

COX, L.R. (1928)

A SYNOPSIS OF THE LAMELLIBRANCHIA AND GASTROPODA OF THE
PORTLAND BEDS OF ENGLAND.

Part I - Lamellibranchia. (Gastropoda never published).

Proceedings Dorset Natural History and Archaeological
Field Club. 1928. Volume L.



A Synopsis of the Lamellibranchia and Gastropoda of the Portland Beds of England.

PART I—LAMELLIBRANCHIA.

By L. R. COX, M.A.

(Published by permission of the Trustees of the British Museum).

INTRODUCTION.

THE study of the fossils found in the Portland Beds of this country had been very much neglected until, four years ago, Lt-Col. R. H. Cunningham's collecting provided the material for a description in these *Proceedings* of the rich fauna of the shell-bed which forms the base of the Portland Stone in the Isle of Portland. Colonel Cunningham has since extended his collecting to other horizons of the Portland Beds, some of which are quite fossiliferous, although in none, except the Roach chert-bed, is the preservation of the fossils so perfect. Three years ago I was able to make a small collection from the Portland Sand of St. Alban's Head and Hounstout, while Mr. C. H. Waddington, of Cambridge University, who more recently has made an intensive study of the Hounstout section, has kindly submitted to me a further series of fossils from that locality.

The most important collection of Portland fossils made by past workers is that of W. H. Hudleston (Vice-President of the

Dorset Natural History and Antiquarian Field Club, 1900-1909), which is now preserved partly in the Museum of Practical Geology at Jermyn Street, partly in the Sedgwick Museum, Cambridge, and partly in the County Museum at Dorchester. A fairly large collection must also have been made by J. F. Blake when preparing his paper on the Portland Beds of England (1880, *Quart. Journ. Geol. Soc.*, Vol. XXVI, pp. 189-235). A certain amount of this material, including the type-specimens of most of his new species, is now in the British Museum, but many of the species which figure in his lists, including some which have not been found by other collectors, are unrepresented in what remains of his collection. This is particularly unfortunate, since an author who figured a *Barbatia* as a *Sowerbysa* and a *Corbula* as a *Leda* is likely to have made other mistakes in identification. The British Museum collection also contains a series of Portland fossils, acquired from R. F. Damon, and including the original specimens of most of the figures in his *Handbook to the Geology of Weymouth and the Island of Portland* (1860), besides smaller series collected by W. Cunnington, P. B. Brodie, and others. The Museum of Practical Geology contains some of W. Cunnington's material, as well as collections made nearly a century ago by Fitton, and by Buckland and De la Beche, when preparing their well-known memoirs, referred to later. The Hudleston and Blake Collections contain, in addition to material from the Dorset Coast, important series of fossils from the various quarries and other sections in which the Portland Beds are exposed in the counties of Wiltshire, Oxfordshire, and Buckinghamshire.

All this material has proved to include a further number of undescribed species, while it supplies new records for many species already described, including some which have not previously been identified from this country. The time is scarcely ripe for a complete monograph of the British Portlandian fauna, since I have every reason to believe that further collecting both from Portland and from inland localities will add a good many more species to the list. Since there is no immediate prospect

of obtaining the material on which such a monograph could be based, it seems desirable to publish a synopsis of the lamellibranch and gastropod fauna of the Portland Beds, as represented in the above-mentioned collections; this will bring the nomenclature of previously known species up to date besides including descriptions of the new species, and should serve as a basis for further work.

As here understood, the Portland Beds comprise the Portland Sand and Portland Stone of the Dorset Coast and the contemporaneous deposits of other districts. The term "Portland Stone" needs no definition, so far as Dorset is concerned, but the Portland Sand grades into the Kimmeridge Clay below, and some arbitrary stratum must be taken as its base. Fitton (1836, *Trans. Geol. Soc.*, 2nd. ser., Vol. IV, p. 210), who was responsible for the introduction of this term, estimated the thickness of the Portland Sand on Emmet's Hill, west of St. Alban's Head, as 120 to 140 feet. Blake (loc. cit., p. 195) took 280 feet as the thickness of the Sand in the same locality. H. B. Woodward (1895, "Middle and Upper Oolitic Rocks of England," *Mém. Geol. Surv.*, p. 180) estimated 130 to 170 feet, and Strahan (1898, "Geology of the Isle of Purbeck and Weymouth," *Mém. Geol. Surv.*, pp. 60, 62) gave 100 to 120 feet, taking as the base of the Sand a sandstone-band (the "Massive Bed," see below) which forms a conspicuous feature in the cliff at Hounstout. This interpretation agrees closely with Fitton's original estimate and is the one here adopted, although, so far as the lamellibranch fauna is concerned, the matter is of little importance, as the same species range throughout. Buckman (1926, "Type Ammonites," Vol. VI, p. 33) takes the base of the Sand about 50 to 60 feet lower, in accordance with the colouring of the Geological Survey map of 1855.

It is on the Dorset Coast that both divisions of the Portland Beds attain their greatest thickness. Inland, the Portland Sand is either not represented at all, owing to discontinuity in sedimentation, as at Swindon (unless its uppermost beds are there represented by the lowest bed of the local Portlandian

series), or is greatly reduced in thickness, as at Long Crendon, in Buckinghamshire, where, according to Buckman (*loc. cit.*, p.35), less than six feet of strata represent the whole thickness of the Sand of the coast. Unfortunately, earlier workers misinterpreted the sandy beds which are exposed in the Cemetery at Swindon, and near Oxford, on Shotover Hill and at Wheatley, as the equivalent of the Portland Sand, and the rich molluscan fauna of these beds has been listed as a Lower Portland fauna. We now know that these beds are of Upper Kimmeridgian age, and were deposited contemporaneously with the Oil-shales of the Kimmeridge Clay of the type-district. The Hartwell Clay also, a very fossiliferous deposit near Aylesbury which is slightly younger than the sandy beds of Swindon and Shotover, has often been regarded as of Lower Portlandian age, but this too is now known to belong to the Upper Kimmeridgian.

