599; E. of Oborne Village, Sherborne, Dorset Inf. Ool., Building Stone; Manchester Mus. (S.B. Coll.) L. 11228 S. 84, 32, 22.5, 43; 135.30.5, 20, 46; ribs 40; max. c. 135

PARKINSONIA PACHYPEURA, nov.
Parkinsonian, garantiana; Holotype. See CCCLII
Oppelia fusca; Solly & Walker, 1891, cit. spec.
Proc. Dorset F.C. xi, 119; "Eype, [Black Rocks], Bridport, Dorset"
"Clay on top of Inf. Ool.," [Fuller's Earth Clay, lower part]
S. 30, 53, 25, 15; 575, 56, 21, 87

Gonoxyites limosus, nov.
Zigzagiceratian, knapheuticus; Holotype. See CDLXXXI
Ammonites gowerianus
[Kellaways, Wiltshire; Kellaways Rock], buff grit
Nottingham Univ. Coll. C., ex R.A.C.; runcinate; short lat. aur.
S. 26, 42, 40, 27; 46, 39, 36, 33

GALILAEITES CURTICORNUTUS, nov.
Proplanulitan, opimus; Holotype. See CCCIX
"Ammonites fluctuosus, Pratt, 1841, Holotype?"

"Am. Mag. N.H., [viii, 164, 165]; vi, i; Christian Malford, [Wilts]"

"Oxford Clay; Am. Bakeriæ, d’Orb.; M.P.G., pres S. P. Pratt, 30353"

S. 92, 35, —, 38, ribs c. 29; 162, 28, —, 51, ribs 24

**BINATISPHINCTES FLUCTUOSUS, Pratt sp.**

Kosmoceratan, *fluctuosus*. See CDLXXXV
Cardioceras cordatum
Horton Brickyard, Horton-cum-Studley, Oxfordshire
"Oxford Clay"; S.B. Coll. 4442, purch.; (ES, O), L1, OV
S. 33, 40, 30, 30; 49, 43, 32, 30; ribs 28

Cardioceras costellatum, nov.
Cardioceratan, cardia; Holotype. Cf. DLXXXVIII
CARDIOCERAS CORDATUM
Horton Brickyard, Horton-cum-Studley, Oxfordshire
"Oxford Clay"; S.B. Coll. 4443, purch.; (ES, O), Lt, OV
S. 16, 44, 37, 29; 33, 43, 32, 30, ribs 26

CARDIOCERAS COSTELLATUM, nov.
Cardioceratan, cardia; Paratype. Cf. DLXXXVIII
"Ammonites kapffi"

Bowood, [2 m. W. of Calne], Wilts; Oxf. Clay; M.P.G. 30524
Matrix bluish argillaceous, limestone, weathering whitish; L1, OV
S. 15, 43, 37, 32°5; 30°5, 39°5, 33, 33; ribs 37, on keel, c. 93
Plasmaticerata s.b., T.A. V, 66, § xxi

Plasmaticerata plastum, nov.
Cardioceratan, plastum (Plasmaticerata); Genot., Holot. Cf. DCXVI
"Ammonites kapffi"

"Bowood, [2 m. W. of Calne], Wilts; Oxf. Clay; M.P.G. 30523"

Matrix bluish argillac. limest. weathering greyish; (L1, O)
S. 17, 31, 38, 40; 31, 34, 31, 39; size & max. c. 33; ribs 45, on k., c. 171

Plasmatites crenulatus, nov.
Cardioceratan, plastum; Genotype, Holotype. Cf. DCXVII
Ammonites quadratus, J. Sowerby
(1813, M. C. i, 52; xviii, 3); Vertebliceræs quadratum S. B., 1920, cit. spec.
T. A. III, 17; Cowley, near Oxford; Lower Calc. Grit
S. B. Coll. 2779; S. 58, 40, 40, 26, ribs 21; 90, 36, 31, 32 5; ribs 30

Vertebliceras quadratum, J. Sowerby sp.
Cardiocratan, Vertebliceræ; Topotype. See CXCVIII
Perisphinctes gorei

"Okus Quarry, Swindon, Wiltshire"; [Sandy Bed below Cockly Bed] [Basal part of C. & P.'s Cockly Bed]—T.A. IV, 29, § III, 6 S.B. Coll. 4391, pres. C. H. Gore, F.G.S. Lydistralites-stage inner whorls

Gyromegalites Polygyralis, nov.
Behemothan, polypreon; Genotype, Holotype. Cf. CDI
Perispinctes gorei
Swindon, Wiltshire; Portland Stone; S.B. Coll. 4391
S. 228, 25, 28+, 61, ribs 55; 363, 25, 24x, 67, ribs 59
Max. c. 480; Sl. 63, 64, 42 of 59 mm. whorl-breadth

GYROMEGALITES POLYGYRALIS nov.
Behemothan, polyreon; Genotype, Holotype. Cf. CDI
AMMONITES BONONIENSIS

"Teffont Evias (Chilmark), Tisbury, Wilts; Portl., Chalky Series"
S.B. Coll. 4333, pres. Mr. T. T. Gething; S1 deeper than ES.
Sl. —, 47, 24, of 64; 42.5, 44, 25, of 73 mm.
S. 206, 29, 28, 45, ribs 38; 314, 29, 29, 47, ribs 51

GALBANITES CRETARIUS, nov.
Gigantitan, Gigantites; Holotype. See CCCLV
Ammonites rotundus
Chapmans Pool, Isle of Purbeck, Dorset; "Kimm. Clay"
[Nodule Bed]; S.B. Coll. 4304, pres. Miss E. R. Thompson
S. 100, 27, 36, 47; 122, 29, 34, 52; Sl. 29, 66, 62, 38

Lydistratites lyditicus, S. Buckman, 1922
Paravirgatitan, lyditicus; Plesiotype. Cf. CCCVII
AMMONITES ROTUNDUS
Chapmans Pool; "Kim. Clay," [Nodule Bed, c. 15' above shore] "Rotundum Zone"; S.B. Coll. 4364, inner whorls S. 38, 33, 44, —; 65, 31, 41, 43; ribs 27; Sl. 20'5, 63, 49, 21

LYDISTRATITES LYDITICUS, S. Buckman, 1922
Paravirgatitan, lyditicus; Plesiotype. Cf. CCCVII
Olcostephanus triplicatus
"Okus Quarry, Swindon, Wilts; Portland Stone, Cockly Bed"
"Mus. Pract. Geol. 32394"; Sl. 27, —, 40, 30
S. 88, 32, 40, 41; 139, 30, 40, 44; ribs 25, 58; size 146; max. c. 150

Kerberites Kerberus, S. Buckman, 1924
Behemothan (7), kerberus; Plesiotype. Cf. CCCLV
**Olcostephanus triplexatus**

"Okus Quarry, Swindon, Wilts; Mus. Pract. Geol. 32394"

With inner whorls showing multicostate (virgatite) stage

Virgatite condition lasts till c. 35 mm.; bradypalingenesis?

