

On some Ammonoidea from the Lower Greensand.  
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[Plates XIV.-XVII.]

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## I. INTRODUCTION.

Since Forbes, in 1845, described \* some new ammonites from the Lower Greensand (one of which is now figured for the first time) few papers dealing with British Aptian cephalopods have appeared. Keeping †, in 1883, illustrated a few Upware examples, but no additional forms have been figured in this country except Crick's *Ammonitoceras tovilense* ‡; and the lack of ammonite names is severely felt by workers on the Lower Greensand and by museum curators alike. I wrote, in 1925 §, that I hoped shortly to publish a preliminary account, with a few plates, of new or little known Aptian ammonites, based partly on a fine series of Hythe examples which the Keeper of the Manchester Museum, Mr. J. Wilfrid Jackson, had been good enough to lend me, through the kind intervention of Prof. D. M. S. Watson, F.R.S. The publication of the paper was deferred since Mr. A. Perl, B.Sc., of Hove, was then engaged in zonal collecting in the Isle of Wight, and it was hoped that he would be able to publish his stratigraphical results in the meantime. Mr. Perl has, however, now kindly given me his material, and other specimens were presented by Mr. E. H. Crinage, of Ventnor, or were lent by various museums, to the authorities of which the writer expresses his grateful acknowledgments. The present paper is thus now offered as a preliminary account of the Lower Greensand ammonites, pending the publication of a fuller monograph. There are a number of workers on the Weald Research Committee of the Geologists' Association investigating the Lower Greensand in the circum-Wealden area, and it is hoped that the account will facilitate local and regional correlation of faunas. It may be added that there are yet some incompletely known smaller forms, *e.g.*, from the Wicken Beds, and a certain number of unnamed larger species from the Bargate Stone of Surrey, the Ferruginous Sands of the Isle of Wight, and from Seend in Wiltshire that require description. They must await an opportunity for adequate illustration, since reduced figures of large ammonites are generally misleading, and the writer's 'Monograph of

\* "Catalogue of Lower Greensand Fossils &c.," Quart. Journ. Geol. Soc. vol. i. (1845), pp. 237-50, pp. 345-55, pl. v.

† 'The Fossils and Palæontological Affinities of the Neocomian Deposits of Upware and Brickhill' (Cambridge, 1883).

‡ "On *Ammonitoceras tovilense* from the Lower Greensand (Aptian) of Kent," Proc. Malac. Soc. vol. xii. 1916, pp. 118-120, pl. vi.

§ Spath, in Walton, 'Folkestone and the Country Around,' 1925, p. 31.

the Gault Ammonites,' now being published by the Palæontographical Society, will have to be completed before a full account of the Lower Greensand ammonites can be thought of. Recent French works, like those by Kilian, Kilian and Reboul, and Roch, repeatedly quoted below, will be found useful; but Dr. Corroy's\* 'Revision of the Aptian Fauna of the Eastern Border of the Paris Basin,' including many of the common English forms, is too brief, and no ammonites are illustrated.

Morris, in the second edition of his Catalogue (1854), listed twelve species of Lower Greensand Ammonoidea. The total is now brought up to fifty, not counting some unnamed forms briefly referred to in this note. But the ammonite fauna of the Lower Greensand as a whole must be considered an impoverished one. This is shown not only by the fact that in many collections it is represented only by the single species *Deshayesites deshayesi* (Leymerie), but there is also a total absence of such widely-spread genera as *Aconeceras* and *Sanmartinoceras*, not to mention the fundamental *Phylloceras* and *Lytoceras*, and the equally important *Desmoceratidæ*, dominant in Aptian times in Mediterranean regions. I previously† discussed the probability of the migration of *Aconeceras* (found at Speeton) from north to south, but I hope to deal with the distribution of Aptian ammonites when revising the Kachh forms. In that description will also be incorporated an account of the unpublished Barremian and Lower Aptian ammonites from the Tendaguru region in Tanganyika Territory received since I referred to this fauna in 1921‡.

The need for a revision of the British Aptian belemnites and nautili is not so pressing. The former are mostly fragmentary and largely indeterminable, except, perhaps, in the Wicken Beds. The nautili are common, but mostly belong to the two species *Cymatoceras radiatum*, J. Sowerby, sp. §, and *C. pseudoelegans* (d'Orbigny). *Anglonautilus undulatus* (J. Sowerby) of the *nutfieldiensis* beds is generally incomplete, and *Eucymatoceras plicatum* (Fitton)|| and,

\* 'Le Néocomien de la bordure orientale du bassin de Paris,' Nancy, 1925, pp. 1-334, pls. i.-xii.

† "Cretaceous Cephalopoda from Zululand," Ann. S. Afr. Mus. vol. xii. pt. 7, no. 16, 1921, p. 310.

‡ *Ibid.* p. 311.

§ See Foord and Crick, "Nautili &c.," Ann. & Mag. Nat. Hist. (6) vol. v. 1890, p. 398.

|| Also recorded from Saint-Dizier and Gurgy, Yonne, France (in Corroy, *loc. cit.* [Neocomien Bassin, Paris, 1925], p. 307). Foord ('Catalogue of Fossil Cephalopoda in the British Museum,' vol. ii. 1891, p. 246) stated this to be "well represented," but there are still only five specimens.

*Heminautilus saxbyi* (Morris) are known in only a few individuals. *Eutrephoceras sublævigatum* (d'Orbigny), recognized by Crick in the Lower Greensand of Seend and Faringdon, represents another rare type.

## II. CORRELATION OF THE APTIAN.

In this connexion it may be advisable to refer to the zones of the Aptian, previously put forward\* and discussed by Dr. Neavey† in his new admirable Text-Book. The lowest zone, corresponding to what has been called the Parancyloceratan age, may be provisionally named the *rectecostatus*-zone; for *Costidiscus* of the *rectecostatus* type were previously listed‡ as characterizing beds above the true (Mediterranean) Barremian or uppermost Neocomian.

It is true that *Costidiscus*, like its close ally *Macroscephites*, occurs already in the Upper Barremian; but according to Kilian § *Costidiscus rectecostatus* (d'Orbigny), var. *crassa*, Kilian, is far commoner in the Lower Aptian (Bedoulian) than in the Barremian, while *Macroscephites striatiusulcatus*, occurring with the former, is also much more abundant in the Aptian than *M. ivanii*, which has its maximum development at the top of the Barremian. There, however, they are associated with a fauna which is quite different from that of the Lower Aptian, characterized by the sudden development of the early Cheloniceratids. It ought to be mentioned in this connection that the so-called "*Macroscephites*" of the Isle of Wight (e. g., "*M.*" *gigas*, quoted as recently as 1921 ¶) have nothing in common with the true *Macroscephites* just mentioned except a certain similarity of coiling. Similarly, *Crioceratites* (generally but wrongly written "*Crioceras*") does not occur in the Lower Greensand.

The true *Ancyloceras* (group of *A. matheronianum*, d'Orbigny) is also typically Lower Aptian. Unfortunately it is known apparently in only a single British example (Mantell's original ¶¶) from the *Perna* bed of Atherfield, and

\* Spath, "On the Ammonite Horizons of the Gault and Contiguous Deposits," Summary of Progress for 1922, Mem. Geol. Survey, 1923, p. 148.

† 'Stratigraphical Palæontology,' London, 1928.

‡ Spath, "Ammonites of the Speeton Clay and Subdivisions of the Neocomian," Geol. Mag. vol. lxi. 1924, p. 80 (table iii.).

§ In Frech, 'Lethæa Geognostica,' ii. Mesozoicum, 3 Kreide, part i. Lief. 2 (1910), p. 253.

¶ "Geology of the Isle of Wight," H. J. Osborne White, Mem. Geol. Survey, p. 28.

¶¶ See 'Geological Excursions in the Isle of Wight,' 2nd ed., 1851, p. 444, fig. 41 (B.M. no. C. 3748, ex S. H. Beckles Coll.). Judd, however, in 1871 ("Punfield Formation," Quart. Journ. Geol. Soc. vol. xxvii. p. 220), recorded *Ancyloceras* from immediately above the Wealden Paper Shales and below the *Perna* Bed of Sandown Bay.

to show that correlation is as yet far from exact I may mention that there are as yet only two ammonite fragments (*Procheloniceras*?) known from the overlying (true) Atherfield Clay. Adopting Mr. Osborne White's \* divisions of the Lower Greensand succession in the Isle of Wight, I correlated the *Perna* Bed (I.) with the lower *deshayesi* zone, *Deshayesites deshayesi* being listed from this bed as well as from the true Atherfield Clay (II. a). These records, however, are doubtful. *Deshayesites*-like forms occur low in the Lower Aptian, e.g., Roch † has them from a number of beds below the maximum occurrence of the typical *D. deshayesi* (his bed 6), which latter seems to correspond to my *hambrovi*-subzone. The other subdivisions previously listed were named after forms occurring in the Speeton-Hanover succession only in default of better species; for *Ancylloceras matheronianum* (of the *Perna* Bed) has too large a range at Bedoule, and the two *Procheloniceras*? fragments known so far from the (restricted) Atherfield Clay are obviously insufficient for exact correlation.

The names *weissi* and *bodei* adopted from Stolley ‡ must thus still be considered as merely provisional labels. The basal bed of the Hunstanton Carstone had yielded species (e.g., *Dufrenoyia*) of the higher "consobrinoides"-zone as well as *Deshayesites* of the *bodei* type, and thus represents a condensed deposit with forms of more than one horizon from the lower *deshayesi*-zone (if Stolley's placing of *bodei* is correct) up to the Upper Aptian. In the *Perna* Bed of Woodhatch, near Reigate, Surrey §, *Deshayesites* of the *laeviusculus* type occur, not identical with those found at Hunstanton, and neither these and the associated *D. bodei*, *D. sp. n. aff. tenuicostatus* (v. Koenen), and *D. fissicostatus* (Phillips) of Norfolk and Yorkshire, nor the typical *D. weissi* (Neumayr and Uhlig), have yet been found in the Isle of Wight.

The Lower Lobster Bed (II. b) has yielded abundant

\* *Loc. cit.* (1921), p. 27, II. a = Atherfield Clay, s. s. [70 ft.], II. b = Lower Lobster Bed [30 ft.], III. a = Crackers, s. s. [20 ft.], III. b = Upper Lobster Bed [40 ft.].

† "Etude Stratigraphique et Paléontologique de l'Aptien inférieur de la Bedoule," *Mém. Soc. géol. France*, n. s., vol. iv. p. 7.

‡ *Centralblatt f. Mineral. &c.*, 1908, p. 220. See Spath, "Cret. Cephalopoda from Zululand," *Ann. South Afr. Mus.* vol. xii. no. 7, 1921, p. 311. I pointed out in 1924 (*Geol. Mag.* p. 85) that Stolley wrongly placed the Aptian of Ahaus below instead of above the *deshayesi*-zone, and it is not impossible that he misinterpreted *D. weissi*.

§ G. W. Butler, "On the *Perna* Bed and the Weald Clay of Reigate," *Proc. Geol. Assoc.* vol. xxxiii. (1922), p. 316.

typical *Deshayesites deshayesi* and allies, also *Cheloniceras hambrovi* (Forbes), but in the succeeding Crackers (III. a) the same forms still occur, with examples of what seems to be the true, evolute, and coarsely ribbed *P. consobrinus* (d'Orbigny). The Upper Lobster Bed (III. b), also very fossiliferous, yielded the pyritized example of *Deshayesites* referred to below and figured in Pl. XVII. fig. 5, whilst in bed IV. (Lower *Gryphæa* Bed = wrongly "*consobrinoides*" horizon) the form figured in Pl. XVII. figs. 1-2 (*D. grandis*, sp. n.) is dominant. The *Deshayesites* of these top beds of the Lower Aptian, taken to correspond to bed 8 of Roch's Bedoulian, often grow to a very large size, and persist into the Upper Aptian.

The succeeding beds (V. to X.), with a thickness of over 200 feet, are characterized by species of *Tropæum*, notably the hooked *T. hillsi* and *T. gigas* below, and the more closely coiled *T. bowerbanki* above. In the Isle of Wight the next higher beds of the Ferruginous Sands (XI. to XIV.) have yielded only rare *Cheloniceras* of the *subnodosocostatum* group, and in the succeeding Sandrock Series, which may include Upper Aptian as well as the lowest Albian, ammonites are almost unknown. The few fragments in our public collections that may have come from these upper beds in the Isle of Wight are not only insufficiently labelled, but too poorly preserved for definite identification. Moreover, the Upper Aptian *Cheloniceras* of the *martini* group are not only closely allied to the earlier (Lower Aptian) forms of the *cornuelianum*-type, but *Ch. subnodosocostatum* (which is very similar to Forbes's *Amm. martini*) directly connects with *Diadochoceras nodosocostatum* of the Lower Albian. The few hundred feet of British deposits of this period represent a fairly rapid accumulation, and the subzones previously given are probably quite sufficient to accommodate the faunas so far known from other areas. There is as yet nothing comparable to the Lower Albian fauna, with forms of the *clansayense*-group from the Luitere Zug, described by Jacob and Tobler\* ; and the correlation of the Folkestone Sands or uppermost member of the Lower Greensand series is as uncertain as that of the Sandrock of the Isle of Wight. Both, however, are succeeded by the Middle Albian *mammillatus*-zone in most places, and the slightly earlier *Leymeriella* fauna is at present known only from Leighton

\* "Gault de la Vallée de l'Engelberger Aa," Mém. Soc. Paléont. Suisse, vol. xxxiii. 1906, pp. 1-26, pls. i., ii. Natzki ("Stratigr. Unt. Kreide Mangyschlak," Mat. Géol. Russie, vol. xxvi. 1918, p. 189), put these *nolani*-beds into the Upper Aptian.

Buzzard in Bedfordshire and (in a single example) from Berwick Common, near Lewes, Sussex. The Lower Greensand at the latter locality, according to H. J. Osborne White \*, has phosphatic nodules in a top bed. No ammonites seem to have been found "in situ" in this bed, and it was thus provisionally assigned to the *mammillatum*-zone.

### III. SPECIFIC DESCRIPTIONS.

#### Family I. Parahoplitidæ, Spath, 1922.

#### Genus DESHAYESITES, Kazansky, 1914 †.

##### 1. *Deshayesites deshayesi* (Leymerie MS.), d'Orbigny sp.

1841. *Ammonites deshayesi*, Leymerie MS.; d'Orbigny, Pal. Franç. Terr. Crét. i. p. 288, pl. lxxxv. figs. 1, 2, non 3.  
 1842. *Ammonites deshayesi*, Leymerie, Mém. Soc. Géol. France, (1) vol. v. pl. xvii. fig. 17.  
 1845. *Ammonites deshayesi*, Leymerie; Forbes, *op. cit.*, Quart. Journ. Geol. Soc. vol. i. pl. xiii. fig. 2.  
 1875. *Ammonites deshayesi*, Leymerie; Topley, Geology of the Weald, p. 421.  
 1914. *Hoplites (Deshayesites) deshayesi*, Kazansky, pars, "Description Céphal. Crét. Daghestan, etc.," Tomsk. Izv. Technol. Inst. vol. xxxii. no. 4, p. 100.  
 1926. *Deshayesites deshayesi* (Leymerie), Rengarten, "Faune Dépôts Crétacés &c.," Mém. Com. Géol. n. s., livr. cxlvii. p. 100.  
 1927. *Parahoplites deshayesi* (Leymerie); Roch, *op. cit.*, Mém. Soc. Géol. France, n. s., vol. iv. p. 15.

The example figured by Forbes (M.P.G. no. 2289, ex Geol. Soc. Coll.) is considered typical. The species does not grow to more than, say, 80 mm. diameter, but there are slightly more densely and more distantly ribbed, also evolute and involute varieties, connecting this species with its allies. There may occasionally be difficulty in distinguishing the young of the latter: the immature specimen referred to by Lamplugh ‡ as one of the "*Ammonites knaptonensis*" in the Bean Collection (B.M. no. C 4652), and said to come from "Yorkshire," is one of these indefinite forms of the *deshayesi* group; it almost certainly also is from Atherfield, and thus cannot be one of Bean's originals.

\* "Geology of the Country near Lewes," Mem. Geol. Survey, Sheet 319, 1926, p. 35.

† = "*Parahoplitoides*," Spath, "Cretaceous Ammonoidea from Angola," Trans. Roy. Soc. Edinburgh, vol. liii. pt. 1 (no. 6), 1922, p. 111. *Deshayesites* and *Dufrenoyia* are somewhat intermediate between the Hemihoplitidæ, Spath, and the typical Upper Aptian *Parahoplites*, s. s.

‡ 'Naturalist,' Nov. 1890, p. 2.



The example figured by Prestwich\* (B.M. no. 70520) is a less typical *D. deshayesi*; the illustration shows the ribbing somewhat too coarse, which suggests reference to *D. consobrinoides*. At that small diameter, however, the varieties above mentioned cannot yet be satisfactorily distinguished. Kilian †, who also accepted Forbes's example as typical, separated from the present species the small ammonites figured by Neumayr and Uhlig ‡ and by v. Koenen § as *Hoplites deshayesi*, and renamed (var. "*rhodanica*") the large example illustrated by the former authors ||, although this had already been separated by Sinzow ¶ under a new name. In reality both the small specimens just mentioned are difficult to separate from the true *D. deshayesi*, although one is here referred to *D. consobrinoides*, discussed below, and the other is considered to connect the *deshayesi*-group with the earlier *D. fissicostatus* and allies, known in England only from Speeton, Wicken, and the Hunstanton Carstone.