Further confusion has also been introduced into Upper Jurassic stratigraphy by an early mistake on the part of continental geologists, who, attempting to correlate their rocks with those of the type-sequence in Dorset by purely lithological characters, grouped as Portlandian a series of strata which are mainly of Kimmeridgian age. Even though this mistake has long been recognised, conservatism has led to the retention of the term "Portlandian" in this erroneous sense, even by modern continental authors. In the present paper, when referring to the distribution of the various fossils in the French deposits, I have sought to eliminate confusion by citing the stratigraphical subdivision in French. Thus the "Portlandien inférieur" is equivalent to part of our Upper Kimmeridgian, the "Portlandien moyen" to the top of our Kimmeridgian, together with our Portland Sand and the base of the Portland Stone, while the "Portlandien supérieur" represents the rest of our Portland Stone.

A few remarks may be made on the localities from which the fossils listed in the present synopsis were collected.

THE LOWER PORTLAND BEDS, OR PORTLAND SAND. The locality which has yielded the best-preserved Portland Sand mollusca examined by me is below Blacknor, on the west coast of the Isle of Portland, just beyond the collecting ground of the Portland Shell-bed fossils described previously. The sequence here was noted by Blake (loc. cit., p. 192) and, more recently, by Latter (1926, *Proc. Geol. Assoc.*, Vol. XXXVII, p. 82), who gives interesting photographs. Colonel Cunningham sends me the following details of the chief fossiliferous beds, as noted by him :

Shell-bed, forming base of Portland Stone.

5. Blue marl.
4. Bed with large ammonites (15 ft. below the Stone).
3. Liver-coloured sandy marl, containing, 30 ft. below the Stone, a bed yielding *Trigonia* and other lamelli-branches.
2. *Exogyra*-bed (40 ft. below the Stone). A hard black rock, about 5 ft. thick, composed largely of *Exogyra bruntrutana*, but yielding also several other species of lamellibranchs, and a few gastropods, moderately well preserved. It also contains echinoid radioles.
1. Sandy beds, with cement-stones, yielding a large *Trigonia*, *Buchia* (= *Aucella*), *Discinisca*, etc. These beds grade below into Kimmeridge Clay.

The sequence at St. Alban's Head was also noted by Blake (loc. cit., p. 195) and, more recently, by Latter (loc. cit., p. 76). The beds are more accessible at Hounstout, and a photograph of the section here and details of the sequence (based largely on observations made by Mr. C. H. Waddington) have been published by Buckman (loc. cit., pp. 29-31). The following are Mr. Waddington's details of the most important beds, from the fossil-collecting point of view :

Portland Stone.

3. Cement-stone Series (about 100 ft. thick). Two bands, the "Upper Sandstone" above, and the "Cement-stone" below, are prominent in the upper part of this

series, and a conspicuous, light-coloured band (the "Stinkstone") in the lower part, about 60 ft. below the top of the Sand. A fourth, and less prominent, cement-band, bluish in colour, occurs near the base of this series.

2. "Massive Bed." About 5 ft. of massive yellow and blue sandstone, forming the most conspicuous datum line in the cliff. Buckman figures specimens of this rock, containing *Rhynchonella portlandica* Blake.
1. Below are sandy marls, grading down into Kimmeridge Clay.

In the inland counties, the thin series of beds which in places correspond to the Portland Sand of the coast are at times quite fossiliferous, although the preservation of the fossils is often unsatisfactory. The only fossils from these beds examined by me are a series from Long Crendon, Bucks., kindly submitted to me by Mr. C. H. Waddington. Details of the sequence at this locality are given by Buckman (loc. cit., p. 35).

THE UPPER PORTLAND BEDS. The sequence at Portland needs no further description. The most fossiliferous rocks are the Shell-bed, at the base of the Stone, and the Roach, at the top. These two beds present a marked contrast in the state of preservation of the included fossils, those of the lower bed occurring as well-preserved, although re-crystallised, shells, while those of the Roach are merely moulds. Attention must, however, be called to the existence of a bed of chert at the very top of the Roach, and accessible, for example, near the Blacknor Battery. This bed contains a peculiar and apparently dwarfed fauna, and its silicified fossils are very well preserved; they represent many of the species which occur as moulds in the Roach proper. This bed was known to Damon, but he refers to it (1884, op. cit., 3rd. Edit., p. 89) as occurring at the base of the Roach. Were it possible to explore it systematically, it would probably yield a number of species in addition to those listed in the present synopsis.

Except in the Isle of Portland, the Portland Stone of the Dorset Coast offers but little variety to the collector, and I was unable to trace the shell-bed which, according to Blake, forms the basement of the Stone at St. Alban's Head. The Hudleston Collection, however, includes a series of shells localised as "Seacombe," apparently indicating the presence of a comparable bed at that locality, which lies some distance to the east of St. Alban's Head.

In conclusion, a brief reference must be made to some of the inland exposures of the Upper Portland Beds. More detailed accounts will be found in Blake's paper and in H. B. Woodward's memoir, referred to above. The exposures of the Vale of Wardour were known to collectors long ago, and were described in Fitton's memoir (*loc. cit.*, pp. 253-255), and, long afterwards, by Blake (*loc. cit.*, pp. 200-202). The soft, chalky limestone of Chilmark is particularly fossiliferous, and was the source of a number of species described in the present synopsis. The old quarries at Chicks Grove also yielded many fossils a century ago, particularly to Miss Benett, whose "Catalogue of the Organic Remains of the County of Wilts," (1831) contains the first published figures of several Portlandian species. At Swindon, the Okus Quarry shows a fine section of the lower beds of the Upper Portland succession, with the highly fossiliferous "Cockly Bed" not far from the base, but it is difficult to collect well-preserved fossils there. Higher beds of the Portlandian sequence are exposed elsewhere in the district. In the Oxford district, the Upper Portland Beds are found at Shot-over Hill and elsewhere, but nowadays it is difficult to collect many fossils. It is in Buckinghamshire that some of the most fossiliferous localities are situated, and the Hudleston Collection, in particular, contains fine series from such localities as Quainton, Brill, Long Crendon, Lodge Hill, Coney Hill (near Over Wichenden), and the Aylesbury district. In this county the most important fossiliferous beds are, to use Blake's terminology, the "Creamy Limestones" towards the top of the

Upper Portland sequence, and the " Rubbly Beds " towards the base. There can be no doubt that further collecting from this district also will increase considerably the list of species found in the British Portland Beds.