**Kerberites Kerberus**, S. Buckman, 1924

Behemothan (7), *kerberus*; Plesiotype. Cf. CCCLV
**Bigotites thevenini**


Greyish-white matrix; S.B., ex Darell. Coll. 855

S. 51, 35, 37, 36; 86, 35, 35, 38; ribs 35, c. 88; max. c. 150

Venter (test), ribs broken, alternate; venter (cast), sulcate; (Bigotitean)

**BIGOTITES TRIFURCATUS, nov.**

Parkinsonian, *truellei*; Holotype. Cf. CXCI
'Stephanoferas' pseudoprocessum, S. Buckman, 1892, Holotype Q.J.G.S., xlvi, 449; xiv, 4, 5; "[Grange Quarry], Broad Windsor, Dorset" "Inf. Ool., [upper beds]"; Manchester Mus., L. 11426, ex S.B., ex Darell, Coll. S. 69, 39, 47, 38; 121, 40, 42, 32; ribs c. 35; max. c. 210+

Zigzagiceras pseudoprocessum, S. Buckman sp. Zigzagiceratan, pollubrum. See DXCV
'Stephanoceras' subprocerum, S. Buckman, 1892, Holotype Q.J.G.S., xlvii, 449; xiii, 3, 4; "[Grange Quarry], Broad Windsor, Dorset" "Inf. Ool. [upper beds]"; Manchester Mus., L. 11437, ex S.B., ex Darell, Coll. S. 65, 41, 38, 34; 121, 40, 34, 33; ribs c. 44; max. c. 210

Zigzagiceras subprocerum, S. Buckman sp.
Zigzagiceratan, pollubrum. See DCXXIII
Cosmoceras duncani

"Wolvercote Brickyard, Upper Wolvercote, Oxford; Oxford Clay"
["Above athleta, possibly one or two feet"—J.P.]; "M.P.G. Coll. 37480"
S. 37, 40, 35, 21/5; 56, 46/5, 34, 23; Sl. 20/5, 44, 59, 24

Bikosmokeras geminatum, nov.
Kosmoceratan, subtense; Genotype, Holotype. Cf. DIV
Cosmoceras duncani

"Wolvercote Brickyard, Upper Wolvercote, Oxford; Oxford Clay
["High up, but below lamberti"—C.C.G.]; "C. C. Gaddum Coll. No.17W"
S. 63, 43, 32, 22; 119, 39, 32, 30; max. c. 160

Kuklokosmokeras kuklikum, nov.
Kosmoceratan kuklikum; Genotype, Holotype. Cf. DIV
**Cosmoceras duncani**

"Wolvercote, Oxford; Oxf. Clay, [high in pit]; C. C. G. Coll. No. 17 W."

Sl. 35, 27.5, 46, 27.5, checked on φ x 3.2

Last whorl, venter, runcination obsolescent to venter rounded

**Kuklokosmokeras kuklikum, nov.**

Kosmoceratan, *kuklikum*; Genotype, Holotype. Cf. DIV
**Fig. 1**

**Fig. 2**

**Ammonites vertebralis**

"Headington Quarry (Magdalen Pit), Oxford;" Oxford Oolites "Bottom Course" (derived?); S.B. Coll. 4300, purch. workman S. 61, 41, 47, 26; 98, 36.5, 33.5, 35; c. 22 ribs; max. c. 100

**Sagitticeras cariniferum**, nov.
Cardioceratan, *Sagitticeras*; Holotype. See DC

ANACARDIOCERAS EXPOSITUM, nov.
Cardioceratan, cordatiforme; Holotype. See CDLXIII
Cardioceras cf. suessi, S. Buckman, 1925, cit. spec.
Cowley, Oxfordshire; Littlemore Sands; S.B. Coll. 3149
Inner whorls × 3; smooth, uncarinate to c. 5 mm. diam.
Subcren.-subcar. to c. 10, costulate to c. 15; then (ES, O), ES, O, Li, OV

Anacardioceras Expositum, nov.
Cardioceratan, cordatiforme; Holotype. See CDLXIII
CARDIOCERAS MALTONENSE

ANACARDIOCERAS SECUNDARIUM, nov.
Cardioceratan, excavatum; Holotype. See DCXXVIII
Ammonites excavatus

"Cowley (near Industrial School), Oxford"; Oxford Oolites [Lower Calcareous Grit]; S.B. Coll. 2790, purch. workman Headington S. 52, 44, 31, 33; 90, 52, 30, 19; size c. 102; max. c. 135

Anacardioceras delicatum, nov.
Cardioceratan, excavatum; Holotype. See DCXXIX
LUDWIGIA ROMANOIDES
[Sandford Lane], "Sherborne, Dorset; Inf. Oolite"
[Fossil Bed, upper part]; S. B., ex J. B., Coll. 3922
S. 58, 43, 23, 26; 90, 41, 21, 29; max. c. 200
Sides subparallel; venter rounded, strongly carinate

SONNINITES SIMULANS, nov.
Sonninian, tauzei; Holotype. See DXXVIII & CDXXVIII
Ammonites pectinatus, Phillips, Topotype
Shotover Brickyard, Oxford; Portland Sands
Shotover Grit Sands, Dogger of bluish, coarse grit
S.B. Coll. 4297; S. 75, 41, 34, 30; Sl. 28-5, 44, 37, 24

PECTINATITES PECTINATUS, Phillips sp. 1871
Paravirgatitan, pectinatus. Cl. CCCVIII
Fig. 1a

Fig. 3

Fig. 2

**Ammonites rotundus**
Slab with some 30 specimens, including impressions
Chapmans Pool, Isle of Purbeck, Dorset; “K.C.”, Nodule Bed
S.B. Coll. 4363, purch. at Worth Matravers, Dorset

**Pallasiceras rotundum**, J. Sowerby sp
Paravirgatitan, *lydilicus*; Topotypes. Cf. CCCLIH
AMMONITES rotundus
Obverse, DXCa (4363), fig. 5 impr. of a Lyd. gibbosus, see DCXXXIX
Fig. 4, Possibly Pallasiceras gracile, Neaverson, 1925
Fig. 1-3, Specimens & impressions, P. rotundum

PALLASICERAS ROTUNDUM, J. Sowerby sp.
Paravirgatitan, lyditicus. Topotypes. Cf. CCCLIII
AMMONITES ROTUNDUS
Chapmans Pool; a, side, b, venter, c, in. whorls (impr.), 3 specimens
"Kim. Cl.," Nodule Bed; S.B. Coll. 4363a; Sl. 18, 41, 37.5, 21
S. 43, 33, 42 ?, — ; 55, 32.5, 39, 44; 73, 32, 36 ?, 47; not eroded

PALLASICERAS ROTUNDUM, J. Sowerby sp.
Paravirgatitan, lyditicus; Topotype. See CCCLIII
Ammonites pectinatus
Shotover Brickyard (Sandpit), Oxford; Portland Sands
Shotover Grit Sands, coarse grit; S.B. Coll. 4284
S. 63, 35, 17.5, 30; 83, 37, 24, 37; ribs 29 on arc (?) 54

Keratinites cornutifer, S. Buckman 1925
Paravirgatitan, pringlei. See DCI
Ammonites ziphus; S. Buckman, 1925, cit. spec.
Abs. Proc. G. S., No. 1142, 24; Lyme Regis, Dorset; Lower Lias [Black Marl, Bed e, Lang, id. p. 22]; S.B. Coll. 4356, purch.
S. 23.5, 27.5, 59 (38), 53; 36, 39.5, 61 (41), 50; Sl. 7, 86, 79, 32

Xipheroceras ziphus, Hehl-Zieten sp. 1830
Asteroceratan, planicosta. See XXXIX
Ammonites cordatus
Horton Brickyard, Horton-cum-Studley, Oxfordshire
Upper Oxf. Clay, limonitic cast; S.B. Coll. 3595, purch.
S. 27, 41, 41, 28; 56, 46, 37.5 (33), 27; ribs 19; (EL, O), Li, OV
More ribs than Card. cardia, and different proportions

Cardioceras costicardia, nov.
Cardioceratan, cardia; Holotype. See DCXVI
"Amaltheus cordatus"

"[Calne], Wiltshire; Lower Calcareous Grit
"J.W.T. Coll.; S. 65, 45, 31, 21'5; 120, 42'5, 35, 26"

Pachycardioceras robustum, Nov.
Cardioceratan, excavatum; Genotype, Holotype. Cf. CDXX
AMMONITES EXCAVATUS