*Parahoplites weerthi*, Simionescu\*\* (= *Ammonites (Hoplites?) uhligii*, Weerth ††, non Anthula), which superficially resembles the much smaller var. *densicostata* of the present species (e.g., B.M. no. C 24717), does not even belong to the genus *Deshayesites*.

*Horizon and Localities*.—Lower Aptian, middle *deshayesi*-zone (especially beds II *b* and III *a*), Isle of Wight, Kent, Surrey, ? Wicken, Cambs.

## 2. *Deshayesites* aff. *latilobatus* (Sinzow).

1881. *Hoplites deshayesi* (non Leymerie), Neumayr and Uhlig, *op. cit.* Palæontogr. vol. xxvii. p. 177, pl. xlv. figs. 1 *a, b*.  
 1909. *Parahoplites latilobatus*, Sinzow, *op. cit.* Russ. Kais. Min. Ges. (2) vol. xlvii. p. 3.  
 1913. *Parahoplites deshayesi*, var. *rhodanica*, Kilian, *loc. cit.* (Lethæa), pp. 301, 344, 345.

\* 'Geology,' vol. ii. 1888, pl. x. fig. 2.

† *Loc. cit.* (Lethæa, 1913), p. 344.

‡ "Ammonitiden aus den Hilsbildungen Norddeutschlands," Palæontographica, vol. xxvii. 1881, p. 177, pl. xlvi. fig. 3.

§ "Ammonitiden des Norddeutschen Neocom.," Abhand. K. Preuss. Geol. Land.-Anst., N. F., Heft xxiv. 1902, p. 204, pl. xiv. figs. 10 *a, b*.

|| *Loc. cit.* 1881, pl. xlv.

¶ "Beiträge zur Kenntnis des Südrussischen Aptien und Albien," Verhandl. Russ.-Kais. Mineral. Ges. St. Petersburg, ser. ii. vol. xlvi. 1909, p. 3.

\*\* "Synopsis des Ammonites Néocomiennes," Trav. Lab. Géol. Grenoble, vol. v. (1899-1900) 1901, p. 654.

†† "Fauna des Neocomsandsteins im Teutoburger Wald," Pal. Abhandl. vol. ii. 1884, p. 22, pl. vii. fig. 1.

1915. *Parahoplites consobrinoides* (Sinzow ?), Kilian and Reboul, "Aptien Inférieur de Montélimar," Mém. Explic. Carte Géol. Dét. France, p. 40.
1927. *Parahoplites deshayesi*, var. *consobrinoides* (Sinzow), Roch, *op. cit.* Mém. Soc. géol. France, n. s., vol. iv. p. 15.

This form was differently interpreted by Sinzow and Kilian, the latter even stating that it differed from the typical *D. deshayesi* in its coarser ribs, whilst Sinzow showed that it had finer and more numerous ribs. At a later date Kilian united his var. *rhodanica* definitely with *D. consobrinoides* \*, Sinzow, and he was followed in this by Roch ; but if Trautschold's Russian example be taken as typical of the latter species, the present form must be kept entirely distinct. Kilian also was wrong in uniting with the present form both v. Koenen's † small example and Neumayr and Uhlig's ‡ coarsely ribbed specimen. This, however, is probably identical with *D. consobrinoides*, as I understand it, whilst v. Koenen's example is a much more finely ribbed form intermediate between *D. fissicostatus* and the true *D. deshayesi*.

Taking Neumayr and Uhlig's large form as typical, we note that the trifold or even multiplicate ribs persist to a considerable diameter, which indicates affinity with *D. weissii* (Neumayr and Uhlig). The two forms, however, cannot be united in one species, as is done by Roch §, who would keep distinct a var. *latilobata*, whilst referring the type of this same variety, namely, Neumayr and Uhlig's large *Hoplites deshayesi*, to the typical *D. weissii*. In any case, the last is an early form, with resemblance to the later *D. grandis*, but a less truncate periphery and ribs that show a distinct forward sinus on the periphery, but no flattening. The only British example (B.M. no. 48836) that can be compared to this restricted *D. latilobatus* is transitional in this respect to *D. grandis*, and also comes from an intermediate horizon (probably III a). It, however, also shows a tendency to smoothness and a more rounded whorl-shape which links it equally with the still more inflated *D. topleyi* and the more distantly ribbed *D. kiliani* from the same bed. The finely ribbed varieties of *D. deshayesi* are much more evolute.

*Horizon and Locality.*—Lower Aptian, middle *deshayesi*-zone (II b to III b?), Atherfield, Isle of Wight.

\* "Bemerkungen ueber einige Ammoniten des Aptien," Odessa, 1890, pl. A, figs. 8-10 (*vide* Roch, 1927, p. 15). This work does not appear to be in any English library.

† *Loc. cit.* (Ammonitiden norddeutsch. Neocom.) pl. xlv. fig. 10.

‡ *Loc. cit.* (1881) p. 179, pl. xlvi. figs. 1, 1 a.

§ *Loc. cit.* (1927) p. 17.

3. *Deshayesites consobrinoides* (Sinzow), Kilian sp.

1898. *Hoplites consobrinoides*, Sinzow, Ammoniten des Aptien, Odessa, pl. A, figs. 8-10 (*vide* Roch).  
 1913. *Parahoplites consobrinoides*, Sinzow; Kilian, *loc. cit.* (Lethæa), p. 344.  
 1927. *Parahoplites deshayesi* (Leymerie), var. *consobrinoides*, Sinzow; Roch, *op. cit.* (Mém. Soc. Géol. France, n. s. vol. iv. p. 15).

This species differs from the typical *D. deshayesi* merely in the coarseness of its ribbing. In the absence of Sinzow's original account I interpret it with the help of Trautschold's \* figure and the small ammonite figured by Neumayr and Uhlig †, and identified by Kilian ‡ with the present species. It seems fairly common at Atherfield, and is connected with the flat *D. deshayesi* of the same beds by a number of transitions, just as the two species occur together in Russia.

When using the term "*consobrinoides*-subzone" § I had in view chiefly forms like *D. grandis*, which seemed to me then referable to Kilian's "*var. rhodanica*" of *D. deshayesi* [now *D. latilobatus*, Sinzow], whose interpretation I accepted. *Deshayesites consobrinoides*, as now understood, has a range identical with that of *D. deshayesi*, so that it is common only in beds below the upper part of the *deshayesi*-zone, s. l.

A very fine specimen of this species (B.M. no. 46587) from Mr. Saxby's collection measures 112 mm. in diameter, and is complete to the mouth-border. Unfortunately the peristome suffered damage during the life of the animal, and was subsequently repaired, with resulting asymmetry. This form resembles *Colombiceras waageni*, sp. n. (= *Ammonites deshayesi*, non Leymerie in Waagen ||), with more pronounced anguliradiation.

*Horizon and Locality*.—Lower Aptian, middle *deshayesi*-zone (especially II *b* and III *a*), Atherfield, Isle of Wight.

4. *Deshayesites grandis*, sp. n. (Pl. XVII. figs. 1, 2.)

*Type*.—An example (no. 2300 Geol. Soc. Coll.) from Atherfield (probably bed IV or V) in the Museum of Practical Geology.

*Diagnosis*.—Coiling subplaty-, subleptogyral, subangustum-biliccate; whorl-sides flattened, with region of greatest whorl-thickness just below the middle; venter narrowly arched to

\* "Der Inoceramen-Thon von Ssimbirsk," Bull. Soc. Imp. Natur. Moscou, vol. xxxviii. (1865), p. 22, pl. iii. figs. 16 *a-c*.

† *Loc. cit.* (1881) pl. xlvi. fig. 3.

‡ *Loc. cit.* (Lethæa, 1913) p. 344.

§ *Loc. cit.* (Summary Progress, 1923) p. 147.

|| "Jurassic Fauna of Kutch," vol. i. pt. 4, Pal. Indica, ser. ix. no. 4, 1875, p. 246, pl. lx. (corrected plate) figs. 2 *a, b*.

subtabulate. Distinctly falcoid ribs, irregularly bi- or trifurcating, and with long or short, coarse or fine, intercalated ribs. Slight peripheral flattening and scarcely distinct forward sinus. Umbilicus opening out in adult when ribs become single, coarse and distant, and ventral truncation more pronounced, as in *Dufrenoyia*. Suture-line (see Pl. XVII. fig. 1) with comparatively slender saddles.

*Measurements.*—

|                                    |     |     |     |     |
|------------------------------------|-----|-----|-----|-----|
| Holotype (M.P.G. no. 2300) . . . . | 110 | ·45 | ·28 | ·20 |
| B.M. no. C 568 a . . . . .         | 320 | ·36 | ·19 | ·33 |

*Remarks.*—The apparent smoothness of the body-chamber of the fragment figured in Pl. XVII. fig. 1 suggests a transition to *D. kiliani*, described below, and there are other passage-forms (*e. g.*, B.M. no. C 24716) to the latter (smaller) species, with smoother whorl-sides and a more rounded venter. A Lympne specimen (M.P.G. no. 30921) seems to differ from the typical examples of the present form merely in a slightly smaller whorl-thickness, and thus a narrower periphery, but unfortunately its outer whorl (still septate at 100 mm. diameter) is poorly preserved.

Large examples (*e. g.*, B.M. nos. C568*b*, C3645), apparently from high beds (Upper Aptian), that seem to be referable to the present species differ chiefly in the earlier appearance of the coarse ribbing characteristic of the body-chamber, but there are also slight variations in whorl-section and thickness, and if a narrow interpretation were attempted every individual could be made the type of a new species.

The present form resembles the earlier *D. weissii* (Neumayr and Uhlig), and may account for part of the confusion prevailing with regard to the range of this much misunderstood species. *D. grandis* is certainly closer to *D. weissii* than are the large uncoiling forms of the *conso-brinus*-type figured by Kilian and Reboul\* and quoted by Roch †.

A Bedoule example in the British Museum (no. C 5840), perhaps a large specimen of the form represented in Kilian and Reboul's pl. vii. fig. 2, seems indistinguishable from comparable Atherfield examples (*e. g.*, L.F.S. no. 902, from "top. iv."), but the fragmentary Neufville examples of

\* In Kilian, "Contribution à l'Etude des Faunes Paléocrétacées du S.E. de la France.—I. Fauna de l'Aptien inférieur des environs de Montélimar." Mém. Expl. Carte Géol. Dét. France, 1915, pl. iii. fig. 3, pl. iv. fig. 4 (= pl. ix. fig. 1).

† *Loc. cit.* (1927) p. 17.

*Deshayesites* recorded by Dr. Dutertre\* can only be provisionally referred to the present species.

*Horizon and Locality.*—Lower Aptian, upper *deshayesi*-zone, and Upper Aptian, lower *martini*-zone (beds IV. and V.), Atherfield, Hythe, Lympne, Maidstone. Fragments of large *Deshayesites* from Sevenoaks (B.M. no. C 2526) and Hunstanton (C 29616) cannot be definitely assigned to this species, but a small example (B.M. no. C 29617) from the latter locality, although not typical, represents a closely related form.

5. *Deshayesites kiliani*, sp. n. (Pl. XV. fig. 1.)

*Type.*—An example (no. 30922) from Atherfield, Isle of Wight (probably the Lower Lobster Bed), in the Geological Survey Collection.

*Diagnosis.*—Coiling platy-, subleptogyral, subangustum-bilicate; whorl-sides flattened, with rounded umbilical edge and narrowly arched venter. Sigmoidal ribs, as in *D. deshayesi*, in young; later the costation becomes indistinct on lateral area; blunt bulges at umbilical end, corresponding to about three secondaries each, continuous across venter, with forward sinus. Suture-line simple, as in *D. deshayesi*.

*Measurements.*—

|                                     |    |     |     |     |
|-------------------------------------|----|-----|-----|-----|
| Holotype (M.P.G. no. 30922) . . . . | 68 | ·53 | ·27 | ·22 |
| Paratype (L.F.S. no. 836) . . . . . | 66 | ·50 | ·30 | ·24 |

*Remarks.*—The holotype shows nearly half a whorl of body-chamber and the paratype also is not septate to the end, so that this species does not represent the inner whorls of one of the larger forms of *Deshayesites* of higher beds. A third example (M.P.G. no. 38047), which shows part of an almost smooth body-chamber, connects the more typical forms with a slightly more inflated variety (*e.g.*, M.P.G. no. 30911) that forms a transition to the species described below as *D. topleyi*, sp. n.

The young *D. kiliani* is similar to the immature *D. deshayesi*, but less sharply ribbed; it is also less evolute at all diameters, and the narrow body-chamber of the adult *D. deshayesi* is particularly characteristic, whilst the present form shows increasing flattening of the whorls. The transitions to the more finely ribbed *D. grandis* have already been referred to.

*Horizon and Localities.*—Lower Aptian, middle *deshayesi*-zone (beds II *b* and III *a*), Atherfield, Isle of Wight.

\* "Crétacé Inférieur du Bas-Boulonnais etc.," Ann. Soc. Géol. Nord, vol. xlix. (1924) 1925, p. 242 (four specimens in the Musée Géologique at Boulogne).

6. *Deshayesites topleyi*, sp. n. (Pl. XV. fig. 5.)

1889. *Ammonites leopoldinus*, d'Orbigny; Bristow, &c., Geology Isle of Wight, 2nd ed. p. 266.

*Type*.—An example (L.F.S. no. 834) from the Lower Lobster Bed (=II *b*) of Atherfield, Isle of Wight.

*Diagnosis*.—Coiling subplaty-, substenogyral, subangustumbilicate. Whorl-sides slightly flattened, with high but rounded umbilical slope and arched venter. Ribs sigmoidal, blunt and indistinct, slightly bulging at umbilical end, and traversing venter with a slight forward sinus. About three secondaries to each primary, but division not distinct. Suture-line as in *D. deshayesi*.

*Measurements*.—

|                                     |    |     |     |     |
|-------------------------------------|----|-----|-----|-----|
| Holotype (L.F.S. no. 834) . . . . . | 55 | ·47 | ·34 | ·24 |
| Paratype (L.F.S. no. 835) . . . . . | 65 | ·46 | ·32 | ·23 |

*Remarks*.—This species differs from the last, and especially from *P. deshayesi*, in its inflated whorl-shape and blunt and indistinct ribbing. In the holotype (Pl. XV. fig. 5) the ribbing is still visible, though faint; in the (unfigured) paratype it has almost disappeared, and it is probably on account of this smoothness, combined with a rounded venter and elliptical whorl-section, that this species has been mistaken by Fitton and some of his followers for d'Orbigny's *Amm. leopoldinus* (in coll.).

There is an undescribed form (L.F.S. nos. 919–920), characteristic of bed III *a*, but beginning already in II *b*, with blunt but extremely coarse ribs at all diameters, which in its shape is intermediate between the present species and *D. consobrinoides*. Another new form, discussed above under *D. latilobatus*, on account of a similar tendency to smoothness, also resembles *D. topleyi*, but is much more finely ribbed.

*Horizon and Locality*.—Lower Aptian, middle *deshayesi*-zone (II *b* and III *a*), Atherfield, Sandown (?), Isle of Wight.

7. *Deshayesites vectensis*, sp. n. (Pl. XVI. figs. 5 *a*, *b*.)

*Type*.—An example (B.M. no. C 889 *c*) from Blackgang, Isle of Wight (J. S. Gardner Coll.).

*Diagnosis*.—Coiling subplaty-, subleptogyral, subangustumbilicate. Whorl-sides gently rounded, venter first flattened, later arched. Ribbing first bifurcating and gently sigmoidal, as in *D. deshayesi*; later with intercalated, short, secondary costæ. Suture-line probably simple, as in *D. punfieldensis*.

*Measurements.*—

|  |    |     |     |     |
|--|----|-----|-----|-----|
| Holotype (Pl. XVI. fig. 5 a) . . . . . | 39 | ·37 | (?) | ·34 |
| Paratype (Pl. XVI. fig. 5 b) . . . . . | 70 | ·44 | ·31 | ·26 |

*Remarks.*—This species is close to *D. consobrinoides*, with equally coarse ribbing, but the shorter secondaries and the sharp and thin longer costæ of *D. vectensis* enable us to distinguish the two species. The present form is also connected by transitions with *D. punfieldensis*, showing still coarser costation and a more pronounced tendency of the periphery to become angular.

The extremely coarsely ribbed new form, referred to above under *D. topleyi*, has inner whorls somewhat resembling the present form, but it not only comes from a lower bed and grows to large dimensions (*e.g.*, B.M. no. C 2687), but it has much blunter ribs. On the other hand, in the case of such inner whorls of possibly this new species as those here figured (Pl. XVII. fig. 5), the ribbing is very similar to that of *D. vectensis*, and only the more distinct truncation of the periphery in the latter species (in addition, perhaps, to its wider lateral lobe) may serve as a distinguishing feature. A Punfield specimen in the British Museum (no. C 4979), unfortunately poorly preserved, is apparently identical with the small *Deshayesites*, sp. n., here figured, and shows by its high umbilical edge and loose coiling that the undescribed form here discussed is closer to *D. consobrinoides* than it is to the present species.

*Horizon and Locality.*—Aptian, upper *deshayesi*- or lower *martini*-zone (iv. or v.?), Blackgang, Isle of Wight.

8. *Deshayesites punfieldensis*, sp. n. (Pl. XVI. fig. 3.)

1871. ? *Ammonites deshayesi*, Leymerie; Judd, "Punfield Formation," Quart. Journ. Geol. Soc. vol. xxvii. p. 215.