SYNOPSIS OF THE BRITISH PORTLANDIAN LAMELLIBRANCHIA AND THEIR DISTRIBUTION.

To economise space, the following abbreviations are used to indicate the collectors of the specimens recorded and the museums in which the specimens are deposited, and also the authorities for other records :

R.H.C.	Lt.-Col. R. H. Cunningham Coll.
L.R.C.	L. R. Cox Coll.
W.F.H.	W. F. Hudleston Coll.
C.H.W.	C. H. Waddington Coll.
B.M.	British Museum (Natural History).
M.P.G.	Museum of Practical Geology.
J.F.B.	J. F. Blake Coll., if following the letters " B.M. " ; if alone, meaning " on the authority of J. F. Blake."

In certain cases, such as when the species are described as new, the registration numbers of specimens belonging to the above-mentioned museums are also quoted. For permission to borrow specimens belonging to the Museum of Practical Geology, the Sedgwick Museum, and the Dorset County Museum, I have to thank respectively Dr. F. L. Kitchin, Prof. J. E. Marr, and the Dorset Museum Committee.

The order followed for the families in the following synopsis is roughly that adopted in Dall's section on the Pelecypoda (Lamellibranchia) in Eastman's English Edition of Zittel's " Text-book of Palaeontology " (1913). In the allocation of the various heterodont genera to their respective families I have been guided mainly by the views expressed by Douvillé in his paper of 1921, although it must be remembered that in Jurassic

times some of the families in which Recent genera are grouped had scarcely become differentiated. It is difficult to fit the genera *Sowerbya* and *Quenstedtia* into any existing families, so that each is here elevated into a distinct family. Where a species was discussed in my previous paper, usually the only reference which is now given is to that paper, where a fuller synonymy will be found. It has been thought unnecessary to furnish any details concerning the type-specimens of the species which were there described as new, since such information was given with the original descriptions.

In the account of the fossils, works on Upper Jurassic palaeontology which are referred to are cited by the author's name and the date. A list of these works is given at the end of the paper.

FAMILY NUCULIDAE.

1. *Nucula lorioli* Cox.

1925, p. 123, pl. i, figs. 1a, b.

Occurrences. Upper beds of Portland Sand of St. Alban's Head (B.M., L.44267, L.R.C.). Shell-bed of Portland (type-occurrence). Chert-bed of Portland Roach (B.M., L.42104-5, R.H.C.).

Remarks. Blake (1880, p. 217) records a *N. depressa* from the Creamy Limestones of Bucks.; this appears to be a *nomen nudum*. In his table (p. 226) he does not mention *N. depressa*, but records *N. obliquata* Blake from the beds in question. This species was first described from the Lower Kimmeridgian, but I have seen specimens from the Hartwell Clay. Blake's record, however, probably refers to *N. lorioli*, which is less inequilateral.

2. *Nuculana dammariensis* (Buvignier).

Cox, 1925, p. 124, pl. i, figs. 2a, b.

Occurrences. Shell-bed of Portland. Portland Stone of Hartwell (B.M., L.41171, H. le Strange). "Portlandien supérieur" of the Meuse (type-occurrence). "Portlandien moyen" of Yonne and the Haute Marne.

Remarks. This species was referred by me previously to a subgenus *Isonuculana*, proposed as a substitute-name for

Nuculopsis Rollier, non Girty and *Isoleda* Rollier, non de Ryckholt. This proves to be a synonym of *Rolliceria* Cossmann, which was proposed in 1920 (*Rev. Crit. Paléozool.*, xxiv, p. 82) in the same connexion, actually three years before Rollier proposed *Isoleda*. Unfortunately, however, the species *Nucula palmarum* Sow. was cited as genotype. Although this was interpreted as a Middle Lias species by Quenstedt, Dumortier, and Oppel, it actually came from the Carboniferous Limestone; most probably Sowerby's abbreviation "M.L.", used in his index to indicate the horizon, was taken to mean "Middle Lias" instead of "Mountain Limestone." It is therefore doubtful if this subgenus is strictly applicable to Jurassic shells at all, but in any case its distinctive characters are not very important.

Blake (1880, p. 233, pl. ix, fig. 16) figures a "*Leda* sp." from the Freestones of Swindon, but I find that this specimen (B.M., L.20330) is a *Corbula*.

FAMILY ARCIDAE.

3. *Arca* sp.

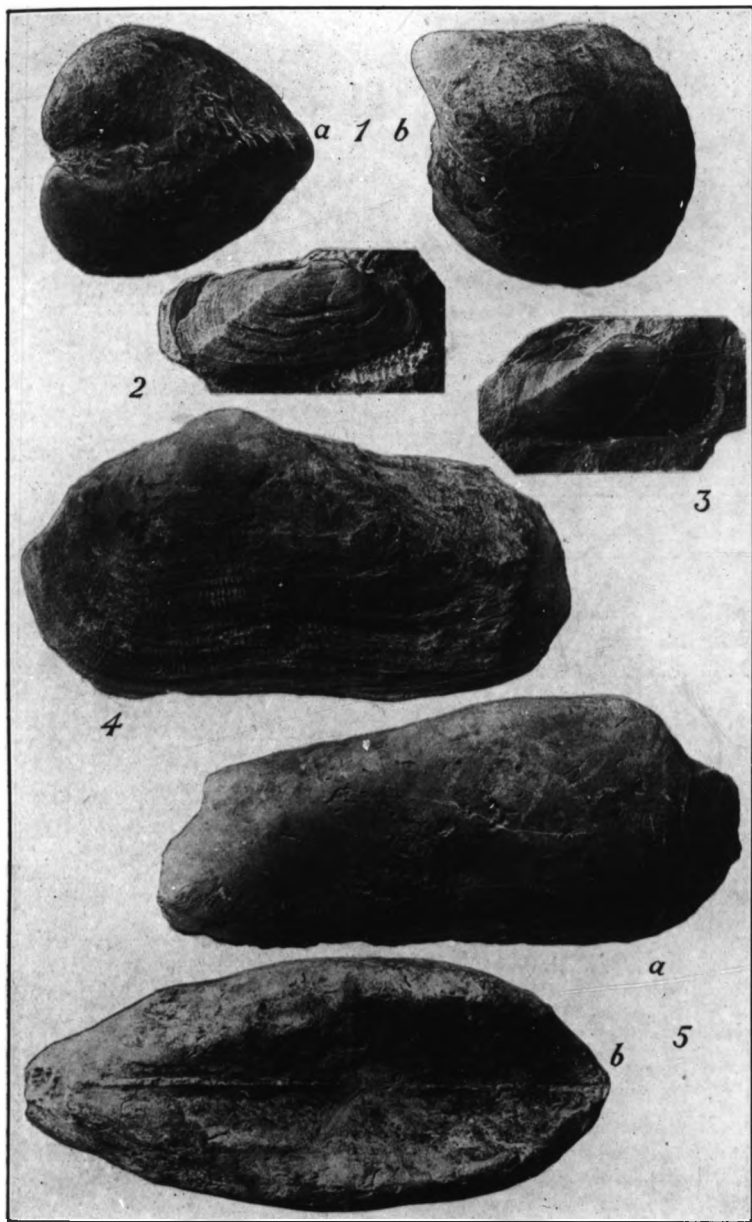
Occurrence. Portland Roach (B.M., L.52297-8, R.H.C.).