Cowley, (near Industrial School), Oxford; Lower Calc. Grit
Littlemore Sands, (T.A. V, 51, 5); S.B. Coll. 3360, purchased
S. 53, 47, 34, 22'5; 130, 53, 30, 10'8; 186, 50, 29, 9'9
S. 250, 45, 28, 15'4; max. c. 253; keel, inner whorls, finely serrate

ANACARDIOCERAS DELICATULUM, NOV.
Cardioceratan, excavatum; Holotype. See DCXXX
AMMONITES VERTEBRALIS
Headington Quarry (Magdalen College Pit), Oxford
"Bottom Course"; S.B. Coll. 4419, purch. workman
S. 70, 40, 18.5?, 28.5; 102, 34, c. 17.5, 33; ribs 34

VERTEBRICERAS COSTULOSUM, nov.
Cardioceratan, Vertebriceras; Holotype. See DCXIX
**Perisphinctes rotundus**

Wheatley Brickyard, Wheatley, Oxfordshire; Kimmeridge Clay Nodule Band (Big Stones); S.B. Coll. 3804; Sl. 29, 52, 52, 34, p. 9 S. 100, 29, 31, 45; 146, 29, 32, 48; ribs 52; max. c. 190

**Allovirgatites Woodwardi, Neaverson, 1925**

Allovirgatitan, *woodwardi*; Chorotype. Cf. CCCLI III
"Perisphinctes dorsoplanus"
(Cf. T.A. IV, 1923, 33, 36); *Sphinctoceras distans*, Neaverson, 1925
*Mus. Pract. Geol. 37483"; Sl. 47, 52, 53, 34; p. 9

*Allovirgatites distans*, Neaverson sp.
Allovirgatitan, *woodwardi*; Topotype. See DCXXXVII
"Perispinctes dorsoplanus"
Wheatley Brickyard, Wheatley, Oxfordshire; Mus. Pract. Geol. 37483
S. 118, 27, 25, 52; ribs 49; 190, 27, 35, 52; ribs, 38; max. c. 350;
Peripheral ribs sometimes in zigzag style

Allovirgatites distans, Neaverson sp.
Allovirgatitan, woodwardi; Topotype. See DCXXXVII
**AMMONITES ROTUNDUS**
Chapmans Pool, Isle of Purbeck, Dorset; "Kimm. Clay"
Nodule Bed, in cliff west of stream, about 15' up
S.B. Coll. 4368; Sl. 59, 76, 66, 42

**LYDISTRATITES GIBBOSUS, nov.**
Paravirgatitan, lyditicus; Holotype. See CCCLIII
Ammonites rotundus
Chapmans Pool; S.B. Coll. 4368, in situ

Lydistratites gibbosus, nov.
Paravirgatitan, lyditicus; Holotype. See DCV
Ammonites rotundus
Chapmans Pool, Isle of Purbeck, Dorset
S.B. Coll. 4368; max. c. 390 +

Lydistratites gibbosus, nov.
Paravirgatitan, lyditicus; Holotype. See DCVI
SONNINIA CORRUGATA; S. Buckman, 1889, cit. spec.
Geol. Mag., (3) vi, 202, 203; 1896, Q.J.G.S., lii, 680, § iv, 5
Dundry (N. Qy., Main Road), Somerset; S. B. Coll. 1935
S. 108, 46, 28, 19'4; 207, 41, 21, 29'4+ k; max. c. 260
"Attached, Placunopsis aff. gingensis Quen. sp. & fibrosa Laube." J.W.T.

SONNINIA CORRUGATA, J. de. C. Sowerby sp. 1824
Sonninian, propinquans; Topotype. See CCXCVIII
LEPTECHIOCERAS APLANATUM; S. Buckman, 1924
Euechioceras nobile, T. & W., Trans. R. Soc. Ed., 1925, 706, 725,
"Radstock Grove, Radstock, Som.; base of armatus; J.W.T. Coll. 132"
S. 90, 20, 15°5, 60; 197, 17, 13°5, 68; size 218; max. c. 225

EUECHIOCERAS NOBILE, TRUEMAN & WILLIAMS
Deroceratan, Euechioceras; Genotype, Holotype. Cf. CDXLIII
ANCYLOCERAS CALLOVIENSIS, MORRIS, 1845, Syntype
Ann. Mag. N.H., xv, 32; vi, 3a; “near Chippenham, [Wilts]”
“Kelloway rock”; “Kelloway, Wilts,” C. Pearce lab., brown grit
Bristol Museum, Ca. 7353, Chaning Pearce Coll.

PARAPATOCERAS CALLOVIENSE, MORRIS sp.
Proplanulitan, opimus; Genotype, Lectotype. See V, 33. Cf. CDXCI1
CALOCERAS APLANATUM, HYATT, 1889, Holotype
Gen. Ariet. p. 147, f. 23, 24; Whitby, Yorks; Jamesoni Bed
Metechioceras, Trueman & Williams, 1925; Mus. Cambridge, Mass.
S. (cast) 60, 21, 18, 58; 76, 21.5, 17, 62; size c. 80, max.?
Cast and photograph sent by Prof. S. Henshaw

METECHIOCERAS APLANATUM, HYATT sp.
Deroceratan, Metechioceras. Cf. CDLXXXII
Hammatoceras dolium, S. Buckman, 1889, Holotype
Q.J.G.S. xlv, 661-663, Pl. xxii, 17; "Bradford Abbas, Dorset"
"Paving Bed, Murch. zone; Manchester Mus. (S.B. 576) LIII288"
S. 12, 35, 57, 35, -K; 21, 36, 40+, 40, -K (= carina or keel)
Removal of matrix has disclosed kakovorph; fig. 2 abnormal side

Parammatoceras dolium, S. Buckman sp.
Ludwigian, planiforme. See DLXXVIII
Witchellia læviuscula
Frogden Qy., Oborne, Dorset; I.O., bed below green grain marl
Q.J.G.S., xlīx, 1893, p. 500, § xv, 10; S. B. Coll. 2240
S. 58, 48, 27, 22 (+k); 107, 46, 22, 24, (k. present)

Rubrileiitites ruber, nov.
Sonninian, ruber; Genotype, Holotype. Cf. CDX
Ammonites moorei

"[Grange Quarry], Broad Windsor, Dorset; Inferior Oolite
"Top beds of I.O." [and of quarry]; S.B., ex Darell, Coll. 864
S. 29, 34.5, 31, 34.5; 56, 36, 26, 35.5

Phaulozigzag Phaulomorphus, nov.
Zigzagiceratan, zigzag; Genotype, Holotype. Cf. Cl.III
Beginning of last whorl, rib-ends suggest micromphalus stage

MICROMPHALITES OXUS, nov. Gracilisphinctean, micromphalus; Holotype. See CDLIII
"Ammonites koenigi"
"Rampisham, Dorset; Oxford Clay; Mus. Pract. Geol. 7685"
Ex Darell Coll.; Proplan. laboratus, T.A. III, 1921, 36
S. 71, 39, 31, 34; 117, 37, 28, 37; 17 ribs

PROPLANULITES LABORATUS, S. Buckman, 1921
Proplanulitan, majesticus; Holotype. See CCCXXX
LUNULOCERAS SVEVUM

"Shotover [Summertown], near Oxford; Oxfordian; J. W. T. Coll.

"Purch. ex Carter; S. 19, 37, 21, 37; 34, 38, 26, 36"

Less umb., more costulate than L. svevum, Quen., Ceph. viii, 1 lectotype

LUNULOCERAS GLYPHTUM, nov.