*Type.*—The Atherfield example (M.P.G. no. 30915) figured in Pl. XVI. figs. 3 a, b.

*Diagnosis.*—Like last, but with coarser ribs and more angular periphery. Suture-line (see Pl. XVI. fig. 3) very simple.

*Measurements.*—

|  |    |     |     |     |
|--|----|-----|-----|-----|
| Holotype (Pl. XVI. fig. 3) . . . . .                           | 51 | ·40 | ·31 | ·36 |
| B.M. no. C 889 a (transition to <i>D. vectensis</i> ). . . . . | 48 | ·38 | ·30 | ·32 |

*Remarks.*—This species in the truncation of its periphery is somewhat transitional to *Dufrenoyia*, but it is connected by various transitions with *D. vectensis*, discussed above. The rather poorly preserved example listed in the table of measurements as one of these transitions shows a rounded

ventral area on the last half-whorl, and apparently was collected together with the two more finely ribbed *D. vectensis* here figured.

The inner whorls of the very coarsely costate new form, above referred to, are similar to the present species, but less loosely coiled and without ventro-lateral edges. The latter cause resemblance to *Dufrenoyia furcata* (Sowerby), but this is still more angular and more coarsely ribbed.

*Horizon and Locality*.—Lower Aptian, upper *deshayesi*-zone (and lower *martini*?). Punfield, Dorset; Atherfield and Blackgang, Isle of Wight.

### 9. *Deshayesites consobrinus* (d'Orbigny).

1841. *Ammonites consobrinus*, d'Orbigny, Pal. Française, Terr. Crét. Céphal. p. 147, pl. xlvii.  
 ? 1889. *Ammonites consobrinus*, d'Orbigny; Bristow, &c., Geology, Isle of Wight, 2nd ed. p. 266.  
 1913. *Parahoplites consobrinus* (d'Orbigny); Kilian, *loc. cit.* (Lethæa) p. 344.  
 1915. *Parahoplites consobrinus*, Kilian & Reboul, *loc. cit.* (Aptien Inférieur) p. 41 [Pl. XVII. fig. 6?].  
 1927. *Parahoplites consobrinus*, Roch, *op. cit.* (Mém. Soc. Géol. France) n. s. vol. iv. p. 15.

This oft-quoted form is before me in a typical Bedoule example (B.M. no. C 5841) of 300 mm. diameter, and I would identify with this species also an Atherfield specimen (B.M. no. C 993), to judge by its sandy matrix from the Crackers (bed III *a*). It is still septate at nearly 150 mm. diameter, has dimensions .37, .23, .33, and it well shows the simple suture-line, with its very short external lobe. Since d'Orbigny's drawing is somewhat diagrammatic, the suture-line of the Atherfield specimen is here reproduced (text-fig. *a*, p. 438).

A Hythe example (M.P.G. no. 30919), of dimensions 125, .40, .25, .28, differs in its smaller umbilicus, and thus may be designated var. *involuta*. Its inner whorls, with neatly truncate periphery, resemble those of *D. grandis*; but the outer whorl, in ribbing, is indistinguishable from that of *D. consobrinus*.

*Horizon and Locality*.—Lower Aptian, middle and upper *deshayesi*-zone. Atherfield, Isle of Wight, and Hythe, Kent.

### 10. *Deshayesites fissicostatus* (Phillips).

1829. *Ammonites fissicostatus*, Phillips, Geology of Yorkshire, i. p. 123, pl. ii. fig. 49.  
 1902. *Hoplitides bodei*, var. *tenuicostata*, v. Koenen, *loc. cit.* (Ammonitiden, Nordd. Neocom.) p. 221, pl. ix. figs. 2 *a-c*.



1924. *Parahoplitooides fissicostatus* (Phillips); Spath, *loc. cit.* (Speeton Clay) p. 79.

This species, as represented by typical Speeton examples in the Bean and Lamplugh Collections (B.M. no. C 24718 and C 32332), may unhesitatingly be identified with the variety *tenuicostata* of "*Hoplitides bodei*" of v. Koenen which is before me in a perfect Timmern (Brunswick) specimen (B.M. no. C 14367). Phillips's original figure being very poor, this species has been misinterpreted by most authors. It is what Yorkshire geologists have generally recorded as *Amm. deshayesi*, and it probably includes *D. dechyi* (Papp), Renngarten\*.

*Horizon and Localities.*—Lower Aptian, lower *deshayesi*-zone. Speeton, Yorkshire (upper part of bed B); Hunstanton, Norfolk (base of "Carstone"); Wicken, Cambs.

### 11. *Deshayesites bodei* (v. Koenen).

1902. *Hoplitides bodei*, v. Koenen, Ammonitiden des Norddeutschen Neocom. p. 221, pl. ix. figs. 1 a-c only.  
 1924. *Parahoplitooides bodei* (v. Koenen); Spath, pp. 78-9.

As restricted to v. Koenen's first example (*i. e.*, the coarsely ribbed forms), this species occurs together with the more abundant *D. fissicostatus* in Upper B at Speeton, as well as at the base of the Carstone of Hunstanton, but generally only in body-chamber fragments.

*Horizon and Locality.*—Lower Aptian, (lower?) *deshayesi*-zone, Speeton, Yorkshire (upper part of bed B); Hunstanton, Norfolk (base of "Carstone," B.M. no. C 26634, C 32333).

### 12. *Deshayesites* sp. n. ind.

1924. *Parahoplitooides tenuicostatus* (v. Koenen); Spath, Speeton Clay, p. 79.

This is a closely ribbed form of the group of *D. fissicostatus*, and was formerly included in v. Koenen's variety, because they occur together also at Timmern (Brunswick) and are connected by numerous transitions. Since the figured example of the var. *tenuicostata* of v. Koenen's *D. bodei*, however, is identical with the true *D. fissicostatus*, it may seem advisable to separate the still considerably more closely costate forms with a new name. They occur plentifully, though mostly in fragments, in the "Carstone" of Hunstanton, associated with passage-forms to *D. fissicostatus* on

\* *Loc. cit.* (Mém. Com. Géol. n. s. livr. cxlvii. 1926), p. 100, pl. ii. figs. 11, 12.

the one hand, and to the forms of the *læviusculus* group discussed below on the other.

*Horizon and Locality.*—Lower Aptian, lower *deshayesi*-zone, Speeton, Yorkshire (upper part of bed B); Hunstanton, Norfolk (base of "Carstone"); Wicken, Cambs.

### 13. *Deshayesites* aff. *læviusculus* (v. Koenen).

1901. *Hoplitides læviusculus*, v. Koenen, *loc. cit.* (Ammonitiden d. Norddeutschen Neocom.) p. 224, pl. viii. figs. 4 a, b, 5 a-c.  
 ? 1926. *Parahoplitoides læviusculus* (v. Koenen); Whitehouse, Cret. Ammonoidea, E. Australia, Mem. Queensland Mus. vol. viii. pt. 3, p. 206.

It is not certain at present whether either the Woodhatch forms previously\* recorded as *P.* spp. n. cf. *læviusculus* or the Carstone form listed under that name from Hunstanton† belong to v. Koenen's species. The former has fine sigmoidal striation, and shows more resemblance to the inner whorls of that author's larger figure, but it seems to remain small (e.g., B.M. no. C 29531). The Hunstanton type (B.M. no. C 32330 G. W. Lamplugh Coll., no. C 29614 H. le Strange Coll.), on the other hand, may be closer to v. Koenen's smaller specimen, and has the same suture-line, but it is less distinctly ribbed. As no German examples are at present available for comparison, and pending the publication of figures of the British forms of the *fissicostatus-bodei-læviusculus* group, the provisional identification must suffice.

Dr. Kitchin ‡ recorded *D. læviusculus* from the Dover Boring, associated with *D. deshayesi*. In the Isle of Wight comparable examples of the latter species have not been found below the Lower Lobster Bed (II b), so that the British forms here provisionally referred to *D. læviusculus* seem to occur at a higher horizon than the German types.

*Horizon and Localities.*—Lower Aptian, lower and middle *deshayesi*-zone, Hunstanton, Norfolk (base of "Carstone"); Wicken, Cambs; Woodhatch, near Reigate, Surrey; and Dover Boring, Kent ("Atherfield Clay").

\* G. W. Butler, "Perna Bed and Weald Clay at Reigate," Proc. Geol. Assoc. vol. xxxiii. 1922, p. 316. Spath, 'Monograph Ammonoidea of the Gault,' Pal. Soc. vol. for 1921 (1923), p. 66.

† Spath, "Ammonites of the Speeton Clay and the Subdivisions of the Neocomian," Geol. Mag. vol. lxi. 1924, p. 79.

‡ In Lamplugh and Kitchin, "Mesozoic Rocks in some of the Coal Explorations in Kent," Mem. Geol. Survey, 1911, p. 107.

Genus *DUFRENOYIA* (Burckhardt MS.), Kilian \*, 1915.

1. *Dufrenoyia furcata* (J. de C. Sowerby).

1836. *Ammonites furcatus*, J. de C. Sowerby, in Fitton, "Strata below the Chalk," Trans. Geol. Soc. (2) vol. iv. p. 339, pl. xiv. fig. 17.  
 1875. *Ammonites furcatus*, J. de C. Sowerby; Topley, Geology of the Weald, p. 421.  
 1913. *Hoplites furcatus* (Sowerby); Kilian, *loc. cit.* (Lethæa) p. 348 (pars).  
 1915. *Dufrenoyia furcata* (Sowerby); Kilian and Reboul, *loc. cit.*, Faune de l'Aptien infér. des Environs de Montélimar, pp. 37, 205.  
 1923. *Dufrenoyia furcata* (Sowerby); Spath, *loc. cit.* (Summary of Progress) p. 146.  
 1925. *Stenhoplites furcatus* (Sowerby); Spath, in Walton, Folkestone, p. 31.  
 1925. *Dufrenoyia furcata* (Sowerby); Burckhardt, "Aptiano de Nazas," Bol. Inst. Geol. Mexico, no. 45. p. 17.  
 1927. *Parahoplites (Dufrenoyia) furcatus*, J. Sow. (in Fitton); Roch, *loc. cit.*, Mém. Soc. Géol. France, n. s. vol. iv. p. 19.

This well-characterized species is not identical with *D. dufrenoyi* (d'Orbigny) †, as Kilian held. On account of its rarity it is probably represented in only few collections, and therefore often misinterpreted. The holotype (M.P.G. no. 2290, ex Geol. Soc. Coll.) is merely a body-chamber cast, with the impression of the inner whorls preserved in the matrix. A similar fragment (B.M. no. C 2532) from "East of Ladder Chine" has a slightly wider whorl-side, and is thus transitional to *D. truncata*, described below.

A coarsely ribbed variety (M.P.G. no. 25503) has only six long and distant costæ, with two short intermediaries, on nearly half a whorl of body-chamber. A smaller fragment of probably the same variety has also been found at the base of the "Carstone" of Hunstanton (Mr. Lamplugh's collection in the British Museum, no. C 32331).

Roch, who, like Kilian, united *D. furcata* and *D. dufrenoyi*, stated that this typically Gargasian (*i. e.*, Upper Aptian) species occurred already in the Upper Bedoulian, associated with *Deshayesites consobrinus*. The British forms are also probably all of Upper Eo-Aptian age, and Kilian's ‡ "*furcatus*-zone" I have on a previous occasion § been obliged to reject.

*Horizon and Localities.*—Lower Aptian, upper *deshayesi*-zone, Hythe, Kent (Hythe Beds); Isle of Wight ("East of

\* Burckhardt, in 1925, adopted the spelling "*Dufrenoyia*."

† Pal. Française, Ter. Crét. (1841) p. 200, pl. xxxiii. figs. 4-6.

‡ *Loc. cit.* (Lethæa, 2, 1910) p. 287 (table).

§ *Loc. cit.* (Summary of Progress, 1922) 1923, p. 147.

Ladder," by the matrix not lower than bed IV); Hunstanton, Norfolk (base of "Carstone"). The record of this species from the *Perna*-bed (in Fitton\*) must be questioned.

2. *Dufrenoyia lurenensis* (Kilian). (Pl. XV. fig. 4.)

1888. *Hoplites lurenensis*, Kilian, "Sur quelques Fossiles du Crét. Infér. de la Provence," Bull. Soc. Géol. France, [3] vol. xvi. p. 681, pl. xx. figs. 2 a, b.

1913. *Hoplites lurenensis*, Kilian, *loc. cit.* (Lethæa) p. 348, pl. viii. figs. 8 a, b (pl. x. fig. 5 ?).

1925. *Dufrenoyia lurenensis* (Kilian); Burckhardt, *loc. cit.* (Bol. Inst. Geol. Mexico, no. 45) p. 17.

The unique British example here figured shows half a whorl of body-chamber, and on the septate earlier half the suture-line is well displayed. It differs from that of *D. dufrenoyi* † only in minor details. *D. furcata* (Sowerby) has a less coarsely ribbed body-chamber.

*Horizon and Locality.*—Lower Aptian, upper *deshayesi*-zone (Hythe Beds), Hythe (Manchester Mus. no. L 11607, ex Dixon Coll.).

3. *Dufrenoyia truncata*, sp. n. (Pl. XVI. figs. 4 a, b, c.)

*Type.*—The Hythe example (Manchester Museum, no. L 11606), figured in Pl. XVI. fig. 4 b.

*Diagnosis.*—Coiling subplaty-, subleptogyral, subangust-umbilicate. Whorl-sides flattened, with gentle umbilical slope; venter truncate. Alternate long and short ribs, flattened on outer half and ending at ventral edge with a slight clavus, but symmetrically connected across periphery (in adult only) with ribs of opposite side. In the young the venter is first arched, with sigmoidal ribs of the sides almost meeting; then smooth siphonal band becomes wider, and the edges of smooth venter are fully developed at about 15 mm. diameter. Suture-line probably similar to that of *D. furcata*.

*Measurements.*—

|  |    |     |     |     |
|--|----|-----|-----|-----|
| Holotype (Pl. XVI. fig. 4 b) . . . . . | 36 | ·47 | ·30 | ·27 |
| B. M. no. 62154 . . . . .              | 65 | ·43 | ·29 | ·27 |

*Remarks.*—This form, like the less compressed *D. furcata*, generally occurs as casts of body-chambers, but the small specimen figured in Pl. XVI. fig. 4 a is probably complete.

\* *Loc. cit.* (Quart. Journ. Geol. Soc. vol. iii. 1847) p. 293.

† Figured in Sarasin, "Quelq. consid. sur les genres *Hoplites*, *Sommeratia*, &c.," Bull. Soc. Géol. France [3], vol. xxv. p. 768, pl. ii. fig. 6 (enlarged × 3).

It shows the simple suture-line and over half a whorl of body-chamber, with the plain mouth-border (on the side not figured). The larger fragment listed as no. 2 in the above table of measurements is almost identical with the body-chamber figured in Pl. XVI. fig. 4c (M.P.G. no. 30920), and the peripheral view might have been taken from either.

*D. dufrenoyi* (d'Orbigny), according to specimens in the British Museum, differs from the present species in having the typically flattened and transversely ribbed venter already at a stage when *D. truncata* still resembles *Deshayesites*; but the two species are sufficiently close to make it unnecessary to adopt a separate generic name ("*Stenhoplites*," Spath, 1922 \*) for the *furcatus* group.

A new Colombian species (B.M. no. 46561 a), which I had previously considered to belong to the group of the more evolute *Hemihoplites feraudianus*, d'Orbigny sp. †, does not differ greatly from the form here described, and may well represent a passage-form. The "*Dufrenoya*" *stuebeli* (Gerhardt), figured by Burckhardt ‡, is also similar, but Mayer-Eymar's § *Hoplites somalicus*, also transitional from *Hemihoplites* to *Dufrenoyia* and *Deshayesites* is more evolute.

*Horizon and Locality*.—Lower Aptian, upper *deshayesi*-zone (Hythe Beds), Hythe, Kent.

#### Genus PARAHOPLITES, Anthula, 1899, emend.

##### 1. *Parahoplites nutfieldiensis* (J. Sowerby).

(Text-fig. b, p. 438.)

1815. *Ammonites nutfieldiensis*, J. Sowerby, Min. Conchology, vol. ii. p. 11, pl. cviii.  
 1845. *Ammonites nutfieldiensis*, J. Sowerby; Forbes, *loc. cit.* (Quart. Journ. Geol. Soc. vol. i.) p. 353.  
 1869. *Ammonites nutfieldiensis*, J. Sowerby; Meyer, "Lower Greensand of Godalming," Geol. Assoc. p. 16.  
 1875. *Ammonites nutfieldiensis*, J. Sowerby; Topley, "Geology of the Weald," Mem. Geol. Survey, p. 421.  
 1921. *Parahoplites nutfieldiensis* (J. Sowerby); Spath, in L. Dudley Stamp, "Excursion to Tilburstow Hill, &c.," Proc. Geol. Assoc. vol. xxxii. p. 31.  
 1925. *Parahoplites nutfieldiensis*, J. Sowerby; Spath, *loc. cit.* (Summary of Progress) p. 146.