Remarks. This species, which is probably new, is known to me only by specimens too fragmentary to describe. A portion of the mould of the hinge-teeth is preserved, and shows that they were of the taxodont type. I have not seen an external mould. The original length of the shell must have been at least 50 mm.

4. "*Arca*" *foetida*, n.sp. Pl. I, figs. 2, 3.

Occurrences. Portland Sand ("Stinkstone") of Hounstout, abundant (Holotype, C.H.W.). Hartwell Clay (B.M., 34539).

Specific characters. Shell of medium size, sub-rectangular, elongate, about three times as long as high, very inequilateral, smooth except for pronounced growth-rugae. Umbones broad, depressed, contiguous, situated at about the anterior third. No cardinal area. Posterior slope with an obtuse ridge running from the umbo to the postero-ventral corner of the shell, delimiting a slightly concave posterior area which is limited on its dorsal side by a second and equally prominent ridge, just below the margin. Posterior margin



sub-vertical, very feebly convex. Ventral margin sub-parallel to the hinge-margin, and straight except for an ill-defined emargination below the umbo, corresponding to a broad, shallow depression of the flank. Anterior end of shell rounded and moderately low. Internal characters unknown.

Dimensions. Holotype : Length, 34.0 mm., height, 14.5 mm. The inflation cannot be estimated, since this, like all the other specimens, is crushed.

Remarks. This species is doubtfully referred to the Arcidae ; it has not the broad cardinal area of a *Parallelodon* and also differs from that genus in its smooth exterior. Since its hinge is unknown, it must be described provisionally under *Arca* s. lat. It is probably the species which Blake records from the Portland Sand as *Arca velledae* de Loriol. The latter species (sec de Loriol, 1868, p. 180, pl. xi, fig. 17), which comes from the "Portlandien moyen" of Yonne, is less elongate, while the ridge which limits its posterior area is less defined and the area itself has a well-marked median fold.

It is worthy of notice that in shape "*A*" *foetida* is very similar to a *Corbula* (apparently undescribed) which occurs in our Wealden beds. It is, however, much larger.

5. *Barbatia cavata* (de Loriol).

Cox, 1925, p. 125, pl. i, figs. 3-6.

Occurrences. Portland Sand of Gad Cliff (doubtful cast, B.M., R.H.C.). Shell-bed of Portland. "Cockly Bed" of Swindon ; Creamy Limestones of Coate and of Crouch's Pit, Aylesbury (M.P.G., W.F.H.). Rubbly Beds of Aylesbury (B.M., L.20343, J.F.B.). "Portlandien moyen" of the Boulonnais (type-occurrence) and "Portlandien supérieur" of the same district.

Remarks. This species includes *Arca beaugrandi* de Loriol in its synonymy. The specimen from the Rubbly Beds of Aylesbury referred to above was figured by Blake (1880, pl. ix, fig. 8) as *Sowerbya longior*.

6. *Isoarca* ? sp. Pl. I, figs. 1a, b.

Occurrence. Portland Sand (*Exogyra*-bed) of Blacknor, Portland (B.M., L.52339, R.H.C.).

Remarks. The single specimen referred with doubt to this genus is a gibbose internal cast, which is very inequilateral, with

acute, prosogyrous, terminal umbones, and is obliquely produced in a postero-ventral direction. The posterior slope is not ridged; in the left valve it bears traces of a curved groove running from the umbo to the posterior margin and possibly corresponding, as in *Cucullaea*, to the track of the platform for the attachment of the adductor muscle. Unfortunately, the details of the hinge are not visible.

It is doubtful whether this cast belongs to *Isoarca* or to a *Cyprina*-like genus. It rather resembles the Tithonian species, *Isoarca explicata* and *I. alta*, as figured by Boehm (1881, p. 165, pl. xxx, figs. 1-5, pl. xxxi, figs. 1, 2), but there are obvious differences in shape. Some resemblance may also be traced between it and the Kimmeridgian shell, *Isocardia cornuta* Kloeden, especially as figured by Seebach (1864, p. 126, pl. iv, figs. 3a-d), but the posterior slope of that species is sharply carinate.

7. *Parallelodon dorsetensis* Cox. Pl. I, fig. 4.

1925, p. 127, pl. i, figs. 7a, b & pl. ii, figs. 1a, b & 2.

Occurrences. Shell-bed of Portland (type-occurrence). Roach of Portland (B.M., L.52299-302, R.H.C.). Portland Stone of Crouch's Pit, Aylesbury, and of Quainton (M.P.G., W.F.H.).

Remarks. Like other species of the same group, *P. dorsetensis* is very variable both in its outline and its inflation. The best-preserved specimen examined, from Quainton, is here figured; it is much larger than the holotype and more rectangular in shape, while its byssal gape is less pronounced. Moulds of what appears to be this species are not uncommon in the Roach, the impressions of the hinge-teeth and of the external ornamentation being well preserved.

8. *Parallelodon* cf. *nobilis* (Contejean). Pl. I, figs. 5a, b.

Arca nobilis Contejean, 1859, p. 294, pl. xvii, figs. 14-17; Thurmann and Étallon, 1862, p. 210, pl. xxvi, fig. 9.