Kosmoceratan, svevum; Holotype. See DI
Cardioceras excavatum

"Headington [Cowley], near Oxford; Argovian; J. W. T. Coll. purch.
"S. 72, 39, 30, 22; 130, 48, 39, 20"; max. c. 135

Galeocardioceras galeiferum, nov.
Cardioceratan, excavatum; Genotype, Holotype; Cf. DCXXXIV
Ammonites vertebralis

Vertebriceras rachis S.B. 1920, T.A. iii, 16; Cowley, near Oxford
Lower Calc. Grit; S. B. Coll. 2776, purch.
S. 53, 41, 61 (51) 26.5; 80, 35, 50 (44), 36; max. c. 90

Vertebriceras rachis, S. Buckman, 1920
Cardioceratan, Vertebriceras; Holotype. See DCXXXVI
Perisphinctes, auriculate, S. Buckman, 1920, cit. spec.
T.A.iii, p.26; Cowley (near Industrial School); Lower Calc. Grit
"Upper dogger of Sands, Vertebrieras"; S.B. Coll. 3264
S. 35, 28, 40, 49; 60, 30, 30, 50; Sl. 10, 60, 60, N.30

Otosphinctes ouatius, nov.
Cardioceratan, Vertebrieras; Genotype, Holotype. Cf. CCCXXXIII
Dichotomoceras dichotomum

S. 138, 29, 22, 45: 213, 35, 17, 54; Sl. 39. —, 43+, N. 77

Dichotomosphinctes antecedens, Salfeld sp. 1914
Perisphincteian, antecedens; Genotype. Cf. CXXXIX
Ammonites pectinatus
Wheatley Brickyard, Oxfordshire; Portland Sands
Wheatley Sands, cream-coloured, fine grit; S.B. Coll. 4545
S. 54, 43, c. 19.5, c. 18; 78, 47, c. 19, 23; horn 28; over curve, 34 mm.

keratinites proboscide, nov.
Paravirgatitan, pringlei; Holotype. See DCII
Ammonites devillei
Shotover Brickyard (Sandpit on north), Oxford; Portl. Sands
Shotover Grit Sands; hard blue grit; S. B. Coll. 4545, purch.
S. 65, 35, 30, 33; 89, 36, 27, 37; length of horn 16 mm.

KERATINITES NASO, nov.
Paravirgatitan, pringlei; Holotype. See DCLI
"Coroniceras keelingi, Tutcher MS.
"Limefield (Keeling’s Quarry), N. of Rockhill Farm,
"Keynsham, Somerset; J.W.T. Coll., pres. Mr. Oliver Keeling
"S. 295, 21, 23, 61; 439, 24, 25, 60;" max. c. 500

Keynshamites keelingi, Tutcher sp.
Coroniceratan, rotator; Genotype, Holotype. Cf. CXXXI
CORONICERAS KEELINGI, Tutcher MS.
"Keynsham, Somerset; J.W.T. Coll.; Lower Lias
"Keeling indicated position as lower part of bucklandi beds"

KEYNSHAMITES KEELINGI, Tutcher sp.
Coroniceratan, rotator; Genotype, Holotype. Cf. CXXXI
Stephanoceras commune
Middleton Cheney, S.W. Northants; Up. & Mid. Lias Junction Transition Bed [athleticum]; S. B. Coll. 4641 S. 45, 28, 22, 51; 67, 24, 20, 57; max. c. 120

Orthodactylites Directus, nov.
Harpoceratan, directus; Genotype, Holotype. Cf. CLVII
Ammonites attenuatus, Simpson, 1855, Holotype
Foss Yorks. Lias, 51, 54; Peak [near Whitby], Yorkshire
Upper Lias, [Jet Rock]; Whitby Museum, No. III
S. 15, 30, 30, 40; 26, 34, 25, 42; max. c. 27
Ribs arched over venter; several ribs entire

Microdactylites attenuatus, Simpson sp.
Harpoceratan, exaratum. Cf. CLVII
Ammonites delicatus (Bean MS.), Simpson, 1855, Syntypes P. 54; Whitby, Upper Lias; Tate & Blake, 1876, p. 174 "Blue Shale [at top of] Jet Rock Series"; Whitby Mus. 139 Lectotype; Φ. 18, 32, [30], 45; max. c. 20

Dactylioceras delicatum, Bean-Simpson sp. Harpoceratan, anguinus (delicatum). See LXVIII
DACTYLOICERAS ATTENUATUM
"Astrop pits, King's Sutton, Northants; Up. Lias, subcarinatum z."
"Mus. Pract. Geol. 37972"; ribs arcuate over venter
S. 14, 34, 31, 39; 23, 30, 26, 45; max. c. 40 mm. +

ARCIDACTYLITES ARCUS, Nov.
Hildoceratan, subcarinatum; Cf. DCLV
"Dactylioceras braunianum, var. C,"

"Vigo [Brickyard], Northampton; [Upper Lias, commune zone]"

S.B. Coll. 4636, pres. Mr. B. Thompson, F.G.S.
S. 39, 28, 22, 47; 63, 24'5, 19, 55; max. c. 65

ZUGODACTYLITES BRAUNIANUS, D'Orbigny sp. 1845
Hildoceratan, braunianus; Genotype. Cf. LVII
Witchellia læviuscula, mutation, S. Buckman 1889, cit. spec.
Q.J.G.S., xlv, 1889, 658; Frogden Qy, Oborne, Dorset, Inf. Ool., sauzei, (Id., xlix, 1893, § xv, 9); S.B. Coll. 2255
S. 44, 48, 25, 19; 74, 50, 20, 19, (+ k); max. c. 100 +

Anolkoleites plenus, nov.
Sonninian, sauzei; Genotype, Holotype. Cf. CDX
Ammonites banksii, J. Sowerby, 1818, Holotype
Min. Conch, ii, 229; CC; "Sherborne, Dorset
"Inferior Oolite," Farey, (in Sow.), Sup. Ind., 250; B.M. 43910
S. 143, 33, 94+(87), 46; 241, 28, 61, 49; max. c. 255

Teloceras banksii, J. Sowerby sp.
Stepheoceratan, banksii. See CCCL
Ammonites banksii, J. Sowerby, 1818, Holotype
"Sherborne, [Dorset]"; British Museum (Nat. Hist.) 43910
[Frogden Quarry, Oborne], see S.B., Q.J.G.S., xlix, 1893, § xv, 5
Rather hard ironshot stone, with Belemnites

Teloceras banksii, J. Sowerby sp.
Stepheoceratan, banksii. See CCCL
COSMOCERAS DUNCANI
“Summertown Brickyard, Oxford; Oxford Clay
“Exact position unknown; C. C. Gaddum Coll. No. 1 S.”

BIKOSMOKERAS DEFICIENS, nov.
Kosmoceratan, subtense? Holotype. See DCXXV
COSMOCERAS DUNCANI

"Summertown Brickyard, Oxford; C. C. Gaddum Coll. No. 1 S."
S. 67, 43, 31, c. 22; 125, 36, 28, 32; max. c. 130; Sl. 30, 46.5, 63, 34
Fig. 1, slight runcination, fig. 2 venter rounded

BIKOSMOKERAS DEFICIENS, nov.
Cosmosceran, subtense?; Holotype. See DCXXV
Ammonites intertextus, Simpson, 1855, Holotype
Pp. 35, 50, [Whitby], Yorkshire; Lias [Drift, ex Oxford Clay]
Whitby Mus. 2415; Φ 36.5, 33, 23, 41

Peltoceratoides intertextus, Simpson sp.
Cardioceratan, arduennensis. See DLXIII
Perisphinctes orientalis
Hollow Way, Cowley, Oxford, excavations for houses, 1921
Corallian, [Shell Bed]; S.B. Coll. 3760, purch. Sl. 60, 75, 63, N. 76

Perisphinctes Cowleyensis, nov.
Perisphinctean, martelli; Holotype. See CCLXXXII
**Perisphinctes orientalis**
Cowley, Oxford; Corallian; S.B. Coll. 3760
S. 198, 26, 23'5 54; 272, 24, 26, 57; max. c. 500 +
Fig. 2, venter smooth and almost flat