Sowerby's figure of this species, while not obviously wrong, was not drawn with his customary accuracy. The holotype

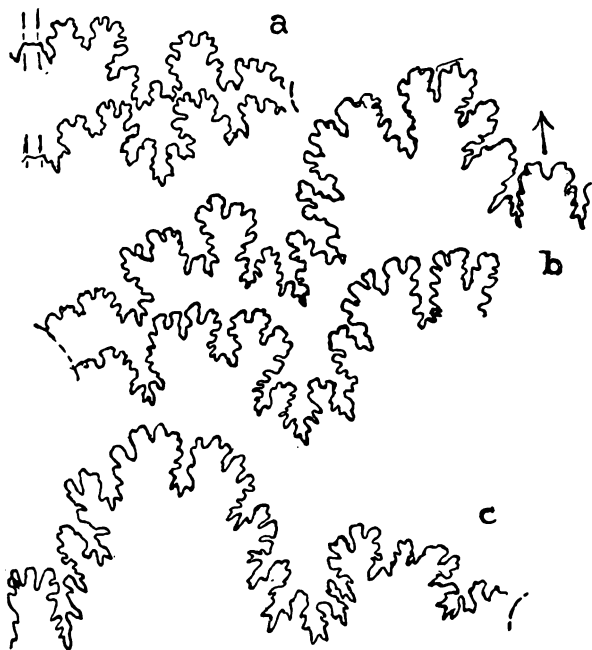
\* See Spath, *loc. cit.* (Summary of Progress for 1922) 1923, pp. 146, 147 (footnote). *D. furcata* there should have been described as of "*pre-dufrenoyi*" age, not "*pre-deshayesi*" age.

† *Loc. cit.* (Pal. Française) 1841, p. 324, pl. xcvi. figs. 4-5.

‡ *Loc. cit.* (Bol. Inst. Geol. Mexico, no. 45, 1925) p. 18, pl. x. figs. 5-6.

§ "Neocom-Versteinerungen a. d. Somali Land," Vierteljahrsschr. Naturf. Ges. Zürich, vol. xxxviii. 1893, p. 11, pl. ii. figs. 5-6.

(B.M. no. 43882) had been recognized already by Crick\* as differing so considerably from the figure that he added "If the figured specimen, figure has been much restored." There is no dearth, however, of fairly well-preserved examples of this species, and it is hoped that an illustration of one of the large specimens known from Nutfield and the Bargate Stone of Surrey, or from Seend in Wiltshire, may



External suture-lines (natural size) of (a) *Deshayesites consobrinus* (d'Orbigny). Lower Aptian, Atherfield, Isle of Wight (B.M. no. C 993); (b) *Parahoplites nutfieldiensis* (J. Sowerby), from the Upper Aptian of Seend, Wilts (M.P.G. no. 30970); (c) *Parahoplites*, sp. n., same locality (B.M. no. 88723).

soon be given. Meanwhile, the last two suture-lines of a specimen from the last locality (with nearly half a whorl of body-chamber and proportions: 150, '50, '42, '25) are here figured (text-fig. b).

The form is close to *P. maximus*, Sinzow †, which at a diameter of 180 mm. has costation resembling that of the

\* 'List of Types and Figured Specimens of Fossil Cephalopoda in the British Museum,' 1898, p. 22.

† *Loc. cit.* ('Ammonitiden Unt. Gault Mangyschlaks') 1907, p. 464, pl. i. figs. 1-3.

immature *P. nutfieldiensis*. In the adult, or even while still entirely septate (at diameters of 100–300 mm.), the latter species acquires more closely-set primaries, as well as secondaries, and the whorl-section is more rounded and the periphery wider at all stages.

*Horizon and Localities.*—Upper Aptian, *subnodosocostatum*-zone, Nutfield, Surrey; Godalming and neighbourhood (Bargate Stone); Pulborough, Sussex; Seend, Wilts. A Hythe specimen in the Manchester Museum (no. L. 12046, in Dixon Coll.) is preserved in a bright green glauconitic sandstone.

## 2. *Parahoplites* aff. *campichei* (Pictet & Renevier), Sinzow.

1907. *Parahoplites campichei* (Pictet & Renevier); Sinzow, Untersuchung Ammonitiden Mangyschlaks, &c., *loc. cit.* p. 460, pl. i. fig. 4.

Associated with typical *P. nutfieldiensis* and allied forms at Seend, Wiltshire, there occur specimens (*e.g.*, B.M. no. 88723 *b*) that are more closely comparable to the large Russian form figured by Sinzow than to Pictet and Renevier's \* diagrammatic figure. The inner whorls, however, are not quite so compressed, differing, in fact, little from those of *P. nutfieldiensis*. There are some British examples that in their finer costation and narrower umbilicus may be compared to the smaller specimen figured by Sinzow (*loc. cit.* pl. i. fig. 6), but their greater general resemblance to *P. nutfieldiensis* makes it probable that they represent merely a more densicostate form of the same group, which also includes *P. uhligi*, Anthula †. The suture-line of one example (B.M. no. 88723) of this unnamed form is represented in text-fig. *c*.

A larger example (M.P.G. no. 30971) of probably the same form as the first is still septate at 140 mm. diameter, but slightly crushed on one side, which shows a peculiarly flexiradiate costation. This specimen also shows close agreement with Sinzow's larger figure (Pl. XIV. fig. 4), as does a Compton (Bargate Stone) example of over 200 mm. diameter (B.M. no. C 25728).

A new form of the same group, to be figured later, is from the green rock at Hythe that also yielded the *P. nutfieldiensis*, recorded above (Manchester Museum, no. L 12047).

*Horizon and Localities.*—Upper Aptian, *subnodosocostatum*-zone, Nutfield, Surrey, and Seend, Wiltshire.

\* "Aptien de la Perte du Rhône, etc.," *Mat. Pal. Suisse*, i. pl. ii. fig. 2.

† "Kreide des Kaukasus," *Beitr. Pal. Österr.-Ungarns*, vol. xii. 1899, p. 114, pl. x. fig. 1.

3. *Parahoplites simmsi* (Forbes), nov. (Pl. XIV. figs. 1 a, b.)  
 1845. *Ammonites nutfieldiensis*, Sowerby, var. *simmsii*\*, Forbes, *loc. cit.*,  
 Quart. Journ. Geol. Soc. vol. i. p. 353.  
 1923. *Parahoplites* (*Acanthoplites*?) *simmsi* (Forbes), Spath, *loc. cit.*  
 (Summary of Progress) p. 146.  
 1925. *Parahoplites* (*Acanthoplites*?) *simmsi* (Forbes), Spath, "Notes  
 on Ammonites, &c.," in Walton, 'Folkestone,' p. 31.

The holotype, not previously figured, has dimensions:—86, .41, .41, .35. Forbes's original description of this variety (correctly believed to be "perhaps a distinct species") was as follows:—"Inner volutions more exposed, outer whorl narrower [than in *Amm. nutfieldiensis*], ribs strong and acute." In view of the poor state of preservation of the holotype little can be added to this description, and no additional examples of this species appear to have been found. The matrix is identical with that of *Parahoplites nutfieldiensis* and allies from Seend in Wiltshire. Sowerby recorded a specimen of *Amm. nutfieldiensis* from Hythe, preserved in a different matrix, namely "Greensand," which may be the example in the Dixon Collection referred to above; but I have not seen any ammonites from the "brown ferruginous sandstone, with nodules, at the base of the Folkestone Sands," referred to on previous occasions.

This species was formerly stated to resemble *Acanthoplites ashiltaensis*, Anthula †, but there is no evidence that the inner whorls were tuberculate, and there are a number of comparable *Parahoplites* that develop a similar outer whorl, also *Colombiceras* of the type of *C. karsteni* (Marcou ‡), although in the latter the costæ are peculiarly flattened. The only British example known to me that could be attached to the genus *Colombiceras* (of the *crassicostatum*-group) is the fragmentary ammonite figured by Keeping § as "*Ammonites cornuelianus*." Forms of the *crassicostatum* and *gargasense* type, according to Kilian ||, characterize the lower zone of the Upper Aptian, and "*Acanthoplites*" *tobleri* (Jacob) ¶ the uppermost zone. The last species also shows superficial resemblance to *P. simmsi*, but it is distinctly

\* Named after Mr. W. F. Simms, F.G.S. (see Quart. Journ. Geol. Soc. vol. i. 1845, p. 76).

† "Kreide des Kaukasus," Beitr. Pal. Österr.-Ungarns. vol. xii. 1899, p. 117, pl. x. figs. 2-4.

‡ See Karsten, 'Géologie de l'ancienne Colombie, &c.,' 1886, pl. v. fig. 1.

§ *Loc. cit.* (1883) p. 89, pl. i. figs. 9 a-c.

|| *Loc. cit.* (Lethæa, iii. 1913) p. 350.

¶ *Loc. cit.* (Mém. Soc. Pal. Suisse, vol. xxxiii. 1906, p. 11, pl. ii. figs. 4 a, b).



transitional between the *Parahoplites* and *Colombiceras* of the *nutfieldiensis* subzone and the Lower Albian forms that become abundant in post-*ashiltaensis* (or *tobleri*) times, or what I called the Acanthoplitan age.

*Horizon and Locality.*—Upper Aptian, *subnodosocostatum*-zone, Kent coast ("Hythe").

4. *Parahoplites sussexensis*, sp. n. (Pl. XVI. fig. 1.)

*Type.*—The Pulborough example (M.P.G. no. 46131) figured in Pl. XVI. fig. 1.

*Diagnosis.*—Coiling subplaty-pachygyral; subangustum-bilicate. Whorl-section greatly depressed, transversely oval, with the ventral area not definitely separated off from the rounded sides. Ribbing sharp, irregularly long and short, and slightly sigmoidal, continuous across the periphery with a forward sinus. Suture-line unknown.

*Measurements.*—

Holotype (M. P. G. 46131) . . . . . 50 .42 .54 .28

*Remarks.*—This species belongs to the same group as the form here described as *P. cf. multicostatus* (Sinzow), and it is possible that the young example figured in Pl. XVI. fig. 2 may turn out to represent its immature stage, in spite of its apparently less sharp type of ribbing. The externally similar forms described by Sinzow seem to have not only different ribbing but a different whorl-shape, so that a new specific name may be suggested for the Pulborough form, in spite of the fact that its inner whorls and suture-line are as yet unknown.

*P. melchioris*, Anthula\*, differs chiefly in its less acute ribbing, which is also more regular.

It would appear that forms of this type are not confined to the uppermost Aptian, but still occur in the lowest Albian.

*Horizon and Locality.*—Upper Aptian, *subnodosocostatum*-zone, Pulborough, Sussex (Sandgate Beds?) †.

5. *Parahoplites cf. multicostatus*, Sinzow.

1907. *Parahoplites multicostatus*, Sinzow, "Ammonitiden aus dem Unt. Gault Mangyschlaks, &c.," *loc. cit.* p. 459, pl. ii. figs. 5-11.

This variable species is a close ally of the genotype of *Parahoplites*, namely, *P. melchioris*, Anthula, but the only

\* *Loc. cit.* (1899) p. 112, pl. viii. figs. 4-5.

† See Elsdon, "Excursion to Pulborough," Proc. Geol. Assoc. vol. xvii. 1901, p. 185.

English examples known are not well enough preserved for definite identification. The most typical specimen (B.M. no. 10783), a crushed body-chamber fragment comparable to Sinzow's fig. 6 but slightly larger, is unfortunately not localized. More doubtful fragments are from Shanklin (B.M. no. C 2533) and Sevenoaks (B.M. nos. C 8280 *a, b*); the latter differ from the immature form here figured (Pl. XVI. fig. 2) in a more pronounced peripheral sinus. A Harsum (Hanover) example of *P. schmidti*, Jacob\*, in the British Museum (No. C 14359) differs chiefly in its more distant costation.

*Horizon and Locality.*—Upper Aptian, upper *subnodosocostatum*-zone. Shanklin, Isle of Wight; Sevenoaks, Kent; Nutfield, Surrey (B. M. no. C 22640).

6. *Parahoplites* sp. juv. (Pl. XVI. fig. 2.)

The small example here figured has dimensions 25, .40, .52, .25, and thus differs but little from the inner whorls of Sinzow's *Parahoplites multicostatus*, pars (Pl. XV. figs. 7, 8), but its ribbing is different from that of the young *P. multicostatus* figured by Sinzow in his pl. ii. fig. 11. In the English form, at 10 mm. diameter already, there are prominent flexicostæ with a distinct peripheral sinus forward; also on the earlier half of the outer whorl two intercalated ribs between a pair of long costæ are of more frequent occurrence than merely one intermediary.

*Horizon and Locality.*—Upper Aptian, upper *subnodosocostatum*-zone. Isle of Wight (Sandrock Series?).

Family II. *Cheloniceratidæ*, Spath, 1923.

Genus *PROCHELONICERAS*, Spath, 1923.

1. *Procheloniceras* cf. *albrechti-austriæ* (Hohenegger MS.), Uhlig.

1882. *Acanthoceras albrechti-austriæ* (Hohenegger in coll.), Uhlig, *loc. cit.* (Wernsdorfer Schichten) p. 253, pl. xx. fig. 13, pl. xxii., pl. xxiii. fig. 1.

1915. *Douvilleiceras albrechti-austriæ* (Hohenegger), Uhlig sp., Kilian & Reboul, *loc. cit.* (Aptien inférieur Montélimar) p. 57, pl. i. fig. 16, pl. iii. fig. 5, pl. viii. fig. 3.

1924. *Cheloniceras albrechti-austriæ* (Hohenegger), Spath, *loc. cit.* (Speeton Clay) p. 79.

What I would consider one of the most typical fragments of this species was collected loose at Atherfield (L.F.S. no. 523), but its gritty matrix is not characteristic of any

\* *Loc. cit.* (Mém. Soc. Pal. Suisse, vol. xxxiii.) 1906, p. 12, pl. ii. figs. 7-8.

one bed, although it agrees with that of specimens from "top IV" and of a *Chelonicer* cf. *cornuelianum* from V or VI. In view of the similarity of fragments of this species to forms like "*Ammonitoceras*" cf. *transcaspium* (Sinzow), discussed below, and to outer whorls of *Chelonicer* of the *cornuelianum* group, records of this form are perhaps not reliable, especially since the species has been differently interpreted by authors like Kilian \*, Sinzow †, and Roch ‡.

The fragment from the Atherfield Clay in the Dover Boring, discussed by Dr. Kitchin §, may be referable to the present form, but it also cannot be definitely identified. It was compared to a large example figured by v. Koenen ||, but this was included by Kilian and Reboul ¶ in their "*Douvilleicer* *pachystephanum*" (Uhlig).

*Horizon and Localities.*—Lower Aptian, *deshayesi*-zone, Atherfield, Isle of Wight; Dover Boring ("Atherfield Clay"), and (?) Hunstanton, Norfolk (base of "Carstone").

## 2. *Prochelonicer* cf. *pachystephanus* (Uhlig).

1882. *Acanthoceras pachystephanus*, Uhlig, "Cephalopoden-Fauna der Wernsdorfer Schichten," Denkschr. Akad. Wiss. Wien, Math. Naturw. Cl. vol. xlvi. p. 255, pl. xxiv. figs. 1-2.  
 1913. *Douvilleicer* *pachystephanus* (Uhlig), Kilian, *loc. cit.* (Lethæa) p. 340.  
 1915. *Douvilleicer* *pachystephanus* (Uhlig), Kilian & Reboul, *loc. cit.* (Aptien Inférieur Montélimar) p. 61, pl. iii. fig. 4, pl. iv. fig. 7, pl. viii. fig. 4.

A small body-chamber portion of an ammonite, resembling the final stage of Uhlig's uncompressed holotype, is provisionally referred to this species, but other forms of *Prochelonicer* might produce similar fragments. This example is listed separately only because it comes from the true Atherfield Clay, in the flat, red, ironstone-nodules of which ammonites seem to be extremely rare.

*Horizon and Locality.*—Lower Aptian, lower *deshayesi*-zone (II a). Atherfield, Isle of Wight.

## 3. *Prochelonicer* ? sp. ind. (Pl. XVII. fig. 4.)

The plaster cast of an umbilical impression here figured is interesting, because, apart from the large fragment of *P.* cf. *pachystephanus* (Uhlig) recorded above, it is the only

\* *Loc. cit.* (Lethæa) 1913, p. 339, pl. viii. fig. 2.

† *Loc. cit.* (*Douvilleicer*-Arten) 1906, p. 167, pl. iv. figs. 1, 2.

‡ *Loc. cit.* (Aptien Bedoule, 1927) p. 20, pl. ii.

§ In Lamplugh and Kitchin, "Mesozoic Rocks in some of the Coal Explorations in Kent," Mem. Geol. Survey, 1911, p. 108.

|| *Loc. cit.* (Ammonitiden Nordd. Neocom. 1902) pl. xli. fig. 1.

¶ *Loc. cit.* (1915) p. 61.

ammonite known to me from the true Atherfield Clay. The inner whorls seem to be merely costate, not tuberculate, so that the identification must remain uncertain, and comparable umbilical impressions of *Parahoplitoides* (e.g., L.F.S. no. 718, from "top IV.") are not strikingly different.

*Horizon and Locality.*—Lower Aptian, lower *deshayesi*-zone (II a). Atherfield, Isle of Wight.

## Genus CHELONICERAS, Hyatt, 1903.

### 1. *Cheloniceras hambrovi* (Forbes).

1845. *Ammonites hambrovi*, Forbes, *loc. cit.* (Quart. Journ. Geol. Soc. vol. i.) p. 354, pl. xiii. fig. 4.  
 1847. *Ammonites hambrovi*, Forbes; Fitton, *loc. cit.* (Quart. Journ. Geol. Soc. vol. iii.) p. 299.  
 1875. *Ammonites hambrovi*, Forbes; Topley, *Geology of the Weald*, p. 421.  
 1913. *Douvilleiceras hambrovi* (Forbes), Kilian, *loc. cit.* (Lethæa) p. 340.  
 1921. *Cheloniceras hambrovi* (Forbes), Spath, *loc. cit.* (Zululand) p. 317, pl. viii. fig. 3.