Occurrences. Portlandian (? Rubbly Beds) of Aylesbury (M.P.G., 48765-6, collector unrecorded). [Upper Kimmeridgian of Montbéliard (type-occurrence) and of Switzerland].

Remarks. This species is represented by two internal casts, which differ from *P. dorsetensis* in being more inequilateral and elongate. The length, height, and inflation of one specimen are respectively 86 mm., 31 mm., and 42 mm.; those of the other are 80 mm., 31 mm., and 32 mm. In its size and shape this species is very similar to *P. nobilis*, but its external characters are unknown. The dentition appears to have been that of a *Parallelodon*.

FAMILY PINNIDAE.

9. *Pinna constantini* de Loriol.

P. viminea J. de C. Sowerby, in Buckland and De la Beche, 1835, p. 20 (*nom. nud.*).

P. constantini de Loriol, 1875, p. 161, pl. xix, fig. 2.

Occurrences. Portland Sand of Corton, near Weymouth (M.P.G., Geol. Soc. Coll., 2932, Buckland and De la Beche), and of Portland (B.M., L.52405, R.H.C.). "Portlandien moyen" of the Boulonnais (type-occurrence).

Remarks. The original specimen listed by Sowerby as *P. viminea*, but unfortunately never described, consists of the major part of a shell which originally must have been about 250mm. in length. Although well preserved for a specimen from the Portland Sand, it has been rather distorted by pressure, so that the distance between the two valve margins now corresponds to the smallest, instead of the greatest, diameter. Each valve has a median longitudinal ridge, and the entire surface on the dorsal side of this ridge, together with the upper half of the surface on its ventral side, is ornamented with prominent, rounded, longitudinal ribs, which are unequal in strength and irregularly spaced; the intervals between them are flat and smooth; there are about 12 ribs above, and eight or nine below, the ridge. The surface between the ribbed area and the ventral margin is ornamented with much finer, wavy longitudinal threads, which swell out in places so as to have rather a scaly appearance; these are crossed by wide, oblique folds, which follow the direction of the growth-lines and curve round so as to meet the margin tangentially.

In its size and ornamentation this specimen agrees very well with de Loriol's *P. constantini*. *P. suprajurensis* d'Orbigny is smaller and has fewer ribs, while it lacks the growth-folds of the ventral region. The second specimen mentioned above, from Portland, is merely a crushed fragment, but it probably belongs to the same species.

FAMILY **ISOGNOMONIDAE** (= **PERNIDAE**).

10. *Isognomon bouchardi* (Oppel).

Perna bouchardi Oppel, 1858, p. 720; de Loriol, 1867, p. 99, pl. x, fig. 1; 1875, p. 167, pl. xxi, figs. 1, 2; Lewinski, 1923, p. 55, pl. ii, figs. 6-9.

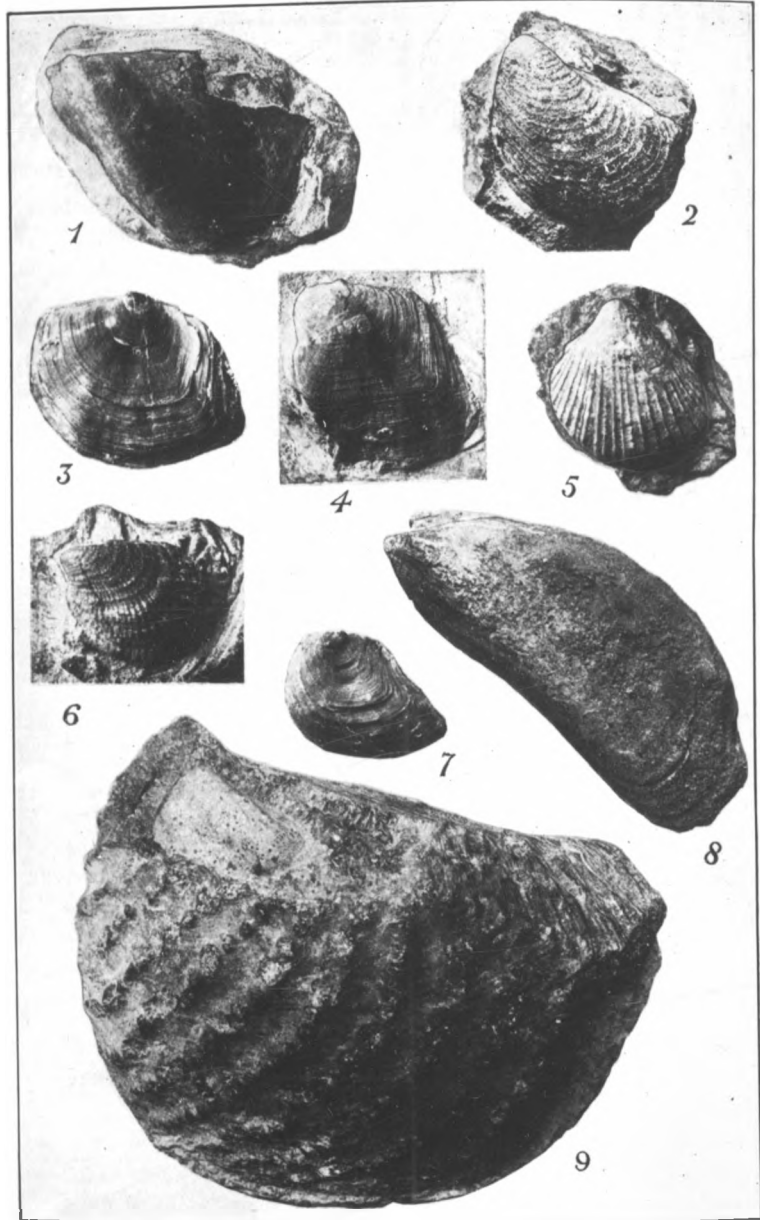
Perna mytiloides Damon, 1860, p. 79, text-fig. 38 (*non* Hermann sp.).

(Iredale, 1915, *Proc. Malac. Soc.*, xi, p. 303, has shown that the earliest name for the genus which is usually known as *Perna* was *Isognomon* Solander, 1786. *Perna*, which dates from Retzius, 1788, is a synonym of *Mytilus*. *Pedalion* Solander MS., Huddesford, 1770, was listed as an English vernacular name, and is not available.)