**Perisphinctes cowleyensis**, nov.
Perisphinctean, *martelli*; Holotype. See CCLXXXII
**Ammonites devillei**

Wheatley, brickyard, Oxfordshire; Wheatley Sands
S.B. Coll. 4587, ex B.J.B.; horn 29, over curve, 33 mm.
S. 71, 42, c. 24, c. 24; 93, 37.5, c. 23.5, 31. Horn seems to have been broken off during life and repaired from “break”

**Keratinites nasutus**, nov.
Paravirgatitan, pringlei; Holotype. See DCLII
AMMONITES SERPENTINUS

"Cudworth, near Ilminster, Somerset; heading for water
"[Upper Lias]; Mus. P. Geol. Coll. 37959;" sl. 24, 36, 54, 25
S. 65, 29, 19, 46; 91, 27.5, 17.5, 52; size 104; max. c. 125

HILDOceratoiDSES SERPENTINUS, ReINEckE sp. 1818
Hildoceratan, Hildoceratoides. Cf. CXIV
"LYTOCERAS CORNUCOPIA; B. Thompson, 1891, cit. spec."
"Brit. Assoc. Rep., Geol. p. 6; near Arbury Hill, Northants"
"Up. Lias, Fish Bed, latescens zone; B. Thompson Coll."
S. 29, 42, 38, 31; 60, 41, 40, 33. Sl. subcompact
Crenulate ribs approximate, equal, dividing

CRENILYTOCERAS CRENATUM, nov.
Harpoceratan, crenatum; Genotype, Holotype. Cf. CCCXCI
"LYTOCERAS CORNUCOPIA; B. Thompson, 1896, cit. spec.
"Proc. Geol. Assoc., xiv, p. 426; near Woodford Halse, Northants
S. 43, 42, c. 39, 33; 79, 47, 36, 28; 116, 46, 35, 32
Crenulate ribs distant; Sl. wide-spreading

ORCHOLYTOCERAS METORCHION, nov.
Harpoceratan, metorchion; Genotype, Holotype. Cf. CDXL
AMMONITES HILDENSIS, YOUNG & BIRD, Topotype
(Geol. Yorks., 1822, pp. 247, 327; xii, 1); Whitby, Yorkshire
[Upper Lias, Alum Shale]; Chamber's Institution, Peebles, Coll.
S. 72, 33'5, 22, 42; 118, 27, 18, 49; with mouth -

HILDOCERAS HILDENSE, YOUNG & BIRD sp.
Hildoceratan, bifrons. See CXIV

DUMORTIERIA RHODANICA, HAUG, 1887 Dumortierian, novata. Cf. DLXXIII
DUMORTIERIA RHODANICA; S. Buckman, 1905, cit. spec.
Penn Wood, Stroud, Gloucestershire; S.B. Coll. 1219
S. 58, 33, 24, 40.5; 95, 33, 20, 43; 155, 28, 18, 49
Max. c. 157. Keel disappears at end of whorl

DUMORTIERIA RHODANICA, Haug, 1887
Dumortierian, novata. Cf. DLXXIII
SONNINIA ADICRA

"Sandford Lane, Sherborne, Dorset; I.O., Foss. Bed, mid. part" (Q.J.G.S., xlix, 1893, 494, 'Sonninia'); S.B. Coll. 1537
S. 122, 37, 35(31), 36; 220, 36, 37(31), 38; max. c. 260
Waagen's fig. without test: this has thick test

SHERBORNITES ADICRUS, WAAGEN sp. 1867
Sonninian, Shirbuirnia; Holotype. See CDXXVII
Oppelia subradiata
Frogden Quarry, Oborne, Dorset; I.O., [Roadstone, upper part]
Cf. Q.J.G.S., xlix, 1893, 500, § xv, 4; S. B. Coll. 4674, purch. +
S. 18°5, 48°5, 27, 27; 35°5, 43, 21, 23

Oppelina pulchra, nov.
Stepheoceratite, Leptosphinctes; Genotype, Holotype. Cf. CDLXXVIII
OPPELIA (umbilicate sp.), S. Buckman, 1893, cit. spec. Q.J.G.S., xlix, 1893, 497, § xiii, 8; Lower Clatcombe Sherborne, Dorset; Inf. Ool., Niortensis; S.B. Coll. 4675 S. 21'5, 42, 25'5, 28; 37, 36'5, 21, 30'5

OPPELINA UMBILICATA, nov.
Stepheoceratan, umbilicata; Holotype. See DCLXX
"RINGSTEADIA PSEUDO-YO"


"S. 104, 46, 25, 14?; 170, 48.5, 27, 16; 180, 47.5, 27.5, 17;" max. c. 330

"Apert. outline at 180." (R. pseudo-yo, Salfeld, VIII, 1, lectotype)

RINGSTEADIA SPHENOIDEA, nov.
Ringsteadian, brandesi; Holotype. See DLXXXIX
Ammonites biplex; Damon, 1860, Fig. Spec.
Sup. Geol. Weym. ix, 9; A. kimmeridiensis, Seebach, 1864, Holotype
F. 40, 30, —, 45; 61, 28, —, 51; ribs 27. Lacks constrictions?

Holcosphinctes kimmeridiensis, Seebach sp.
Holcosphinctean, pallasioide. See DLXIX
**Ammonites rotundus**

Chapmans Pool, Isle of Purbeck, Dorset; "Kimm. Clay"
Nodule Bed, south of stream, about 10' up
S.B. Coll. 4374; Sl. 49, 49, 47, 29; Max. c. 290

**Lydistratites trigonalis**, nov.
Paravirgatitan, *lyditicus*; Holotype. See DCXXXIX
Ammonites rotundus
Chapmans Pool, Dorset; S. B. Coll. 4374
S. 158, 31, 39, —; thickness to height, 115 : 100
S. 185, 30, 35, —; t. to h. 118 : 100; S. 249, 30, 34, 49; 114 : 100

Lydistratites trigonalis, nov.
Paravirgatitan, lyditicus; Holotype. See DCXXXIX
Perisphinctes scythicus, Michalski
(1890, Mém. Com. Géol. viii, vii, r); Hounstout, Kingston, I. of Purbeck
Portland Sand, [Massive Bed, base]; S.B. Coll. 4647, per E.M.B.
S. (58, 42, 33, 42; 79, 42, —, 39) ? Fig. ra, details emphasized

Virgatites scythicus, Michalski sp.
Virgatitan, scythicus. Cf. DXXXVI
Ammonites biplex
Long Crendon (N.W.), Bucks; Portl., Glauc. Beds, Waterstone
S.B. Coll. 4248; S. 174, 29, —, 47?; 277, 25, 30?, 52?
Primaries short; lacks constrictions of Aquistratites

HYDROSTRATITES BIFURCUS, nov.
Behemothan (i), aquator; Genotype, Holotype. Cf. DCLXXIII
Ammonites biplex
Hounstout Cliff, Kingston, I. of Purbeck, Dorset
Portland Sands, White Cement Stone; S.B. Coll. 4649
Pres. C. H. Waddington; S. 95, 35, c. 33, 48; 152, 31', 33', 50
Ribs smaller and closer than in Leucopetrites leucus

Leucopetrites Cæmentarius, nov.
Behemothan, leucus; Holotype. See CCCVII
Wheatleyites pringlei
Shotover Brickyard (north side), Oxford; Portland Sands
Shotover Grit Sands, blue grey grit (dogger); S.B. Coll. 4540
Sl. 48, 42, 42, 23. L.l. broader stems than Shot. pringlei (type)

Shotoverites pringlei, S. Buckman, 1925
Paravirgatitan, pringlei. See CCCLXXXIV
WHEATEYITES PRINGLEI
Shotover, Oxford; Shotover Grit Sands; S.B. Coll. 4540
S. (168, 29, 27, c. 46) estimated. More advanced than
Wheat. pringlei, Pruvost, 1925, 11, 1; see T.A. VI, 24, 25, 29