This species is represented by numerous examples, and it may safely be stated that there are no two specimens identical. In the young there is great resemblance to *Ch. royerianum* (d'Orbigny), but the principal ribs are coarser and the accompanying varices are not so regular as in d'Orbigny's drawing, whilst the intervening spaces are faintly or sometimes even distinctly ribbed in Forbes's species. One large example (M.P.G. no. 30947), at over 140 mm. diameter, has about thirteen coarse umbilical bulges, as against only about eight in the much smaller lectotype. The finest specimen of all, however, from the Saxby Collection (B.M. no. 46588), of nearly 200 mm. diameter, shows that on the body-chamber the ribs tend to become single, so that this specimen shows sixteen inner bullæ. No small specimens are known from beds higher than III, but there are some gigantic examples of *Cheloniceras* from the Isle of Wight (preserved in a reddish-brown ferruginous sandstone, which must be above the top of the Lower Aptian, that combine an inflated whorl-shape with single blunt costation. In spite of their resemblance to the adult *C. hambrovi*, these large forms probably represent fully grown *Cheloniceras* of the type of *C. crassum*, described below, but their inner whorls are not preserved.

A particularly coarse variety (var. *horrida*, nov.) has only five exaggerated bulges, overhanging the deep umbilicus at a diameter of 54 mm. The type of this var. *horrida* is apparently complete, with about half a whorl of

body-chamber, and its early *royerianum*-stage and the succeeding *perli*-stage are reduced to a minimum.

The adult suture-line figured by Forbes is fairly correct, although it looks somewhat unusual; the suture-line of a young example was figured by myself in 1921. On account of its apparent restriction to beds II *b* and III in the Isle of Wight, I\* took the present species as characteristic of the middle *deshayesi*-beds (*hambrovi*-subzone).

The inner whorls of the form figured by Sinzow (*loc. cit.* 1906, p. 162, pl. i. fig. 7) as *Douvilleiceras meyndorffi* (d'Orbigny) are not comparable to the present species as Sinzow thought.

*Horizon and Locality.*—Lower Aptian, middle *deshayesi*-zone (*hambrovi*-subzone). Atherfield (beds II *b*–III *b*). Kilian and Reboul † cited this species from the Bedoulian of the south of France; Corroy ‡ listed it from Gurgy (Yonne).

## 2. *Chelonicerias perli*, sp. n. (Pl. XVI. fig. 6.)

*Type.*—A body-chamber fragment (M.P.G. no. 31046) from Atherfield, Isle of Wight.

*Diagnosis.*—Coiling subplaty-pachygyral, sublatumbilicate. Whorl-section transversely oval, greatly depressed; venter widely arched and evenly rounded. Inner whorls probably like those of *Ch. hambrovi*; the ornament soon changes to more or less regularly alternating long and short ribs, blunt and without distinct nodes at the umbilical end. Suture-line unknown, probably as in *Ch. hambrovi*.

### *Measurements.*—

|                             |    |     |     |     |
|-----------------------------|----|-----|-----|-----|
| Holotype (M.P.G. no. 31046) | 37 | ·39 | ·57 | ·35 |
|-----------------------------|----|-----|-----|-----|

*Remarks.*—This species is close to *Ch. hambrovi* (Forbes), and is connected therewith by transitions (*e.g.*, M.P.G. no. 38046), in which the whorl-section may become as little inflated as in the present form and the ribbing more regular. Another specimen (M.P.G. no. 31047) has even more uniform costation than the holotype of the present species, but it is still costate at nearly 50 mm. diameter, and is so badly worn that it could represent merely the inner whorls of a large *Ch. hambrovi*, with the post-*royerianum* (or “*perli*”) stage unusually prolonged and accidentally preserved.

*Horizon and Locality.*—Lower Aptian, middle *deshayesi*-zone (*hambrovi*-subzone). Atherfield (beds II *b*–III *b*).

\* *Loc. cit.* (Summary of Progress, 1922) 1923, p. 147.

† *Loc. cit.* (Aptien Inférieur Montélimar, 1915) p. 50.

‡ *Loc. cit.* (Neocomien Bassin Paris, 1925) p. 309.

3. *Cheloniceræ* aff. *gottschei* (Kilian).

1902. *Acanthoceras* (*Parahoplites*) *martini*, d'Orbigny, sp., var. *gottschei*, Kilian, "Aptien in Südafrika," Centralbl. f. Min. &c., p. 465.
1910. *Douvilleiceræ* *martini*, var. *gottschei*, Kilian; Krenkel, "Apt-fossilien der Delagoa Bai," Neu. Jahrb. f. Min. &c. (i.) p. 144, pl. xvii. figs. 4, 5, 8, 9.
1921. *Cheloniceræ* *gottschei* (Kilian), Spath, *loc. cit.* (Zululand) p. 312.
1925. *Douvilleiceræ* *martini* (d'Orbigny), var. *gottschei*, Kilian; Burckhardt, *loc. cit.* (Bol. Inst. Geol. Mexico, no. 45) pp. 25, 32.

An example (M.P.G. no. 30969) of about 75 mm. diameter unfortunately only shows the costate body-chamber and traces of the bituberculate inner whorls; but, as far as can be judged, this badly preserved specimen may well be attached to Kilian's form, and shows considerable likeness to the South African specimen figured by the writer in 1921. The species was then discussed in detail.

Another incomplete example (M.P.G. no. 30914), with the bituberculate inner whorls preserved as an impression, shows great resemblance to the Delagoa Bay specimen figured by Krenkel, with merely traces of the earlier tuberculation remaining, and a fairly regular alternation of long and short costæ on the body-chamber.

A specimen in the British Museum (no. 46590 from the Saxby Collection) was previously stated to be almost indistinguishable from the South African example in ornamentation and in suture-line, but to show a more rapid increase in width of the whorl-section. This specimen may be considered to be a passage-form to *Ch. hambrovi*, and it differs from *Ch. perli* chiefly in its wider umbilicus and larger size.

*Horizon and Localities.*—Lower Aptian (Upper?) *deshayesi*-zone. Isle of Wight and Kent Coast (Hythe Beds).

4. *Cheloniceræ* aff. *meyendorffi* (d'Orbigny).

1844. *Ammonites* *meyendorffi*, d'Orbigny, in Murchison, Verneuil, and Keyserling, Géologie de la Russie, &c., vol. ii. p. 428, pl. xxxii. figs. 4-5.
1906. *Douvilleiceræ* *meyendorffi* (d'Orbigny), Sinzow, *loc. cit.* (*Douvilleiceræ* Arten), p. 161, pl. i. figs. 7-9.

A Hythe example (M.P.G. no. 30962) shows resemblance to the large specimen figured by Sinzow, but the characteristic small saddle that subdivides the broad first lateral lobe is wider and more quadrate in the English example. Its position, however, similarly coincides with that of the prominent outer tubercle, whilst the inner node is comparably faint and blunt. The ventral area is slightly less wide than

in the Russian specimen, but the whorl-thickness is 66 per cent. of the diameter, and there is an indication of macrocephalic widening of the aperture. The specimen, however, is still septate at 90 mm. diameter.

In a number of comparable specimens (*e.g.*, B.M. no. C 565) from the Ferruginous Sands of the Isle of Wight the tubercles are smaller, and they may thus represent passage-forms to *Ch. cornuelianum*, although this has fewer secondary costæ, at least in smaller specimens, and a less inflated whorl-shape.

*Horizon and Localities.*—Lower Aptian, upper *deshayesi*-zone. Isle of Wight (Ferruginous Sands) and Kent Coast (Hythe Beds).

### 5. *Chelonicerus cornuelianum* (d'Orbigny).

1841. *Ammonites cornuelianus*, d'Orbigny, Pal. Française, Terr. Crét. p. 364, pl. cxii. figs. 1-2.  
 1875. *Ammonites cornuelianus*, d'Orbigny; Topley, Geology of the Weald, *loc. cit.* p. 421.  
 1889. *Ammonites cornuelianus*, d'Orbigny; Bristow &c., Geology Isle of Wight, 2nd ed. p. 266.  
 1915. *Douvilleicerus cornuelianum* (d'Orbigny), Kilian & Reboul, *loc. cit.* (Aptien Inférieur Montélimar) p. 52.  
 1915. *Douvilleicerus cornueli* (d'Orbigny), Nikchitch, "Douvilleicerus de l'Aptien du Caucase," Mém. Com. Géol. n. s. livr. cxxi. p. 10, pl. i. figs. 1-5.  
 1924. *Chelonicerus cornuelianum* (d'Orbigny), Spath, *loc. cit.* (Speeton Clay) p. 79.  
 1925. *Chelonicerus cornuelianum* (d'Orbigny), Spath, *loc. cit.* (in Walton, Folkestone) p. 31.  
 1925. *Chelonicerus cornuelianum* (d'Orbigny), Dutertre, *loc. cit.* (Ann. Soc. Géol. Nord, vol. xlix.) p. 240.

This well-known species is abundantly represented. Typical specimens of the size of d'Orbigny's holotype are easily identified, but at larger diameters the number of inner tubercles increases considerably, and the ribs of the umbilical wall are very oblique and inclined backwards. This is particularly noticeable in umbilical casts (*e.g.*, L.F.S. no. 639, from Whale Chine), although these cannot, perhaps, be definitely identified. At the same time the secondaries multiply, and finally only single and untuberculate ribs remain. The identification of isolated body-chambers is thus very difficult.

Some poorly preserved specimens from the Ferruginous Sands of the Isle of Wight (*e.g.*, B.M. no. C 888) resemble the outer whorl of the evolute variety figured by Sinzow\*,

\* *Loc. cit.* (*Douvilleicerus*-Arten, 1906) p. 158, pl. i. fig. 1.

but on account of the presence of a distinct peripheral tubercle there is less danger of confusion with the somewhat similar evolute *Procheloniceras albrechti-austriae* (e. g., B.M. no. 73585). On the other hand, a large Hythe example in the British Museum has similar overhanging inner and small outer tubercles. *Crioceras* (*Ammonitoceras*) *transcaspium*, Sinzow, discussed below, would probably also develop a similar outer whorl. Some fragmentary and crushed examples (M.P.G. nos. 37727-8) of the same type, said to be from the "Undercliff," Isle of Wight, and preserved in a light glauconitic matrix, may also belong to this form.

The "*Amm. cornuelianus*" from Upware figured by Keeping has already been referred to (see p. 440) as belonging to quite a different group.

*Horizon and Localities.*—Lower Aptian, upper *deshayesi*-zone, and lower part of Upper Aptian. Isle of Wight (Ferruginous Sands), Kent Coast (Hythe Beds), Bensted's Quarry, Aylesford, and Hunstanton, Norfolk (base of "Carstone"). A transition to *Ch. crassum* from the Toulmin Smith Collection (B.M. no. 48061) is from Boughton, near Maidstone, Kent.

#### 6. *Cheloniceras kiliani* (v. Koenen).

1902. *Acanthoceras kiliani*, v. Koenen, *loc. cit.* (Ammonitiden Nordd. Neocom.) p. 406, pl. xxxiii. figs. 1-3.  
 1915. *Douvilleiceras kiliani* (v. Koenen), Kilian & Reboul, *loc. cit.* (Aptien Inférieur Montélimar) p. 51.  
 1921. *Cheloniceras kiliani* (v. Koenen), Spath, *loc. cit.* (Zululand) p. 314.

This species does not seem to differ much from *Ch. cornuelianum* (d'Orbigny), but is now retained for those examples (e. g., L.F.S. no. 924) in which bituberculation is lost comparatively early and is replaced by very irregular costation, with scarcely two consecutive ribs of a similar thickness. In the case of very large examples, such as are known from the Isle of Wight, specific distinction from other forms of *Cheloniceras* may be impossible.

In a Hunstanton specimen in the Lamplugh Collection (B.M. no. C 32334) the *royerianum*-like inner whorls are shown, and the costation is more irregular than that of the associated *Ch. cornuelianum* (e. g., B.M. no. C 26236), already at a small diameter. *Ch. seminodosum* (Sinzow), from the same deposit, is less tuberculate.

An example from Mr. Perl's collection (no. 644, marked "just below top of VII, at Ladder Chine") is more inflated than v. Koenen's type.



*Horizon and Locality.*—Lower Aptian (upper *deshayesi*-zone) and base of Upper Aptian (*martini*-zone). Isle of Wight (Ferruginous Sands); Hunstanton, Norfolk (base of Carstone).

7. *Chelonicerias crassum*, sp. n. (Pl. XV. fig. 6.)

*Type.*—The Hythe example in the Manchester Museum (no. L 11605) here figured.

*Diagnosis.*—Like *Ch. cornuelianum* (d'Orbigny), but with coarser and more distant ribbing, wider periphery, and greatly exaggerated lateral tuberculation. Suture-line with median saddle of the lateral lobe outside rather than inside position of lateral tubercle.

*Measurements.*—

|   |    |     |     |     |
|---|----|-----|-----|-----|
| Holotype (Pl. XV. fig. 6) . . . . .                                   | 75 | ·40 | ·71 | ·33 |
| B. M. no. 48061 (transition to<br><i>Ch. cornuelianum</i> ) . . . . . | 85 | ·40 | ·68 | ·35 |

*Remarks.*—This species is connected with the last and *Ch. cornuelianum* by various passage-forms (*e.g.*, M.P.G. no. 30963), and, like these two forms, it loses its extremely pronounced tuberculation at larger diameters. An example (B.M. no. C 2561), of over 100 mm. diameter, with nearly half a whorl of body-chamber shows smaller and more irregular tubercles near the end; but in the case of very large examples, such as those mentioned on p. 444, specific identification would be difficult without breaking up the specimens. In fragments of a gigantic Hythe specimen, for example (B.M. no. C 8030), it is only the great whorl-thickness (140 mm., as compared with a height of 60 mm. in the median plane) that suggests reference to *Ch. crassum*, since other fragments (*e.g.*, B.M. no. 5921), doubtfully attached to *Ch. cornuelianum*, are far less depressed.

In a Hunstanton fragment (B.M. no. C 29618), with the whorl-thickness more than double the height, the internal as well as the external suture-lines are visible. The latter agree with the suture-line of *Ch. cornuelianum* (d'Orbigny) figured by Sinzow\*, but the position of the median saddle in the lateral lobe agrees with that of the outer tubercle. The inner tubercle, which is very close to the outer, is more distinct in this fragment than in the holotype.

*Horizon and Localities.*—Lower Aptian, upper *deshayesi*-zone (and lower part of Upper Aptian?). Hythe, Kent; Hunstanton, Norfolk (base of "Carstone"); Isle of Wight (Ferruginous Sands).

\* *Loc. cit.* (*Douvilleicerias*-Arten, 1906) p. 160, text-fig. 1.

8. *Chelonicerias* aff. *seminodosum* (Sinzow).

1906. *Douvilleicerias seminodosum*, Sinzow, *loc. cit.* (*Douvilleicerias*-Arten) p. 165, pl. i. figs. 3-6.  
 1913. *Douvilleicerias seminodosum*, Sinzow; Kilian, *loc. cit.* (*Lethæa*) p. 340, pl. ix. fig. 1.  
 1915. *Douvilleicerias seminodosum*, Sinzow; Nikchitch, *loc. cit.* (*Mém. Com. Géol.*) p. 20, pl. i. fig. 9, pl. ii. fig. 1.  
 1921. *Chelonicerias seminodosum* (Sinzow), Spath, *loc. cit.* (*Zululand*) pp. 313, 317.

Fragments of *Chelonicerias* that may belong to this species have been collected in top IV (*grandis*-bed) of the Isle of Wight (L.F.S. no. 641), but a Hunstanton example (B.M. no. 88983), in a better state of preservation, shows very good agreement with Sinzow's fig. 4 a. It is still septate at 65 mm., but since Sinzow's figure is reduced ( $\times \frac{1}{2}$ ), the resemblance may not be so great at a comparable size. The other forms figured by this author, in any case, are less closely comparable, but Kilian's large form may have similar inner whorls.

*Horizon and Localities.*—Lower Aptian, upper *deshayesi*-zone, Isle of Wight (bed IV), and Hunstanton, Norfolk (base of "Carstone").

9. *Chelonicerias martini* (d'Orbigny).

1841. *Ammonites martini*, d'Orbigny, *Pal. Française, Terr. Crét. i.* p. 194, pl. lviii. figs. 7, 8, 10.  
 1875. *Ammonites martini*, d'Orbigny; Topley, *Geology of the Weald*, p. 421.  
 1913. *Douvilleicerias martini* (d'Orbigny), Kilian, *loc. cit.* (*Lethæa*) p. 340.

The identification of immature specimens like those figured in Pl. XIV. figs. 4 & 6 is very difficult, for the young of *Ch. subnodosocostatum* or of *Ch. tschernyschewi* (Sinzow) are essentially similar, as mentioned below. The larger (fig. 6) might even be a young *Ammonitoceras*, but has the characteristic flattened costation. The specimen represented in Pl. XIV. fig. 7 (M.P.G. no. 30964) seems to agree with d'Orbigny's type-figure, but an early mutation or perhaps a distinct passage-form to *Ch. cornuelianum* occurs already at a presumably much lower level. One such example from the "Hythe Beds" of the Town Malling Quarry, near Maidstone (B.M. no. C 14668), is still septate at 70 mm. diameter, and therefore not only larger but also slightly more coarsely ribbed than the true *Ch. martini*. On the other hand, the peripheral bullæ and two intermediate ribs

of the ventral area are typically developed, and only the persisting large outer tubercle still recalls the earlier *Ch. cornuelianum*. This is probably the "*Amm. martini*" generally quoted from the Hythe Beds.