Occurrences. Abundant throughout the Portland Stone series at most localities. "Portlandien moyen" of the Boulonnais (type-occurrence) and at about the same horizon in Poland.

Remarks. Two species of this genus, namely, *I. bouchardi* and *I. mytiloides*, figure in most lists of British Portlandian fossils. Blake (1880, p. 192) also refers to the presence of a broad species resembling *I. flamberti* (Dollfus) in the Flinty Series of Portland, but the species referred to is probably *I. bouchardi*. In view of the difficulty which specific discrimination in this genus presents, it is difficult to say whether the *I. mytiloides* of authors is distinct from *I. bouchardi*, which is typically rather a wider shell. I consider it preferable to regard them as the same species. While specimens are usually sub-rectangular in shape, some are considerably expanded ventrally, and assume a sub-trigonal outline.

The true *I. mytiloides*, which came from the Inferior Oolite of Gundershofen, in Alsace, was first described (under *Ostrea*) by Hermann (1781, *Schrift. Berlin. Ges.*, ii, p. 276, pl. ix, fig. 9), and is an obliquely elongate shell with an acute apex; it is not in the least like the quadrated species figured under the same name by Goldfuss and other authors.



L. R. Cox, photo.

PLATE II.

11. *Inoceramus cunningtoni* Cox.

1925, p. 128, text-fig. 1.

Occurrence. Shell-bed of Portland.

FAMILY PTERIIDAE (=AVICULIDAE).

12. *Pteria* sp.

Occurrence. Portland Sand (30 ft. from top) of Blacknor, Isle of Portland (B.M., L.52421, R.H.C.).

Remarks. This species, represented only by a fragment showing the mould of the umbonal region and posterior wing of the left valve, resembles *Pt. credneriana* (de Loriol) (1867, p. 94, pl. ix, fig. 7) in its size and general shape, but its umbonal region is prominent and inflated, while the umbo of the French species is described as small and depressed. *Pt. credneriana* comes from the "Portlandien inférieur," i.e. from a horizon considerably below our Portland Sand.

13. *Pteria chilmarkensis*, n.sp. Pl. II, fig. 1.

Occurrence. Portland Stone of Chilmark (Holotype, M.P.G., 48585, W.F.H.).

Specific characters. Shell (known only by left valve) of medium size, very inequilateral, rather compressed. Obliquity (measured by the angle between the hinge-margin and the line joining the umbo to the point most remote from the hinge-margin) about 60 degrees. Most inflated region situated along the axis of obliquity, at a point somewhat above half-way from the umbo to the ventral margin. Umbo small and depressed. Anterior wing small; anterior margin slightly sinuate. Posterior wing expanded, probably tapering to a point (the posterior part of the hinge-margin is, however, broken away in the specimen studied). Surface smooth. Details of hinge unknown.

Dimensions. Length, 38 mm., height, 26 mm., inflation, 6 mm.

Remarks. This species is known to me only by the holotype. It is readily distinguished from *Pt. credneriana* (de Loriol) (1867, p. 94, pl. ix, fig. 7) by its greater obliquity. *Pt. modiolaris* (Münster) (in Goldfuss, 1836, p. 131, pl. cxviii, fig. 5), from the French Kimmeridgian, is closely comparable, but is wider and slightly less oblique. *Pt. subobliqua* (Alth) (1882, p. 290, pl. xxvii, fig. 8), from the Polish Kimmeridgian, is very similar

in shape, but smaller. Hudleston's records (1881, *Proc. Geol. Assoc.*, vii, pp. 168, 172) of the occurrence of *Pl. modiolaris* and *Pl. credneriana* in the Portland Stone of the Vale of Wardour may refer to the species now described.

14. *Pseudomonotis portlandica*, n.sp. Pl. II, fig. 5.

Occurrence. Shell-bed (?) of Portland (Holotype, M.P.G., 48764, collector unrecorded).

Specific characters. Shell small-medium, sub-orbicular, slightly inequilateral, slightly oblique; ventral margin strongly convex, forming almost a semicircle. Left valve gibbose, with the most inflated region situated at about its centre. Umbo prominent, acute. Hinge-line short. Auricles small, the posterior slightly larger than the anterior. Radial ornamentation consisting of about 23 narrow, unequally spaced, obscurely barbed riblets, separated by flat interspaces, in the centre of some of which a much weaker secondary riblet is developed. Concentric ornamentation inconspicuous. Right valve unknown.

Dimensions. Length, 12.5 mm., height, 12.5 mm., inflation, 6.5 mm.

Remarks. This species also is only represented by the holotype. It is very similar to the Middle Jurassic species, *Ps. echinata* (W. Smith), but is slightly more convex. *Avicula douvillei* de Loriol (1875, p. 163, pl. xx, figs. 3-6), from the French Sequanian, is proportionately higher, although its ornamentation is closely comparable.

15. *Oxytoma octavia* (d'Orbigny).

Avicula octavia d'Orbigny, 1850, *Prodrome*, ii, p. 61; de Loriol, 1867, p. 95, pl. viii, figs. 7-9.

Occurrences. Portland Sand (lower part) of Gad Cliff and Hounstout ("Massive Bed") (B.M., R.H.C. & L.R.C.). Portland Sand (concretion bed below *Exogyra*-bed) of Portland (B.M., R.H.C.). "Portlandien moyen" of Boulogne (type-occurrence).

Remarks. A well-characterised species with one secondary riblet alternating with each primary rib.

FAMILY MYALINIDAE.

16. *Buchia masquensis* (v. Buch). Pl. II, fig. 2.

Avicula concentrica J. de C. Sowerby, in Buckland and De la Beche, 1835, p. 20 (*nom. nud.*).

Avicula mosquensis v. Buch, 1844, *Neues Jahrb. Min.*, p. 537, pl. vi, fig. 1. *Aucella mosquensis* Pavlow, 1907, p. 22, pl. ii, figs. 5-8 (with full synonymy); Dutertre, 1927, p. 407, pl. xx, fig. 3.

Aucella pallasi Keyserling, 1846, "Wissensch. Ergebn. Reise Petschora-Land," p. 299, pl. xvi, figs. 1-6; Lahusen, 1888, *Mém. Com. Géol. St. Pétersb.*, viii (i), pp. 9, 34, pl. i, figs. 12-17, 19-20.