SHOTOVERITES PRINGLEI, S. Buckman, 1925
Paravirgatitan, pringlei. See CCCLXXXIV
**Witchellia sutneri**
Frogden Quarry, Oborne, Dorset; I.O., green marl
Bed 9, *sauzai-Witchellia*; S.B. Coll. 2268
S. 46°5'. 40, 36°5'. 28; 93, 47, 29, 22°5'

**Witchellia platymorpha**, S. Buckman, 1925
Sonninian, *Witchellia*; Paratype. See DL.VI
Ammonites bucklandi costaries
"Clandown Colliery Qy., Radstock, Som.; Lower Lias, Eugassiceras
"Spiriferina Bank, derived; not so early as bucklandi; J.W.T. Coll.
"S. 140, 235, 21 (17), 59; 211, 24, 19 (15), 57"; max. c. 250

Primarietites primitivus, nov.
Coroniceratan, gmuedense; Genotype, Holotype. Cf. DLXXI
**Ammonites nanus, Simpson, 1855.** Holotype
Foss. Yorksh. Lias, 38, 39; [near Whitby] “probably Lower Lias”
Whitby Museum, No. 472. F. 6'5 (13), 46, 46, 31

**Tragophylloceras nanus, Simpson sp.**
Liparoceratan, *Beaniceras*. See CCXIX
LYTOCERAS CORNUCOPIA; B. THOMPSON, 1891, cit. spec.
"Brit. Association Report, Geol. p. 6; Catesby, Northamptonshire
"Up. Lias, Fish Bed, latescens zone; B. Thompson Coll."
S. 32°5, 40, 34°5, 34°5; 59. 41, 35°5, 35. Sl. subcompact
Crenulate ribs fine, approximate, equal, dividing

CRENILYTOCERAS FORMOSUM, nov.
Harpoceratan, crenatum; Holotype. See DCLXV
LYTOCERAS CORNUCOPIA; B. THOMPSON, 1896, cit. spec.
"Proc. Geol. Assoc. xiv, p. 426; near Woodford Halse, Northants
"Up. Lias, Cephal. Bed inconstant, above Fish Bed; B. Thompson Coll."
S. 64, 39, 31, 33; 142, 44, c. 34, 36. Sl. wide-spreading
Crenulate ribs subdistant, with intermediaries; later more approx.

ORCHOLYTOCERAS APPROPINQUANS, nov.
Harpoceratan, metorchion; Holotype. See DCLXVI
HARPOCERAS FALCIFERUM
"Barrington (upper quarry), near Ilminster, Somerset
"Upper Lias, Bed 23; Mus. Pract. Geol. Coll. 31620"
S. 27, 41, 28, 28, + K; 57, 43, 26, 30, + K

HARPOCERAS FALCULA, nov.
Harpoceratan, falcula; Holotype. See IV
Ammonites fibulatus, J. de C. Sowerby, 1823, Topotype (Min. Conch. iv, 147, ccccvii, 2); Whitby, Yorkshire; Upper Lias [Alum Shale, Cement Shale]; S.B. Coll. 3809, purch.

S. 53, 24, 23, 49; 77, 22.5, 22, 57; max. c. 80

Peronoceras fibulatum, J. de C. Sowerby sp.
Hildoceratan, fibulatum. Cf. DCLVIII
GRAMMOCERAS SOLONIACENSE
Vigo Brickyard, Northampton, Up. Lias, commune zone
["Cerithium Beds," B. Thompson]; S.B. Coll. 4635
S. 17°5, 41. —, 28°5; 27°5, 36, 32°5, 33; ventral lappet 9 mm.
Diff. G. soloniacense, Lissajous, (1, 5, lectot.), proportions and sulcation

MACONICERAS VIGOENSE, nov.
Hildoceratan, vigoense; Genotype, Holotype. Cf. DCLXXXII
HILDOCERAS SEMIPOLITUM,
Nailsworth, Glos, excavation for gasometer; Upper Lias
Base of Cotteswold Sands, grey stone; S.B. Coll. 4435
S. 87, 33, —, 39; 143, 30, 19, 45; part of mouth

HILDOCERAS SEMICOSTA, nov.
Hildoceratan, semipolitum; Holotype. See DCLXVII
Grammoceras striatulum; S. Buckman 1889, cit. spec.
Q.J.G.S., xlv, p. 444, § ii, 8 [base of]; Coaley Wood, Uley Bury, Glos
Lower part of Cephalopod Bed; S.B. Coll. 4711
S. 44, 32, 25, 39; 76, 29, 30, 47; Sl. longilobate

COSTIGRAMMOCERAS COSTIGERUM, nov.
Grammoceratan, thenarsense; Genotype, Holotype. Cf. DLXXIII
Ammonites læviusculus
Dundry, Somerset; I.O., [Lower White Ironshot]
Cf. Q.J.G.S. lii, 676, §1, 6; S.B. Coll. 271, ex E. Wilson
S. 50, 44, 25, 24; 95, 42, 22, 25, + K; max. c. 98

Dundryites albidus, nov.
Sonninian, mollis; Genotype, Holotype. Cf. CLXXXI
Witchellia sutneri; S. Buckman, 1893, cit. spec. Q.J.G.S., xlix, p. 500, § xv, 9; Frogden Quarry, Oborne, Dorset I.O. green marl; sauzei-Witchellia; S. B. Coll. 2271 S. 53, 41, 29, 31, + K; 98, 43, 23.5, 30.5, + K; max. c. 103 Diff. H. sutneri, Branco, more falc., approx. ribs, longer L2

WITCHELLIA FALCATA, nov. Sonninian, Witchellia; Holotype. See DXCIV
WITCHELLIA SUTNERI
Frogden Quarry, Oborne, Dorset; I.O., green marl bed Sauzei-Witch.; S.B. Coll. 2257; differs sutneri falcate ribs S. 39, 44, 27, 30; 72, 43, 26, 28; max. c. 95

WITCHELLIA ACTINOPHORA, nov.
Sonninian, Witchellia; Holotype. See DCLXXXVIII
CARDIOCERAS VERTEBRALE
Horton Brickyard, Horton-cum-Studley, Oxfordshire
Oxf. Cl.; S.B. Coll. 4366, purch.; (E.L. O), L1, OV
S. 17, 41, 47, 22; 38.5, 44, 43 (36), 27; 17 ribs

CARDIOCERAS QUADRARIUM, nov.
Cardioceratan, cardia; Holotype. See DCXXXIII
Cardioceras excavatum
S. 24°5, 45, 28°5, 28°5; 73, 46, 24°5, 20°5; 133, 53, 34°5, 15

Anacardioceras serrigerum, nov.
Cardioceratan, excavatum; Holotype. See DCXXXV
Fig. 1 $\times 0.82$

Fig. 3 $\times 2.7$

**Cardioceras excavatum**
Cowley, Oxford; Lower Calc. Grit; S.B. Coll. 3404
Figs. 2, 3, inner whorls out of the specimen
Fig. 3 with part of umbilical infilling attached

**ANACARDIOCERAS SERRIGERUM, nov.**
Cardioceratan, *excavatum*; Holotype. See DCXXXV
"? Aulacosphinctes contiguus, [S.B.], Pringle, 1926, cit. spec.
" Geol. Oxf., Ed. 2 (Mem. Geol. Surv.), 68, nodule at base, bed [2 up]
" Chawley Brickyard, Cumnor Hurst, Berks; M.P.G. Coll. 37486"
S 55, 34-5, 39, 34; 96, 31, 28, 45; max. c. 180 +
Sl. 19, 47, 47, 26; 26, 45, 49, 30. Venter subruncinate

Allovirgatites Tutcheri, Neaverson, 1925
Allovirgatitan, woodwardi. See DCXXXVIII and p. 16
Ammonites pallasianus, d'Orbigny
(Russ. 1845, 427; xxxii, 1, 2); T.A., VI, p. 31, 32; Hounstout
Kingston, Isle of Purbeck, Dorset; Portl. Sands, Massive Bed
S.B. Coll. 4660; S. (53. 31, —, 44)?