Another new form of this group with very depressed whorl-section is before me from the River Clekma, near its junction with the Lena, Irkutsk, Siberia (B.M. no. C 7169).

The var. *orientalis*, Jacob \*, which also has a depressed whorl-section, does not seem to occur in the English Aptian. It somewhat resembles, however, the small example figured by d'Orbigny in his fig. 9 (pl. lviii.), which was correctly excluded from the true *Ch. martini* already by Sinzow †. Dr. Kitchin ‡ compared to this small example an ammonite from the Atherfield Clay in the Dover Boring, but this is too low a horizon for the true *Ch. martini*, and, with Sinzow, I would attach forms like d'Orbigny's small example to *Ch. cornuelianum* rather than to *Ch. martini*, var. *occidentalis*, Jacob §.

*Horizon and Localities*.—Upper Aptian, *martini*-zone. Hythe and Maidstone, Kent; Isle of Wight (Ferruginous Sands).

#### 10. *Chelonicerias* aff. *tschernyschewi* (Sinzow).

1906. *Douvilleicerias tschernyschewi*, Sinzow, *loc. cit.* (*Douvilleicerias*-Arten) p. 182, pl. ii. figs. 11-12, pl. iii. figs. 2-7.  
 1906. *Douvilleicerias tschernyschewi*, var. *laticostata*, Sinzow, *ibid.* pl. iii. fig. 1.  
 1913. *Douvilleicerias tschernyschewi*, Sinzow; Kilian, *loc. cit.* (*Lethæa*) p. 340 (pars).  
 1915. *Douvilleicerias tschernyschewi*, Sinzow; Nikchitch, *loc. cit.* (*Mém. Com. Géol.*) p. 25, pl. ii. figs. 2-9, pls. iii.-v.  
 1921. *Chelonicerias tschernyschewi* (Sinzow), Spath, *loc. cit.* (*Zululand*) p. 317.

There are various large examples that resemble the var. *laticostata* of this species figured by Sinzow, but the inner whorls of one of these (B.M. no. C 992, still septate at over 150 mm. diameter) show the *martini*-stage persisting only to about 30 mm. Such inner whorls may, of course, easily be misidentified, but the correct determination of body-chamber fragments, showing untuberculate and close ribbing,

\* In Jacob and Tobler, *loc. cit.* pl. i. figs. 1-3, *e. g.*, B.M. no. C 25241 from the Luitere Zug, Switzerland; non Kilian, *loc. cit.* (*Lethæa*, 1913) pl. x. figs. 6 a, b.

† *Loc. cit.* (*Douvilleicerias*-Arten, 1906) p. 171 (in synonymy).

‡ In Lamplugh and Kitchin, *loc. cit.* (*Mem. Geol. Survey*, 1911) p. 109.

§ See Roch, *loc. cit.* (*Mém. Soc. géol. France*, n. s. vol. iv. 1927) p. 19.

is even less certain. The Allington and Aylesford examples listed below are such doubtful large forms, and both had been referred by Crick to "*Macroscaphites*" *hillsi*, although they are not identical. The former is still septate at 180 mm. diameter, but the second is completely chalcidized. This preservation, reminiscent of the Upper rather than the Lower Greensand, directs attention also to the great external similarity that exists between these forms and very large Cenomanian *Eucalycoceras* of the type of *Eu. newboldi* (Kossmat).

*Horizon and Localities.*—Upper Aptian, *martini*-zone (and top of Lower Aptian?). Isle of Wight (Ferruginous Sands); Maidstone, Allington, Kent (Hofman's Quarry, fourteenth lane from top); Aylesford, Kent (Bensted's Quarry, and doubtfully from a gravel with flint-implements, overlying the Folkestone Sands).

#### 11. *Chelonicerias* aff. *subnodosocostatum* (Sinzow).

1906. *Douvilleicerias subnodosocostatum*, Sinzow, *loc. cit.* (*Douvilleicerias*-Arten) p. 175, pl. ii. figs. 1-8.  
 1913. *Douvilleicerias subnodosocostatum*, Sinzow; Kilian, *loc. cit.* (*Lethæa*) p. 340 (footnote).  
 1915. *Douvilleicerias subnodosocostatum*, Sinzow; Nikchitch, *loc. cit.* (*Mém. Com. Géol.*) p. 40, pl. vi. figs. 4-7.  
 1923. *Diadochoceras subnodosocostatum* (Sinzow), Spath, *loc. cit.* (*Summary of Progress, 1922*) p. 148.

Sinzow (p. 173) considered Forbes's \* figured example to belong to *Ch. subnodosocostatum* or to *Ch. tschernyschewi*, since Forbes stated that his *Amm. martini* grew to a considerable size, whereas the true *Ch. martini* remained small. Sinzow was probably right, and the inner whorls of *Ch. tschernyschewi* are certainly very similar to Forbes's example; but there are many such immature *Chelonicerias* in the English Aptian, and specific identification is often impossible.

A larger example (M.P.G. no. 30913) seems to agree with Sinzow's fig. 4 (pl. ii.), but it still retains intermediate ribs, whilst in the typical *Ch. subnodosocostatum*, these are lost altogether on the outer whorls. There is nothing known to me from the Lower Greensand resembling topotypes (*e. g.*, B.M. no. C. 25242) of the form figured by Jacob and Tobler † as *Douvilleicerias subnodosocostatum*; and if their identifications were correct, Forbes's and other similar British

\* *Loc. cit.* (*Quart. Journ. Geol. Soc.* vol. i.) pl. v. fig. 3.

† *Loc. cit.* (*Engelberger Aa, 1906*) p. 14, pl. i. figs. 4-5.

examples would not belong to the present species. On the other hand, Sinzow's fig. 8 *c* is very close to *Ch. tschernyschewi* (his fig. 11), and these (presumably earlier) forms are apparently not represented in the Luitere Zug fauna. A number of Colombian\* examples in the British Museum (*e. g.*, nos. C 4305 *a, b*), however, do not differ from the example here figured in Pl. XIV. fig. 4, except, perhaps, in whorl-section. But there are considerable differences in this respect also among the immature British forms, and the original of Forbes's lower figure (specimen no. R 2284 B, Geol. Soc. Coll.) is thinner than the more favourably preserved larger example (R 2284 A), which agrees with the specimen here figured.

What may be an entirely new species of the same group as *Ch. subnodosocostatum* is represented by an example (B.M. no. C 2531) from east of Ladder Chine, Isle of Wight. It is almost complete at only 35 mm. diameter, and almost untuberculate.

*Horizon and Localities.*—Upper Aptian, *martini*- and *subnodosocostatum*-zones. Isle of Wight (Blackgang).

## 12. *Chelonicerias* sp. juv. (Pl. XIV. fig. 3.)

The small Hythe example (Manchester Mus. no. L 11608) here figured (and enlarged two diameters) does not seem to be the young of *Ch. cornuelianum*, which is the commonest form of *Chelonicerias* in the Hythe Beds. It is more compressed (with whorl-height about 7 mm. as against 10 mm. thickness), and the lateral tubercle becomes faint and close to the periphery towards the end. There is no resemblance either to the immature *Ch. tschernyschewi* and *Ch. subnodosocostatum* above discussed, or to young examples of the *martini* group from the Gargasian of the Basses Alpes (*e. g.*, B.M. nos. C 5904 *a, b*). On the other hand, a Blackgang specimen of *Ch. aff. martini* (B.M. no. C 888), with a similarly thin whorl-section, differs mainly in the flattening of its ribs, and it is possible that the example here figured is the young of one of those passage-forms between *Ch. cornuelianum* and *Ch. martini* referred to on p. 450.

*Horizon and Locality.*—Lower Aptian, upper *deshayesi*-zone, Hythe, Kent (Hythe Beds).

\* Several *Chelonicerias* from Colombia have recently been figured and described by Mile E. Basse ("Quelques Invertébrés Crétacés de la Cordillère Andine," Bull. Soc. Géol. France, (4) vol. xxviii. 1928, pp. 138-142.

Family III. *Ancyloceratidæ*, Hyatt, 1900, emend.Genus *ANCYLOCERAS*, d'Orbigny, 1842.1. *Ancyloceras matheronianum*, d'Orbigny.

1842. *Ancyloceras matheronianum*, d'Orbigny, Pal. Française, Terr. Crét. i. p. 447, pl. cxxii.  
 1889. *Ancyloceras matheronianum*, d'Orbigny; Bristow, &c., Geology Isle of Wight, 2nd ed. p. 266.  
 1927. *Ancyloceras matheronianum*, d'Orbigny; Roch, *loc. cit.* (Mém. Soc. Géol. France, n. s. vol. iv.) p. 23.

This species, recently discussed in detail by Roch, is represented by the single example figured by Mantell, and referred to on p. 421, the only ammonoid known to me from the *Perna*-beds of Atherfield. It is not restricted to this horizon apparently, for Kilian\* records it together with *Parahoplitoïdes consobrinus* (d'Orbigny).

*Horizon and Locality.*—Lower Aptian, lower *deshayesi*-zone (*Perna*-beds), Atherfield, Isle of Wight. This is apparently on a lower level than the "*Perna*-bed" of Woodhatch, near Reigate, Surrey.

2. *Ancyloceras aff. varians*, d'Orbigny.

1842. *Ancyloceras varians*, d'Orbigny, Pal. Française, Terr. Crét. i. p. 504, pl. cxxvi.  
 1913. *Ancyloceras varians*, d'Orbigny; Kilian, *loc. cit.* (Lethæa) p. 351.  
 1915. *Ancyloceras varians*, d'Orbigny; Kilian & Reboul, *loc. cit.* (Aptien Inférieur Montélimar) p. 68.  
 1924. *Ancyloceras varians*, d'Orbigny; Spath, *loc. cit.* (Speeton Clay) p. 79.  
 1925. *Ancyloceras varians*, d'Orbigny; Corroy, *loc. cit.* (Néocomien Bassin Paris) p. 310.

This species, like the last, is represented by an unique example, a doubtful fragment in the Sedgwick Museum, associated with the similarly incomplete *Ancyloceras*, sp. n., listed from the Hunstanton "Carstone," which may be figured on another occasion.

*Horizon and Locality.*—Lower Aptian, *deshayesi*-zone. Hunstanton (base of "Carstone").

Genus *EPANCYLOCERAS*, nov.

*Holotype.*—*Epancyloceras hythense*, sp. n. (Pl. XV. figs. 3 a, b), from the Lower Aptian of Hythe, Kent.

\* *Loc. cit.* (Lethæa, 1913) p. 344.

*Diagnosis.*—Ancyloceratids with two rows of lateral tubercles and a median row of siphonal tubercles on the principal ribs, and two or three slender and irregular intermediaries. Suture-line with three bifid saddles and four lobes (I, U, L, E), apparently similar to that of *Ancyloceras*, s. s.

*Remarks.*—The unique Hythe example here figured consists of the earlier part of the body-chamber, but there is a larger fragment in the British Museum (no. 74972, from Basle, ex Van Breda Coll.) which belongs to an allied species. This is still septate at 150 mm., has crioceratid coiling, and shows loss of first the ventral sharpening and then of the outer lateral tubercles before the final stage, at which the venter becomes broadly rounded and the whorl-section comparable almost to that of *Hamulina dissimilis* (d'Orbigny)\*. There does not seem to be any described species that agrees with the forms here discussed. *Epancyloceras* is taken to be a development of the same stock that produced *Ancyloceras* and the other genera here described, but on account of the sharpening of the ventral area alone a separate name is advisable.

1. *Epancyloceras hythense*, sp. n. (Pl. XV. figs. 3 a, b.)

*Type.*—The Hythe example (Manchester Museum, no. L 11609, ex Dixon Coll.), figured in Pl. XV. figs. 3 a, b.

*Diagnosis.*—See generic diagnosis above. The dorsal area shows striation continuous across the narrow antisiphonal groove. There are about three of these striæ meeting at each lateral tubercle and two or three intermediate ones, and they all describe a Cupid's bow (directed forward) across the dorsum.

*Remarks.*—The swelling of the ribs in the siphonal line is as marked at the end of the body-chamber as at the beginning, where the final septal surface displays the saddles fairly well, though the lobes are worn. On account of its small size it is difficult to compare the present species with the gigantic "*Crioceras*" *lahuseni* figured by Sinzow †. The similarity of the younger whorls of this species to the Basle example of *Epancyloceras*, referred to above, suggests that the unknown early stage of Sinzow's form may be comparable, and that this should therefore be classed with *Epancyloceras*, but the adult is quite different.

\* *Loc. cit.* (Pal. Française, Terr. Crét. i.) 1842, pl. cxxx. fig. 7.

† *Loc. cit.* (*Douvilleiceras*-Arten 1906) pl. v. figs. 3 a-c.

Genus *TROPÆUM*, J. de C. Sowerby, 1837.1. *Tropæum bowerbanki* (J. de C. Sowerby).

1837. *Crioceratites bowerbanki*, J. de C. Sowerby, "Letter to the Secretary &c.," Trans. Geol. Soc. (ii.) vol. iv. p. 409, pl. xxxiv.
1847. *Crioceratites bowerbanki*, J. de C. Sowerby in Fitton, *loc. cit.*, Quart. Journ. Geol. Soc. vol. iii. p. 303, text-figs. 1, 2.
1875. *Crioceras (Tropæum) bowerbanki* (Sow.), Topley, Geology of the Weald, p. 422.
1889. *Crioceras (Ancyloceras) bowerbanki* (Sow.), Bristow, &c., Geology Isle of Wight, 2nd ed. p. 266.
1902. *Crioceras bowerbanki* (Sow.), v. Koenen, "A monitiden d. Nordd. Neocom," *loc. cit.* p. 247, pl. xxxvii. fig. 4, pl. xlii. fig. 2.
1913. *Ancyloceras bowerbanki* (Sow.), Kilian, *loc. cit.* (Lethæa) p. 352.
1917. *Crioceratites bowerbanki*, J. de C. Sowerby; Crick, "Note on Type-specimen &c.," Proc. Malac. Soc. vol. xii. pt. 4, p. 138, pl. vii.
1926. *Tropæum bowerbanki* (J. de C. Sowerby), Whitehouse, *loc. cit.* (Mem. Queensl. Mus. vol. viii.) p. 213.

The type of this species was recently again discussed and well refigured by Crick. There is a fine series of specimens in the British Museum, and they all differ slightly in proportions and coiling. An Ahaus (Westphalia) example (B.M. no. C 32359) with a very old label "*Crioceras ahausensis*, sp. nov." is also typical, but it is more evolute than v. Koenen's equally large specimen, though less uncoiled than his "*Ancyloceras*" *hillsi* from the same locality.

Among the typical examples from Russia figured by Sinzow\* the original of his pl. xvi. fig. 4 in coiling forms a transition to *T. hillsi*. This, however, does not seem to differ sufficiently in suture-line to allow of the correct identification of fragments, as Sinzow thinks.

Kilian considered this species identical with *Ancyloceras simbirskense*, Jasikov (Sinzow), but, as mentioned below, the Russian form is more closely comparable to *T. gigas* at a corresponding diameter.

*Horizon and Localities.*—Upper Aptian, *martini*-zone (and top of Lower Aptian?), "*Scaphites* Group" (V) of Fitton, Isle of Wight (especially Whale Chine), Hythe (Kentish Rag), Hunstanton (base of Carstone) †.

2. *Tropæum hillsi* (J. de C. Sowerby).

1836. *Hamites hillsii*, J. de C. Sowerby, in Fitton, *loc. cit.* (Trans. Geol. Soc. (2) vol. iv.) p. 128.
1836. *Scaphites hillsii* (J. de C. Sowerby), *ibid.* p. 339, pl. xv. figs. 1, 2, 3.

\* *Loc. cit.* (Mat. Geol. Russl. vol. xxii. 1905) p. 327, pls. xv.-xvii.

† One fragment in the British Museum (no. C 26235), showing the broad periphery and suture-line of v. Koenen's fig. 2 a, pl. xlii.



1847. *Scaphites hillsii* (J. de Sowerby), in Fitton, "Section at Atherfield" (Quart. Journ. Geol. Soc. vol. iii.), p. 303, fig. 3.  
 1875. *Ancyloceras (Scaphites) hillsii* (Sowerby), Topley, Geology of the Weald, p. 421.  
 1898. *Macroscaphites gigas* (J. de C. Sowerby), Crick, "Muscle Impress. &c.," Trans. Linn. Soc. ser. 2, vol. vii. p. 31, pl. xvii. figs. 17-19.  
 1925. *Tropæum hillsii* (J. de C. Sowerby), Spath, in Walton, 'Folkestone,' p. 31.

The specimen represented in Sowerby's pl. xv. fig. 3 from Sir Phillip Egerton's Collection is in the British Museum (no. C 446), but its inner whorls are replaced by crystalline calcite and unrecognizable. The missing smaller example illustrated in fig. 1 and the doubtful Lympne fragment here figured (Pl. XV. fig. 2) show the ribbing rather too coarse, and in von Koenen's Ahaus specimen \* the costation also is badly restored. Sinzow's † Russian examples, however, are typical, and his fig. 5 especially represents the characteristic trapezoidal whorl-section. There are many transitions to *T. bowerbanki*, which was, indeed, considered by Forbes to belong to the same species, and it is doubtful whether the supposed simpler suture-line of *T. hillsii* forms as good a distinguishing feature as Sinzow believed. In typical Lympne (B.M. no. C 32358) and Atherfield examples (L.F.S. nos. 672-3) the suture-line is as complex as that of v. Koenen's Ahaus form or of the typical *T. bowerbanki*.