(The generic name *Buchia* Rouillier, 1845, *Bull. Soc. Imp. Nat. Moscou*, xviii, p. 289, founded on *A. mosquensis*, has priority over *Aucella* Keyserling, 1846).

Occurrences. Portland Sand of Portland (Cement-stones), Gad Cliff (B.M., R.H.C.) and of Corton (M.P.G., Geol. Soc. Coll., 2931, Buckland & De la Beche, originals of *Avicula concentrica*). Passage beds, below Portland Sand, of Hounstout (C.H.W.). Upper Kimmeridgian, *pectinatus*-Zone, of Shotover Hill, near Oxford (Pavlow). Kimmeridge Clay of Devizes (B.M.). "Portlandien moyen" of the Boulonnais. Upper Kimmeridgian of Pomerania (Schmidt) and Poland (Lewinski). Lower Volga Stage of Russia (type-occurrence).

Remarks. Attention has not previously been called to the abundance of this genus in our Portland Sand, and Pavlow, when preparing his elaborate monograph of *Aucella*, could only find three British Jurassic specimens, all from the Kimmeridgian, in the various English Museums. The hand-specimen from which the original specimens of *Avicula concentrica* were obtained is crowded with individuals, and small specimens abound in the cement-stones below the *Exogyra*-bed at Portland. A considerable number of species are described in Pavlow's monograph (he refers the three British specimens seen by him to three distinct species), but in their general shape the specimens from the Portland Sand appear to be closest to *B. mosquensis*, the first representative of the genus to have been described. They are ornamented with fine, narrow, concentric ridges, which are about .75 mm. apart.

FAMILY OSTREIDAE.

17. *Ostrea expansa* J. Sowerby.

Cox, 1925, p. 130.

Occurrences. Throughout the Portland Stone series at most English localities (type-locality, Tisbury, location of Holotype unknown). In France it does not seem to occur at this horizon, since de Loriol

records it only from the "Portlandien moyen," the equivalent of our Portland Sand and uppermost Kimmeridgian; Lewinski records it from the same horizon in Poland as in France. Judging by the figure given by de Loriol (1867, pl. xi, fig. 4), the French specimens are much thinner than the average British Portland Stone specimen, and are closer to the Kimmeridge Clay species, *O. delta* W. Smith (*delloidea* Sow.). I have seen no specimens from our own Portland Sand.

Remarks. Besides *O. expansa*, the species *O. lacviuscula* Sow. is listed in H. B. Woodward's memoir (1895) as occurring throughout our Portlandian rocks. This is a Kimmeridge Clay species, possibly synonymous with *O. delta*; records from the Portlandian probably refer to thin specimens of *O. expansa*.

18. *Ostrea bononiae* Sauvage.

O. bononiae Sauvage, in Sauvage & Rigaux, 1871, *Journ. de Conch.*, xix, p. 354; 1872, *ibid.*, xx, p. 175, pl. x, fig. 8; de Loriol, 1875, p. 212, pl. xxiii, fig. 9 & pl. xxiv, fig. 16.

O. matronensis de Loriol, 1872, p. 396, pl. xxiii, figs. 5-7.

Occurrences. Portland Sand ("Massive Bed" and "Stinkstone") of Hounstout (B.M., L.R.C.; C.H.W.); *Exogyra*-bed of Portland Sand, below Blacknor, Portland (B.M., R.H.C.). *Virgatites*-Zone of Upper Kimmeridgian, upwards, in Kent borings (Lamplugh, Kitchin & Pringle). Blake records this species also from the Creamy Limestones of Bucks. Top of "Portlandien inférieur" and throughout the "Portlandien moyen" of Boulogne (type-occurrence).

Remarks. This is an oval or orbicular species of moderate size, which is either smooth or grows attached to, and acquires the ornamentation of, ammonites and other bodies. In H. B. Woodward's memoir (1895), *O. diriuscula* Phillips is also recorded from the lower beds of the Portlandian. This is a Malton Corallian species, and the record from the Portlandian probably refers to *O. bononiae*.

19. *Ostrea chicksgrovensis*, n.sp. Pl. II, figs. 3, 4 & 7.

Occurrence. Chalky beds of Chicks Grove, near Tisbury (Holotype, B.M., 24809, Mantell Coll.; figured paratypes, B.M., 10143, Mantell Coll., and M.P.G., 48597, ex Geol. Soc. Coll., Miss E. Bennett).

Specific characters. Shell fairly small, sub-quadrate, very slightly oblique. Upper valve feebly convex, with its umbo very small and forming a thorn-like projection from near the middle of a long,

straight hinge-margin, which usually represents nearly the maximum length of the shell, although in some specimens the ventral margin may be longer. Posterior margin making a right or slightly obtuse angle, anterior margin a slightly larger angle, with the hinge-margin. Ventral margin straight or slightly convex, making a well-defined angle with the anterior margin, and either meeting the posterior margin in a curve or making an angle with it. Surface of shell ornamented with delicate, closely spaced growth-threads, more pronounced growth-undulations occurring at intervals, especially near the ventral margin, towards which the marginal region of the shell may slope steeply.

Dimensions. Holotype : Length, 30 mm., height, 23 mm.

Remarks. This is a well-defined species, and is certainly not the young shell of *O. expansa*; its quadrate shape is very characteristic. *O. multiformis* Koch & Dunker is similarly characterised by delicate filose ornamentation, but is much higher in proportion to its length and much less constant in shape. I have seen no British Portlandian specimens which are referable to *O. multiformis*, although it figures in Blake's list of Portlandian species. Its type-horizon is considerably lower.

20. *Ostrea blakei* Cox.

1925, p. 131, pl. iii, figs. 4-6.

Occurrences. Shell-bed of Portland (type-occurrence). Portland Stone of Chilmark (M.P.G., W.F.H.), and of Swindon (B.M., L.22280, Caroline Birley Coll.). *Trigonia gibbosa* Sands of "Portlandien supérieur," of Boulogne (Prof. P. Pruvost *in litt.*).