Virgatites pallasianus d'Orbigny sp.
Virgatitan, scythicus. See DCLXXV
Ammonites vermis, Simpson, 1855
(F. Yorks. Lias, 51); “Barrington Quarry, Somerset; Upper Lias, Bed 20”
S. 25, 24, 24, 56; 33, 25, 21, 57; max. c. 36

Vermidactylites vermis, Simpson sp.
Hildoceratan, vermis. See T.A. vi, 1926, 42
AMMONITES LONSDALII, PRATT, 1841, Topotype
(Ann. Mag. N.H. viii, 164); "Christian Malford, Wiltshire
"Oxford Clay, [Christian Malford Beds]; M.P.G. Coll. 30562"
S. 48, 50, —, 21; 104, 50, —, 20; max. c. 110

LUNULOCERAS LONSDALII, PRATT SP.
Kosmoceratan, acutistriatum. See DI
Ammonites discus

Blackthorn Hill, (Qy. N. of Bicester-Aylesbury Road)
Bicester, Oxon; Lower Cornbrash; S.B. Coll. 4117, purch.
S. 53, 58, c. 26, c. 6'6; 110, 58, c. 23, 4'5 [o?]; max. 170+
Without test. Li more projected than in DVI

Clydonicerat an, discus. Cf. D & Vol. v, 29
AMMONITES ROTUNDUS
Chapmans Pool, Isle of Purbeck, Dorset
Kimmeridge Clay [Nodule Bed]; S.B. Coll. 4366, pres. Miss E. R. Thompson
S. (185, 26, 35 5, —, est.) ; width to height, 136 : 100; Sl. 47, 64, 62, 38
Fig. 2, note effect of foreshortening on inner lobule of L1

LYDISTRATITES GIBBOSUS, S. Buckman, 1926
Paravirgatitan, lyditicus; Paratype. See CCCLIII

Plesechioceras Typus, nov.
Deroceratan, Plesechioceras; Genotype, Holotype. Cf. CDXLI.3
PLEURECHIOCERAS DECIDUUM; TRUeman & Williams, 1925, Genotype Echioc.; Trans. R. S. Edinburgh, liii (3), 719
"S. 55, 22.5, 20 (17), 60; 80, 20, 19 (16), 63," J.W.T.

PLEURECHIOCERAS TYPICUM, nov.
Deroceratan, Plessechioceras; Genotype, Holotype. Cf. DCIX
LEPTECHIOCERAS PLANUM, TRUEMAN & WILLIAMS, 1925, Holotype
Echioc.; Trans. R. S. E., liii (3) 731, 705, fig. 31; ii, 5
Clandown Quarry, Radstock, Som.; Armatus Bed; J.W.T. Coll. H. 14
"S. 36, 19‘5, 14, 61; 48, 19, 14‘5, 65," J.W.T.

LEPTECHIOCERAS PLANUM, TRUEMAN & WILLIAMS
Deroceratan, planum. See CDXLII
Euechioceras angustilobatum, Trueman & Williams, 1925, Holotype Echioc.; Trans. R. S. Edinburgh, liii (3), 726, 736
Kilmersdon Colliery Quarry, Radstock, Somerset; Armaatus Bed
J.W.T. Coll. H. 134; "S. 84, 19, 15.5, 63; 118, 18, 16, 68," J.W.T.

Stenechioceras angustilobatum, T. & W. sp.
Deroceratan, Euechioceras; Genotype. Cf. XCVI
Ammonites cf. kurrianus; S. Buckman, 1922, cit. spec. Q.J.G.S. Ixxviii, 394; Thorncombe Beacon, Bridport, Dorset Marlstone, c. 9" below top of Pleurotomaria bed; S.B. Coll. 4608 S. 138, 45, 17, 27. EL very short; acc. lobe in ES, long & large

PLATYHARPITES PLATYPELURUS
Amaltheian, argutus; Genotype, Holotype. Cf. CCC1.XIII
Dactylioceras helianthoides, Yokoyama, 1904
(Jur. Amm.; Journ. Sci. Coll. Tokyo, xix, 16; vi, 4, lectotype)
"Barrington Quarry, Somerset; Upper Lias, Bed 6; M.P.G. Coll. 38013"
S. 26, 30, 49°5, 49°5, 48°5, 28, 33, 45°5; size 54; max. c. 60

Xeinodactylites helianthoides, Yokoyama sp.
Harpoceratan, Harpoceratoides (helianthoides); G.T. See T.A. vi, 41
Ammonites annulatus, J. Sowerby, 1819; Chorotype (Min. Conch., iii, 41; ccxxi, 5, Oppel’s lectotype, Juraf. 1856, p. 255)
“Barrington Quarry, Somerset; Upper Lias, Bed 18/19”
“M.P.G. Coll. 38302”; S. 50, 27, 30, 52; 78, 22.5, 23.5, 59

Dactylioceras annulatum, J. Sowerby sp.
Harpoceratan, falciferum. Cf. CLVII and see T.A. i, p. v
AMMONITES FIBULATUS
Whitby, Yorkshire; Upper Lias, [Alum Shale, Cement Shale]
S.B. Coll. 4722; S. 32, 28, 25, 43.5; 43.5, 26, 23, 53
Size c. 47; max. c. 77. Prefibulate stage

PERONOCERAS PRÆPOSITUM, nov.
Hildoceratan, fibulatum; Holotype. See DCLXXXIII

EMILEITES MALENOTATUS, nov.
Sonninian, mollis; Genotype, Holotype. Cf. CDXIV
CARDIOCERAS sp., S. Buckman, 1925, cit. spec.
T.A. v, p. 65; Jordan Cliff, Preston, Weymouth, Dorset
Oxford Clay, Jordan Cliff Beds; S.B. Coll. 4254
S. 29, 48, —, 22'5; 55, 46, 29, 27

CARDIOCERAS ANACANTHUM, nov.
Cardioceratan, cardia; Holotype. See DCXC

PRIONODOCERAS TRUCULENTUM, NOV.
Prionodoceratan, prionodes; Holotype. See CDLXIV.
Ammonites pectinatus
Wheatley, Brickyard, Oxfordshire; Portland Sands
Wheatley Sands; S.B. Coll. 4316
S. (110, 35°3, 27, 37, est.); 195, 31, 24°5, 45; max. c. 260
On venter intermittent projected ribs indicate incipient "horns"

PECTINATITES SCALARIFORMIS, nov.
Paravirgatitan, pectinatus; Holotype. See CCCLIV
SPHÉROCERAS PEREXPANSUM
[Clatcombe], "Sherborne, Dorset; Inf. Ool., [humphriesianum zone]"
S.B., ex Darell, Coll. 1264; shows mouth—furrow and lip
S. 4½, 52, 76, 22; 72, 35, 47, 3½; max. 73

LABYRINTHOCERAS INTRICATUM, S. Buckman, 1919
Sonninian, Labyrinthoceras; Paratype. See CXXXIV
Ammonites tenuicostatus
Whitby, Yorkshire; Upper Lias [Grey Shales]; S.B. Coll. 4712 purch.
S. 44, 25.5, 25, 52; 66, 22.5, 20, 56; size c. 60; max. c. 90
Inner whorls smooth. See T.A. vi, December, 1926, p. 41

Tenuidactylites tenuicostatus, Young & Bird sp., 1822
Harpoceratan, tenuicostatus; Genotype.
Ammonites planicosta
Lyme Regis, Dorset; Lower Lias, [planicosta bed]
S.B. Coll. 4460, purchased; bituberculate form
S. 70, 30, c. 34(24), 50; 108, 31, c. 31(27), 49.5; 226, 20.5, c. 22(20), 46