Sowerby's *Hamites grandis* is not based on a portion of the straight shaft of *T. hillsii* as Kilian ‡ implies. On the other hand, Krenkel's § *Ancyloceras fallauxi* (Uhlig), var. *mozambiquense*, which does not appear to be related to Uhlig's || species, may well be compared to typical fragments of the present form from the Isle of Wight.

The fragments of *Tropæum* before me from the Wissant Sands of Nesles and Neufville ¶ are not complete enough to be definitely referred to the present species.

*Horizon and Localities.*—Upper Aptian, *martini*-zone (and top of Lower Aptian?), "Scaphites-Group" (V) of Fitton, Isle of Wight, Kentish Rag (Hythe and Bensted's Quarry, Aylesford, near Maidstone).

\* *Loc. cit.* (Ammonitiden der Nordd. Neocom.) 1902, pl. xxxiii. fig. 4.

† "Ueber einige evolute Ammoniten-Formen aus dem oberen Neocom Russlands," Mat. z. Geol. Russl. vol. xxii. 1905, p. 327, pl. xv. figs. 1-3, 5, 6, pl. xvii. fig. 7, pl. xxii. fig. 6.

‡ *Loc. cit.* (Lethæa, 1913) p. 352.

§ *Loc. cit.* (Neu. Jahrb. 1910, i.) p. 153, pl. xvii. figs. 2, 3.

|| *Loc. cit.* (Wernsdorfer Schichten, 1883) p. 141, pl. xxix. fig. 1.

¶ See Dutertre, *loc. cit.* (Ann. Soc. Géol. Nord, vol. xlix.) p. 242.

3. *Tropæum gigas* (J. de C. Sowerby). (Pl. XVII. fig. 3.)

- (?) 1828. *Hamites gigas*, J. de C. Sowerby, Min. Conchology, vol. iv. p. 183, pl. dxciii. fig. 2.  
 1840. *Scaphites gigas* (J. de C. Sowerby), *loc. cit.* Trans. Geol. Soc. [2] vol. v. p. 411, pl. xxxiv. figs. 2, 2 a.  
 1847. *Scaphites gigas* (J. de C. Sowerby), in Fitton, *loc. cit.* (Quart. Journ. Geol. Soc. vol. iii.) p. 303, text-fig. 4.  
 1875. *Ancyloceras (Scaphites) gigas* (Sowerby), Topley, Geology of the Weald, p. 421.  
 1926. *Australiceras (?) gigas* (J. de C. Sowerby), Whitehouse, *loc. cit.* (Mem. Queensl. Mus. vol. viii.) p. 207.

The missing holotype (? *Ancyloceras*) from the Hythe Beds was only a body-chamber fragment, and the larger specimen figured in 1840 (now B.M. no. 46473) does not show the early whorls. Neumayr\* wrote that a cast of this form showed the ribs of the spiral portion bundled in umbilical tubercles. But it may be surmised that the original was artificially carved in an attempt to improve its appearance (as is the case with various examples in the British Museum), and in, *e. g.*, the casts of *Ancyloceras gigas* supplied by Krantz the inner whorls are certainly most misleadingly restored (*e. g.*, Birkbeck College cast). Unfortunately among the many typical specimens examined there is not one that has the inner whorls well preserved, so that, apart from the slightly coarser costation, an example like that here figured might equally well have been referred to either of the two forms of *Tropæum* above discussed. Even the specimen in the Sedgwick Museum, recorded by Dr. Whitehouse, was only doubtfully attached to this species. Its earliest volutions are not visible, and the partial trituberculation seen on the inner whorls here illustrated is not taken to be of generic significance.

This small example begins with a toxoceratid open curve of rounded section, and with oblique close costation as in "*Anciloceras*" *simbirskense*, Jasikov †, or *A. gracile*, Sinzow ‡. Then there follows a trituberculate stage, as in typical *Australiceras*, for another three-quarters of a turn, and, finally, on the last third of the outer whorl there is the usual fine, close, and rursiradiate *Tropæum* ribbing. It is probable that ornamentation and coiling are equally unstable in the closely allied *Ancyloceras renauxianum*, d'Orbigny §, which, according to Sinzow ||, was incorrectly drawn. The separation

\* *Loc. cit.* (Ammonit. Hilsbild. Nordd.) 1881, p. 191.

† See Sinzow, Mater. Geol. Russl. vol. iv. 1872, p. 33, pl. vi. fig. 1.

‡ *Ibid.* pl. vi. fig. 5.

§ Pal. Française, Terr. Crét. i. 1842, p. 499, pl. cxxiii.

|| "Ergänzende Bemerkungen, &c.," Verh. Russ.-Kais. Min. Ges. ser. 2, vol. xlv. 1906, p. 189.

of the present species from Kilian's \* group of *Ancyloceras renauxianum*, and the inclusion in the group of the typical *Ancyloceras matheronianum* (= *Ancyloceras*, s. s.) is thus not accepted.

*Horizon and Localities.*—Upper Aptian, *martini*-zone (and top of Lower Aptian ?), "Scaphites" Group (V) of Fitton, Isle of Wight. Kent, Hythe and Sevenoaks (well bored to 90 ft. through Kentish Rag, on Crockham Hill; B.M. no. C 11208).

#### 4. *Tropæum* cf. *gracile* (Sinzow).

1924. *Ancyloceras* cf. *gracile* (Sinzow), Spath, *loc. cit.* (Speeton Clay) p. 79.

1926. *Australiceras gracile* (Sinzow), Whitehouse, *loc. cit.* (Mem. Queensl. Mus. vol. viii.) p. 212.

The original *Anciloceras gracile*, Sinzow † cannot be separated generically from *T. gigas* and *T. simbirskensis*, discussed above. There is no reason to suppose that Sinzow interpreted his species differently in 1905 ‡, and Dr. Whitehouse's lectotype (pl. xviii. fig. 1) must be assumed to have a loosely coiled or curved beginning, unlike what I would consider to be typical *Australiceras*. The four specimens in the Sedgwick Museum referred to by Dr. Whitehouse are as uncertain as is his own Queensland form (pl. xxxiv. fig. 4), but there is a large Maidstone form before me (B.M. no. C 2502) which may well be compared to the lectotype of Sinzow's species. It is still septate at 330 mm. diameter, and neither the earliest whorls nor the final shaft are known. The costation is fine and close, but where the inner whorls begin to emerge from the matrix that covers the centre they seem to show a bundling as in the somewhat similar "*Crioceras*" *carinato-verrucosum*, Sinzow (pl. xxi. fig. 1). The identification of this example also is thus provisional.

*Horizon and Localities.*—Upper Aptian, lower part. Hunstanton (base of "Carstone") and Maidstone (so-called "Hythe Beds"). A small fragment in the Manchester Museum (no. L 12048, ex Dixon Coll.) that may also belong to this species is apparently from the true Kentish Rag at Hythe.

#### 5. *Tropæum* sp. ind. (Pl. XV. fig. 2.)

Another species of *Tropæum* is represented by a septate example (B.M. no. 46493) of 140 mm. diameter, which, in

\* *Loc. cit.* (Lethæa, 1913) p. 351.

† *Loc. cit.* (Mat. Geol. Russl. vol. iv.) 1872, p. 35, pl. vi. figs. 5, 6, 10, 11.

‡ *Loc. cit.* (*ibid.* vol. xxii. (2)) p. 306, pl. xvii. figs. 1-4, pl. xviii. figs. 1-5, pl. xix. fig. 1.

the comparative coarseness of the ribbing of the earlier whorls as compared with the latter, resembles *Crioceras arcticum*, Stolley\*. This is probably a form of the *bowerbanki-hillsi* group, as its author and Dr. Whitehouse† thought, but the coarsely ribbed inner whorls of the English example are quite unlike those of the other species of *Tropæum* here described, and suggest comparison with the equally bluntly costate but hook-shaped *Tonohamites decurrens* (Roemer) discussed below. Since the inner whorls of Stolley's form are unknown, and since only one imperfect example of the English species is available, the identification must remain uncertain.

*Horizon and Locality*.—Upper Apian, probably *nutfieldiensis*-subzone. Locality unrecorded (Nutfield, Surrey?).

### Genus AMMONITOCERAS, Dumas, 1876.

#### 1. *Ammonitoceras tovilense*, Crick.

1916. *Ammonitoceras tovilense*, Crick, Proc. Malac. Soc. vol. xii. p. 118, pl. vi.  
 1923. *Ammonitoceras tovilense*, Crick; Spath, *loc. cit.* (Summary of Progress, 1922) p. 147.  
 1925. *Ammonitoceras tovilense*, Crick; Burckhardt, *loc. cit.* (Bol. Inst. Geol. Mexico, no. 45) p. 40.

This seems to be the only typical English *Ammonitoceras* so far known. I used it (in the absence of a more suitable fossil) to characterize the upper "Hythe Beds" of the Maidstone District, which may include the equivalents of Sandgate Beds of other areas; but I do not think that Dr. Whitehouse‡ was right in considering *Ammonitoceras* to replace *Tropæum* in time, or in declaring *Tropæum* to be a descendant of *Australiceras*, which is probably not very different in age from the other two. It is not certain that Kilian§ was wrong in considering at least some of his *Ammonitoceras* to be derived from the Cheloniceratids (*i. e.*, his "*Douvilleiceras*"), and the inclusion of this genus in Ancyloceratidæ is provisional. But the present species and a comparable gigantic *Ammonitoceras* from Portuguese East Africa (B.M. no. C 25341) are believed to be Ancyloceratids.

\* "Kreideformation und ihre Fossilien auf Spitzbergen," K. Sv. Vet. Handl. vol. xlvii. no. 11, 1912, p. 16, pl. i. fig. 1, p. 27, text-fig. 2.

† *Loc. cit.* (Mem. Queensl. Mus. vol. viii.) 1926, p. 213.

‡ *Loc. cit.* (Mem. Queensl. Mus. vol. viii.) 1926, pp. 208-213.

§ *Loc. cit.* (Lethæa, 1910) p. 276; but forms like *A.* ? ("*Crioceras*") *lukuseni*, Sinzow, *loc. cit.* (*Douvilleiceras* Arten, 1905, pl. v. fig. 3) also resemble *Epancyloceras* (see p. 455).

*Horizon and Locality.*—Upper Aptian (so-called “Hythe Beds”). Maidstone, Kent.

Genus *TONOHAMITES*, Spath, 1924.

1. *Tonohamites decurrens* (Roemer).

1841. *Hamites decurrens*, Roemer, Nordd. Kreidegebirge, p. 92, pl. xiv. fig. 6.

1902. *Hamites decurrens*, Roemer; v. Koenen, *loc. cit.* (Ammonitiden Nordd. Neocom.) p. 392, pl. xxxiii. figs. 2, 3 a, b.

1924. *Hamites decurrens*, Roemer; Spath, *loc. cit.* (Speeton) p. 85.

Three examples in the British Museum (nos. C 892 c, d, C 3671) are comparable to the earlier half of v. Koenen's figured Ahaus specimen, but they are too incomplete for definite identification. A still more doubtful and worn example from the Wicken Beds was recorded by Keeping\* as “*Ancyloceras* sp.,” and was associated with a better second example with fine ribbing, which appears to belong to quite a new form, difficult to place at present.

*Horizon and Locality.*—Upper Aptian (*martini*-zone), Ferruginous Sands of Blackgang, Isle of Wight.

2. *Tonohamites proteus*, sp. n. (Pl. XVI. fig. 7.)

*Type.*—The Lympne example (M.P.G. no. 32147) figured in Pl. XVI. fig. 7.

*Diagnosis.*—Hamitids with tuberculation like that of degenerate *Chelonicerases*, at first more or less distinct, but tendency to develop irregular costation on outer whorl-ports. Ribbing closer than in the untuberculate *T. decurrens* (Roemer).

*Remarks.*—The example here figured probably represents the final hook of a hamitoid shell. A smaller paratype in the British Museum (no. C 892 b) retains at least part of the longer middle limb, and shows that this was parallel to the final limb for at least its own length, as in typical *Hamites*. But the early whorls are missing in all the specimens examined, and may even have resembled the immature *Chelonicerases* (*martini* group?) sp. ind., figured in Pl. XIV. fig. 6. This type of ornamentation persists in some examples to the final shaft. In one specimen traces of bituberculation have been noticed, but as a rule only the lower umbilical tubercle gives rise to branching blunt costæ, with a varying number of single ones between. In the closely allied examples here referred to *T. decurrens* (Roemer) the costation has become single and quite hamitid. Some of

\* *Loc. cit.* (Neocomian of Upware) 1883, p. 153.

the specimens are crushed obliquely, and this may account for the somewhat different aspect of all the individuals, but it is not impossible that if complete examples were available they might turn out to belong to more than one species.

*Horizon and Localities.*—Upper Aptian, *martini*-zone. Lympe, near Hythe, Kent, and Blackgang, Isle of Wight.

### 3. *Tonohamites*?, sp. n. (Pl. XIV. fig. 5.)

The small fragment here figured probably represents a new species of *Tonohamites* (or *Ancyloceras*?), but it is too incomplete for accurate determination. It is illustrated chiefly because it shows the suture-line, which differs from that of *Tonohamites decurrens* (Roemer) as figured by v. Koenen \*, in having a deeper external lobe and plumper saddles. The ribbing is more oblique and less uniformly blunt than in Roemer's species, but the whorl-section is similarly rounded.

Aptian Hamitids are, unfortunately, very rare, and therefore incompletely known. It is probable, however, that forms like *Ptychoceras humboldtianum*, Karsten †, and the *Hamites* sp. figured by Jacob & Tobler ‡ connected the typical Gault forms with the Lytoceratid *Anahamulina* so common in the Upper Barremian.

*Horizon and Locality.*—Upper Aptian (*martini*-zone). Isle of Wight.

### INCERTÆ SEDIS.

#### *Hamites*? (gen. nov.?) *grandis* (J. de C. Sowerby). (Pl. XIV. fig. 2.)

1828. *Hamites grandis*, J. de C. Sowerby, Min. Conchol. vol. vi. p. 187, pl. dxciii. fig. 1.  
1875. *Ancyloceras (Hamites) grande* (Sowerby), Topley, Geology of the Weald, p. 421.  
1925. *Ptychoceras*, sp. n., Dutertre, "Crétacé Inférieur du Bas-Boulonnais, &c.," Ann. Soc. géol. Nord, vol. xlix. (1924) p. 242.

Sowerby's holotype represents the septate fragment of a large individual, which, like the small French fragment here figured, shows trifid lobes. This prevents comparison with *Ptychoceras (puzosianus-group)*, which, according to Kilian §,

\* *Loc. cit.* (Ammonitiden Nordd. Neocom. 1902) pl. xxxiii. fig. 3 b.

† *Loc. cit.* (Géologie de la Colombie, 1886), pl. i. figs. 1 a-c. According to an example in the British Museum (no. C 3631) the smaller limb is not always in close contact.

‡ *Loc. cit.* (Engelberger Aa, 1906) pl. ii. figs. 11 a, b.

§ *Loc. cit.* (Lethæa, 1913) p. 354.

still occurs in the Aptian, and to which I previously attached Dr. Dutertre's fragment. The Hamitids of the Aptian, unfortunately, have not yet been studied in detail, and the promised revision of the Albian forms\* must await the completion of the description of the ammonites.

The Aptian forms here discussed, with very oblique costation and circular whorl-section, may be provisionally kept distinct from the Ancyloceratids recorded above.

Kilian † apparently considered *H.?* *grandis* to represent merely a portion of the straight shaft of a *Tropæum* ‡. In view of the presence of larger nodes in the holotype, it is possible that it may yet turn out to belong to a gigantic species of *Ancyloceras*, comparable to some smaller Bedoule forms recently figured by Roch §, but the specimen here figured is even more distinct. A comparable smooth siphonal line, with slight thickening of the untuberculate ribs on each side of this band, is not found in Bedoule specimens in the British Museum (which also possesses the holotype of Astier's || *Ancyloceras andouli*, generally quoted from Bedoule).

*Horizon and Localities.*—Upper Aptian, *martini*-zone (Hythe Beds), Smeeth, near Ashford, Kent. Neufville, Boulonnais (Rigaux Coll. in the Musée Géologique at Boulogne).

#### EXPLANATION OF THE PLATES.

##### PLATE XIV.

- Figs. 1 a, b. Parahoplites simmsi* (Forbes), nov. Upper Aptian (Sandgate Beds?), Hythe. (M.P.G. no. 2288, Geol. Soc. Coll.) P. 440.
- Fig. 2. Hamites?* (gen. nov.?) cf. *grandis* (J. de C. Sowerby). Upper Aptian, Neufville, Boulonnais. (Rigaux Coll. Musée Géologique, Boulogne.) P. 462.
- Fig. 3. Chelonicerasesp. juv.* Upper Aptian, Hythe Beds, Hythe. (No. L 11608, Manchester Museum.) (Enlarged  $\times 2$ .) P. 453.
- Fig. 4. Chelonicerasesp. juv.* ("martini," Forbes, non d'Orbigny). Upper Aptian, Ferruginous Sands, Atherfield, Isle of Wight. (B.M. no. C 3028.) P. 453.
- Fig. 5. Tonohamites?*, sp. n. Upper Aptian, Ferruginous Sands, Isle of Wight. (M.P.G.) P. 462.