Xipheroceras binodulatum, nov.
Asteroceratan, planicosta; Holotype. See DCXXXII
**Ammonites planicosta**
Lyme Regis, Dorset; Lower Lias, [planicosta bed] S.B. Coll. 596, purchased; bituberculate form S. 36, 28, 42 (29), 51.5; 54, 28, 34.5 (30), 52; size c. 60

**Xipheroceras binodulatum, nov.**
Asteroceratan, planicosta; Paratype. See DCXXXII
DACTYLIOCERAS COMMUNE
Whitby, Yorkshire; Upper Lias, [Alum Shale]; S.B. Coll. 4713, purch.
S. 44, 26.5, 28, 47.5; 64.5, 24.75, 24.75, 55; max. c. 70
See T.A. vi, Feb., 1927, p. 43

KOINODACTYLITES COMMUNIS, J. Sowerby sp., 1815
Hildoceratan, bifrons; Genotype. Cf. DCC
DACTYLIOCERAS COMMUNE
Whitby, Yorkshire; Upper Lias, [Alum Shale or above]
S.B. Coll. 4724, purch.; S. 52, 25, 26, 60; 79, 20'25, 19, 62
Has mouth. See T.A. vi, Feb., 1927, p. 43

CURVIDACTYLITES CURVICOSTA, S. BUCKMAN
Hildoceratan bifrons; Genotype, Holotype. Cf. DCLVII
SONNINIA, mammillate sp., S. Buckman, 1893, cit. spec. Q.J.G.S., xlix, 494; Sandford Lane Qy., Sherborne, Dorset Fossil Bed, lower part; S.B. Coll. 998. (Am. arenatus, Quen. Amm. Sch. J., ii, 482; lx, 10, has sl. degenerate) S. 154, 41, 25.5, 28.5; 274, 37.5, 27.5 + test (23–t.), 37; max. c. 300

PREPAPILLITES ARENATUS, QUENSTEDT SP., 1886
Soninian, Shirburnia. Cf. CL.
AMMONITES BROCCII, J. SOWERBY, 1818, Holotype
Min. Conch., ii, 233; cci; "Sherborne, Dorset; Under Oolite"
See Farey, Sup. Ind. M.C. ii, 250; B.M. (N.H.) Coll. 43906a
Matrix hard, grey, slightly ironshot, with glauconitic inclusions

EMILEIA BROCCII, J. SOWERBY sp.
Sonninian, brocchii; Genoelectotype. See CDXIV
AMMONITES BROCCII, J. SOWERBY, 1818, Holotype
"Sherborne, Dorset; Under Ool."; Brit. Mus. (Nat. Hist.), 43906a
Not Sandford Lane Qy., but = lower middle part of its Foss. Bed
S. 75, 45, 72, 21; 126, 385, 56, 26; max. c. 220
Sl. (plane) 42, 77, 88, 48; (over curve, fig. 2), 67, 49, 57, 315

EMILEIA BROCCII, J. SOWERBY sp.
Sonninian, brocchii; Genolectotype. See CDXIV
*Sphæroceras* brocchi; S. Buckman, 1893, cit. spec. Q.J.G.S., xlix, 494; [Sandford Lane], "Sherborne, Dorset" "Inf. Oolite," [mid. part of Fossil Bed]; S.B., ex J.B. Coll., 2058 S. 77, 45.5, 71, 21; 132, 40, 57.5, 28; max. c. 240

*Emileia* Brocchii, J. Sowerby sp., 1818 Sonninian, *brocchii*; Genosyntype. See CDXIV
Spheeroceeras brocchi; S. Buckman, 1893, cit. spec. [Sandford Lane Quarry], Sherborne, Dorset; S.B. Coll. 2058 Sl. (plane) 39, 72, 85, 48; (extended), 63, 45, 53, 30

Emileia Brocchii, J. Sowerby sp., 1818 Sonninian, brocchii; Genosyntype. See CDXIV
AMMONITES BROCCHI
Cf. J. Sowerby, M.C., ii, 233; ccxi, lower fig.; "Dundry, Somerset; I.O."[Lower White Ironshot, hard bed], Cf. S.B., Q.J.G.S., lli, 676, § 1, 5
S. B. Coll. 4742, ex E. Wilson; Sl. 12, 79, 86, 50
S. 25, 46, 72, 38; 37, 41, 62, 32\(^\frac{3}{5}\); size 38; a colomorph

EMILEIA SUBCADICONICA, nov.
Soninian, brocchi; Holotype. See DCCXXX & Cf. DCCII
Ammonites humphriesianus crassicosta

"Milborne Wick, Somerset; Inferior Oolite [saussel]"
S.B., ex J.B., Coll. 2074; 000 spat of Ostrea?; L2 double
S. 88, 35, 52, 41; 123, 285, 455, 43; size c. 139; max. c. 180

Kumatostephanus perjucundus, nov.
Soninian, Labyrinthisoceras; Holotype. See CCCXLV
**Ammonites humphriesianus crassicosta**

Milborne Wick; S.B. Coll. 2074; matrix white, with green grains
Green grains perhaps derived from bed 5. L2 single

**Kumatostephanus perjucundus, nov.**
Sonninian, *Labyrintheoceras*; Holotype. See CCCXLV
Perisphinctes martinsi

"Clifton Maybank, Bradford Abbas, Dorset; I.O."
S.B., ex J.B., Coll. 3298; S. 58, 34, 31, 43; 94, 27, 20, 49; max. c. 110
About 4 shallow constrict. per whorl; venter subbigotitean to smooth

Bajocisphinctes Bajociensis, Siemiradski sp., 1899, 334
Parkinsonian, garantiana. Cf. CXCI
Perisphinctes parandieri

Headington Quarry, (Magdalen Coll. Pit); Corallian, "Bottom Course"
S.B. Coll. 4537, purch.; Sl. 55, 63, 70, N.c. 83
S. 227, 24, c. 23, 52; 322, 25, 22 (1975), 57; max. c. 350
Pre-swollen, ventr. ribs subarc.; during swollen, venter flat, briefly

Perisphinctes tumulosus, nov.
Perisphinctean, martelli; Holotype. See DCLXIII
Perisphinctes pakandieri; S. Buckman, 1925, cit. spec.
T.A. v, 63; Holton Quarry (Lye Hill), Holton, Oxon; Corallian
"Holton Beds, c. 12' up" (J.P.); S.B. Coll. 4294, per Mr. J. Pringle
S. 242, 20° 5, 38 (30° 5), 59° 5; 349, 25° 5, 23° 5 (21), 59; has mouth
Venter flat (swollen stage) Cf. De Loriol, Pl. vii, (non viii, Holot.)

Dichotomosphinctes holtonensis, nov.
Perisphinctean, antecedens; Holotype. See DCL.
Pictonia tenuis
"S. 47, 30, 30, 40; 74, 35, 28', 39," (J.W.T.); max. 100+

Pictonia costigera, nov.
Rasenian, baylei; Holotype. See DXXXIII
AMMONITES PSEUDOGIGAS
West of Coney Hill, Over Winchendon, Bucks; Portland Stone
Upper Witchett, soft, white chalky; S.B. Coll. 4564, purch. workmen
S. 91, 35, 42, 40; 153, 41, 43, 33; max. c. 160; Sl. 35, —, 26+, 13+

GLOTTOPTYCHINITES AUDAX, n. ov.
Gigantitan, glottodes; Holotype. See CDIII
Ammonites pseudogigas
Over Winchendon; 4564; “from about middle of top bed”
Shallow quarry, showing upper beds of Creamy Limestone
Up. Witchett, 2 feet; Hardish stone (Osses Ed), 3’ 6”; Sandy marl

Glottoptychinites Audax, nov.
Gigantitan, glottodes; Holotype. See CDIII