\* See Spath, "Albian Ammonoidea from Portuguese East Africa &c.," Ann. Transv. Mus. vol. xi. pt. 3 (1925), p. 189.

† *Loc. cit.* (Lethæa, 1913) p. 352.

‡ Such fragments occur in the Hythe Beds (*e.g.*, B.M. no. 6144, 8154, from Lympne).

§ *Loc. cit.* (Mem. Soc. Géol. France, vol. viii. 1927) pls. iii., iv.

|| Catal. descript. *Ancyloceras*, 1851, p. 22, pl. vi. no. 12, pl. vii. no. 12 bis (B.M. no. 73806).

- Fig. 6. *Chelonicerias* sp. ind. (*martini* group?). Upper Aptian, Ferruginous Sands, Blackgang, Isle of Wight. (B.M. no. C 26689.) P. 450.
- Fig. 7. *Chelonicerias* aff. *martini* (d'Orbigny). Upper Aptian, Ferruginous Sands, Isle of Wight. (M.P.G. no. 30964.) P. 450.

## PLATE XV.

- Fig. 1. *Deshayesites kiliani*, sp. n. Lower Aptian, *deshayesi*-zone, Atherfield, Isle of Wight. (M.P.G. no. 30922.) P. 429.
- Fig. 2. *Tropæum* sp. ind. (*hillsi* group). Aptian, Hythe Beds, Lympne, Kent. (M.P.G. no. 32149.) P. 457.
- Figs. 3 a, b. *Epancyloceras hythense*, sp. n. Aptian, Hythe Beds, Hythe. (Manchester Museum, no. L 11609.) P. 455.
- Fig. 4. *Dufrenoyia lurensis* (Kilian). Same bed and locality. (Manchester Museum, no. L 11607.) P. 436.
- Fig. 5. *Deshayesites topleyi*, sp. n. Lower Aptian, *deshayesi*-zone, Atherfield, Isle of Wight. (L.F.S. no. 834.) P. 430.
- Fig. 6. *Chelonicerias crassum*, sp. n. Aptian, Hythe Beds, Hythe. (Manchester Museum, no. L 11605.) P. 449.

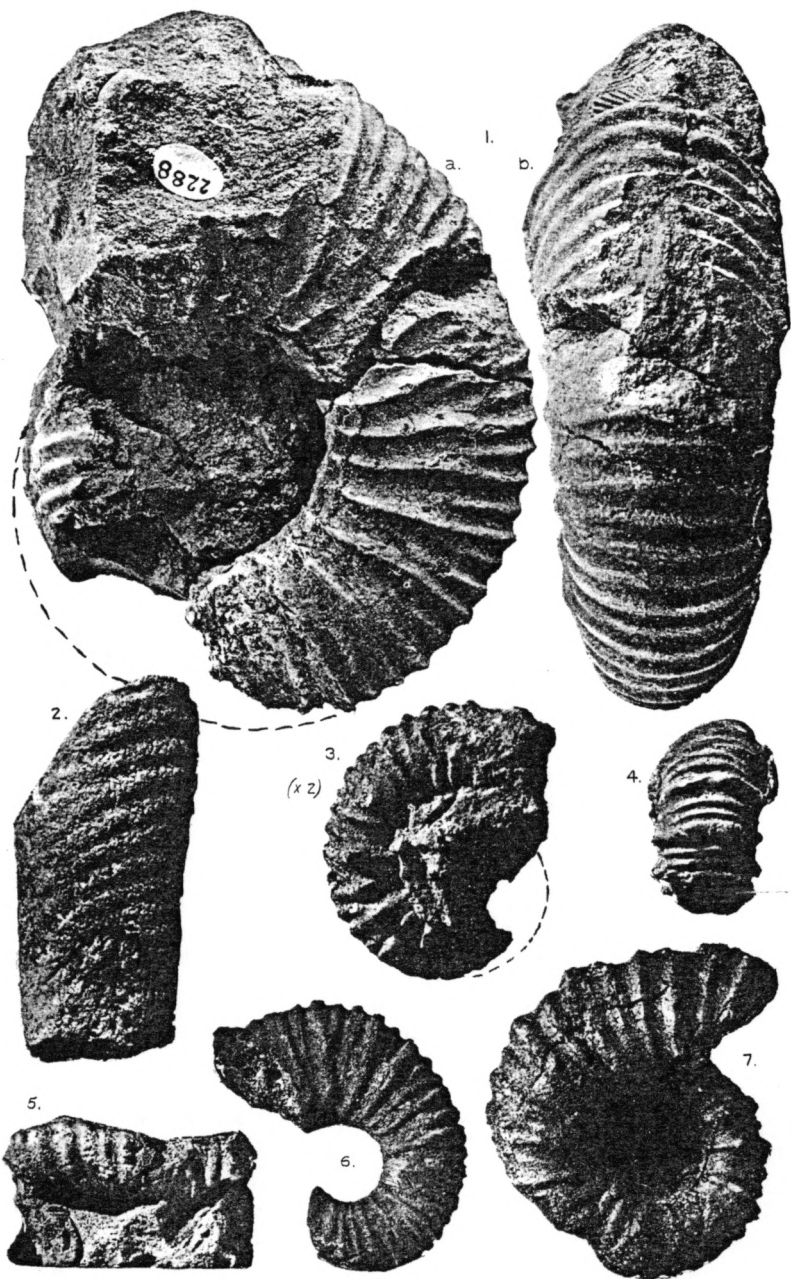
## PLATE XVI.

- Fig. 1. *Parahoplites sussexensis*, sp. n. Upper Aptian, *subnodosocostatum*-zone. Pulborough, Sussex. (M.P.G. no. 46131.) P. 441.
- Fig. 2. *Parahoplites* sp. juv. (*multicostatus* group). Upper Aptian, Sandrock Series?, Isle of Wight. (M.P.G.) P. 442.
- Figs. 3 a, b. *Deshayesites punfieldensis*, sp. n. Lower Aptian, *deshayesi*-zone, Atherfield, Isle of Wight. (M.P.G. no. 30915.) P. 431.
- Figs. 4 a-c. *Dufrenoyia truncata*, sp. n. a, b. Inner whorls of a paratype and side-view of holotype (Manchester Museum, no. C 11606). c. Peripheral view of another example (M.P.G. no. 30920) from the Aptian, Hythe Beds, Hythe. P. 436.
- Figs. 5 a, b. *Deshayesites vectensis*, sp. n. Aptian (Ferruginous Sands), Blackgang, Isle of Wight. (B.M. nos. C 889 c, d.) P. 430.
- Fig. 6. *Chelonicerias perli*, sp. n. Lower Aptian, *deshayesi*-zone, Atherfield, Isle of Wight. (M.P.G. no. 31046.) P. 445.
- Fig. 7. *Tonohamites proteus*, sp. n. Aptian, Hythe Beds, Lympne, Kent. (M.P.G. no. 32147.) P. 461.

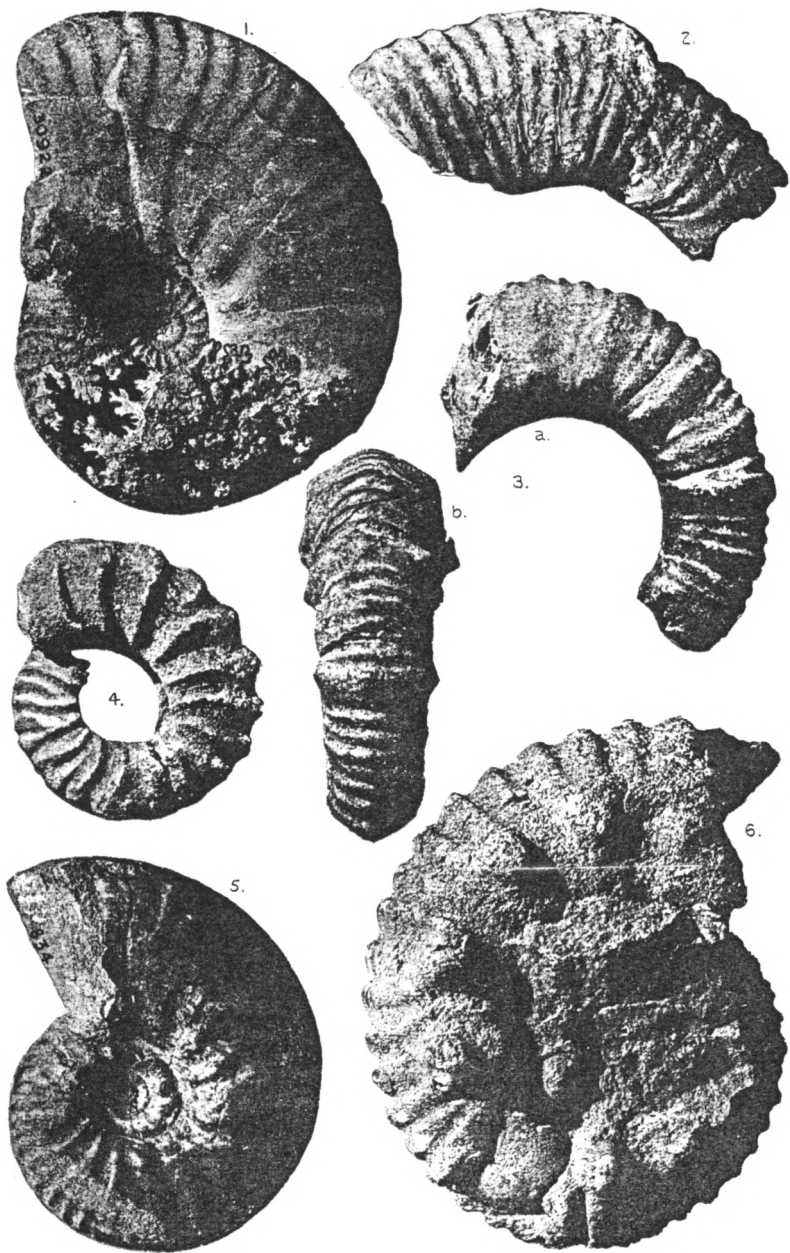
## PLATE XVII.

- Fig. 1. *Deshayesites* aff. *grandis*, sp. n. Fragment, showing last two suture-lines, from the Aptian, *martini*-zone (bed V or VI), west of Whale Chine, Isle of Wight. (L.F.S. no. 717.) P. 427.
- Figs. 2 a, b. *Deshayesites grandis*, sp. n. Aptian, upper *deshayesi*- or lower *martini*-zone, Atherfield, Isle of Wight. (M.P.G. no. 2300, Geol. Soc. Coll.) P. 427.
- Fig. 3. *Tropæum* cf. *gigas* (Sowerby). Upper Aptian, *martini*-zone, Isle of Wight. (B.M. no. C 3671.) P. 458.
- Fig. 4. *Prochelonicerias*? sp. ind. Plaster cast of an umbilical impression. Lower Aptian, Atherfield Clay, Isle of Wight. (L.F.S. no. 719.) P. 443.
- Fig. 5. *Deshayesites* sp. (*consobrinoides-vectensis* group). Lower Aptian (bed III b=Upper Lobster Bed), Atherfield, Isle of Wight. (L.S.F. no. 720.) P. 431.

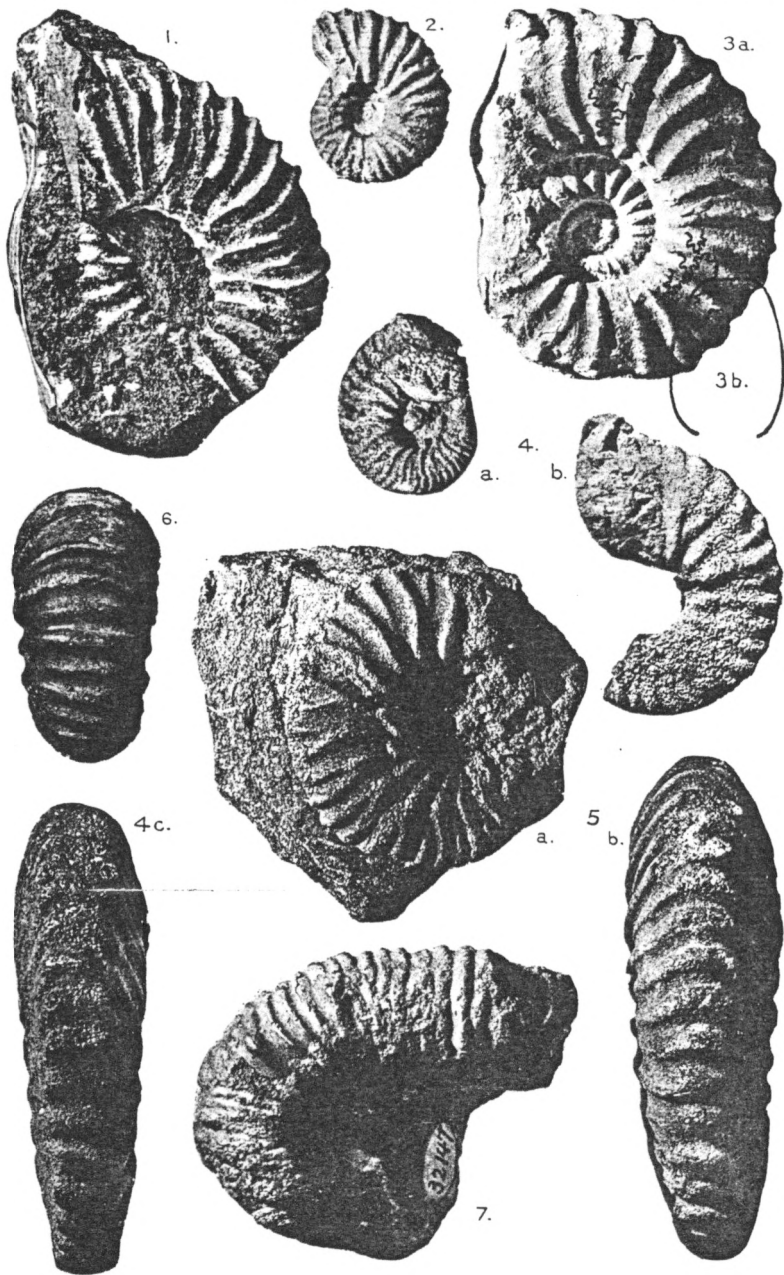




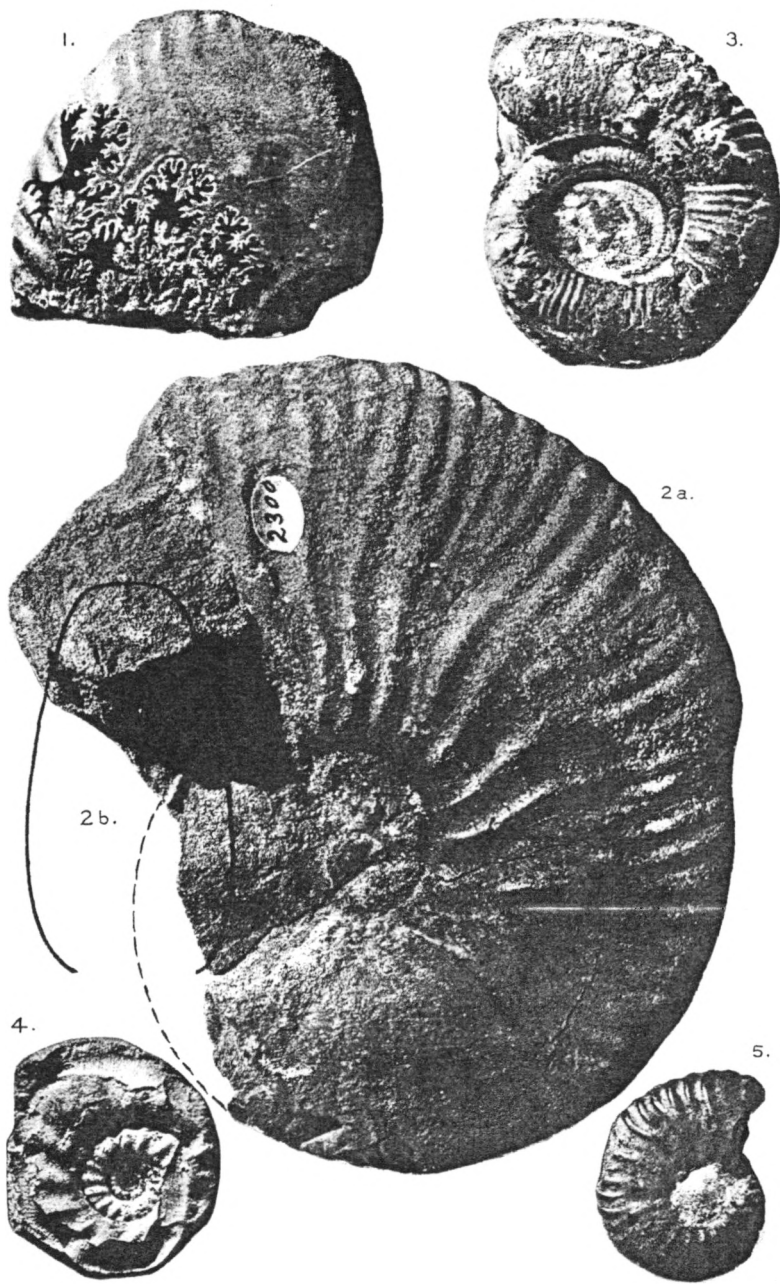
LOWER GREENSAND AMMONOIDEA.



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