Remarks. This species is rather like *O. dubiensis* Contejean (1859, p. 320, pl. xxi, figs. 4-11), which, although first described from beds of Lower Kimmeridgian age, is abundant in the "Portlandien moyen" of the Boulonnais (de Loriol, 1867, p. 115, pl. xi, figs. 2-3). *O. blakei* is narrower, more inequilateral, and more lunate in shape. A closely comparable species also occurs in the Upper Kimmeridgian of Poland, and has been described by Lewinski (1923, p. 66, pl. iii, figs. 9-11) as *Exogyra virguloides*; like *O. dubiensis*, it appears to be rather wider and less lunate than *O. blakei*.

21. *Ostrea damoni* Cox.

1925, p. 131, pl. iii, fig. 7.

Occurrence. Shell-bed of Portland:

Remarks. This peculiar form is known only by the holotype. It is possible that it may be an abnormal specimen of *O. blakei* in which pronounced plications have developed, for some unknown reason.

22. "*Ostrea*" *flabellosa* Damon.

1888, "Geology of Weymouth," Supplement, 3rd edit., pl. xx, fig. 9.

Occurrence. Portland Stone of Portland (Holotype, B.M., L. 6793).

Remarks. The holotype is an internal mould, with a small amount of crystalline calcite adhering in places and representing the original shell. There are a few obtuse plications near the margins. A large, orbicular muscle-scar lies at the centre of the mould, but the nature of the hinge cannot be seen. This specimen probably came from the Portland shell-bed and I am very doubtful if it is an oyster at all. In my previous paper I recorded the oyster, *O. solitaria* J. de C. Sowerby, from the shell-bed. This record was based on a calcitic specimen, elongate-ovate in shape, with a few smooth, sharp, dichotomising folds radiating from the umbo to the inferior margin; it bears a very close resemblance to the specimen figured as "*O. aff. solitaria*" by Boehm (1883, pl. lxx, fig. 23). A small portion happened, however, to be hidden by matrix, and development led to the unexpected discovery that this is merely a specimen of *Plicatula boisdini* in which the surface details have been eroded away, giving it an oyster-like appearance. The folds, where they had been obscured by the matrix, bear spines just like those of normal specimens of the *Plicatula*. It seems very probable, therefore, that Damon's *O. flabellosa* may be a *Plicatula* which has been similarly eroded.

O. solitaria, which is typically a Corallian species, figures in most lists of Portlandian species. Damon states that it occurs in the Portland Curf, while Blake lists it from the Portland Sand of Dorset, from the Swindon Freestone, and from the Rubbly

Beds and Creamy Limestones of Bucks. and Oxon. I have, however, seen no specimens in the various collections examined. A shell from Crookwood is exhibited in the Museum of Practical Geology under this name, but it is undoubtedly a *Plicatula*. On the whole, the records of *O. solitaria* from the English Portlandian do not appear to be sufficiently authentic for the species to be retained on the list.

23. *Exogyra thurmanni* (Étallon).

Ostrea thurmanni Étallon, in Thurmann & Étallon, 1862, p. 273, pl. xxxviii, fig. 7; de Loriol, 1867, p. 111, pl. x, figs. 7-9; 1875, p. 209.

Occurrences. Portland Sand of Gad Cliff (B.M., R.H.C.). "Portlandien moyen" of Boulonnais. Kimmeridgian of Switzerland (type-occurrence), Germany, etc.

24. *Exogyra bruntrutana* Thurmann.

E. bruntrutana Thurmann, 1830, *Mém. Acad. Strasbourg*, i, p. 13.

Ostrea bruntrutana de Loriol, 1867, p. 113 (with synonymy); 1868, p. 212; 1872, p. 399, pl. xxiv, figs. 7-18; 1875, p. 215.

(?) *O. hemicyclus* J. de C. Sowerby, in Buckland & De la Beche, 1835, p. 20 (*nom. nud.*).

Occurrences. Portland Sand (all horizons) of Dorset. Shell-bed of Portland. Creamy Limestones of Bucks. and Oxon. (J.F.B.). "Portlandien inférieur" to "Portlandien supérieur" of Boulonnais. Corallian and Kimmeridgian of numerous localities.

Remarks. This species forms a thick shell-bed in the Portland Sand below Blacknor, Isle of Portland; the specimens do not seem to differ in any characters from those from lower horizons.

FAMILY TRIGONIIDAE.

25. *Trigonia pellati* Munier-Chalmas.

1865, p. 418, pl. iv, fig. 4; de Loriol, 1867, p. 85, pl. viii, fig. 4; Lycett, 1872, p. 41, pl. vii, figs. 1, 2, pl. xi, fig. 1; de Loriol, 1872, p. 299, pl. xvii, fig. 2; 1875, p. 118, pl. xvii, fig. 2; Bigot, 1893, p. 332, pl. xvi, fig. 4; Skeat & Madsen, 1898, p. 119, pl. ii, fig. 3; Lewinski, 1923, p. 76, pl. vi, fig. 8.

Occurrences. Portland Sand, all horizons, of the Isle of Portland, Gad Cliff, etc. (B.M., R.H.C.). Kimmeridge Clay of Dorset, Wilts., Ely, etc. (Lycett). Hartwell Clay (de Loriol). "Portlandien inférieur" and "Portlandien moyen" of the Boulonnais (type-occurrence), and of the Haute Marne. "Virgulien" of Haute Marne.

"Pterocérien" of Normandy. Upper Kimmeridgian of Poland. Derived Kimmeridge-Portland boulders of Denmark. Blake's record of its occurrence in the Rubbly Beds and Creamy Limestones of Bucks. and Oxon. probably refers to *T. portlandensis* Cox. The Oxford Clay specimen figured as *T. pellati* by Lycett (1877, pl. xxxix, fig. 1) also probably belongs to another species.

26. *Trigonia* cf. *cymba* Contejean.

1859, p. 281, pl. xiv, figs. 1, 2; de Loriol, 1875, p. 124, pl. xvii, fig. 1; Lycett, 1877, p. 192, pl. xxxviii, fig. 1.

Occurrences. Portland Sand of Kimmeridge Bay (Lycett). [Kimmeridgian ("Virgulien") of Montbéliard (type-occurrence) and of the Boulonnais].

Remarks. In the Portland Sand specimen the posterior area is much smoother than in French specimens from the type-horizon.

27. *Trigonia portlandensis* Cox.

T. muricata Lycett, 1872, p. 50, pl. ix, fig. 1 (*non* Goldfuss).

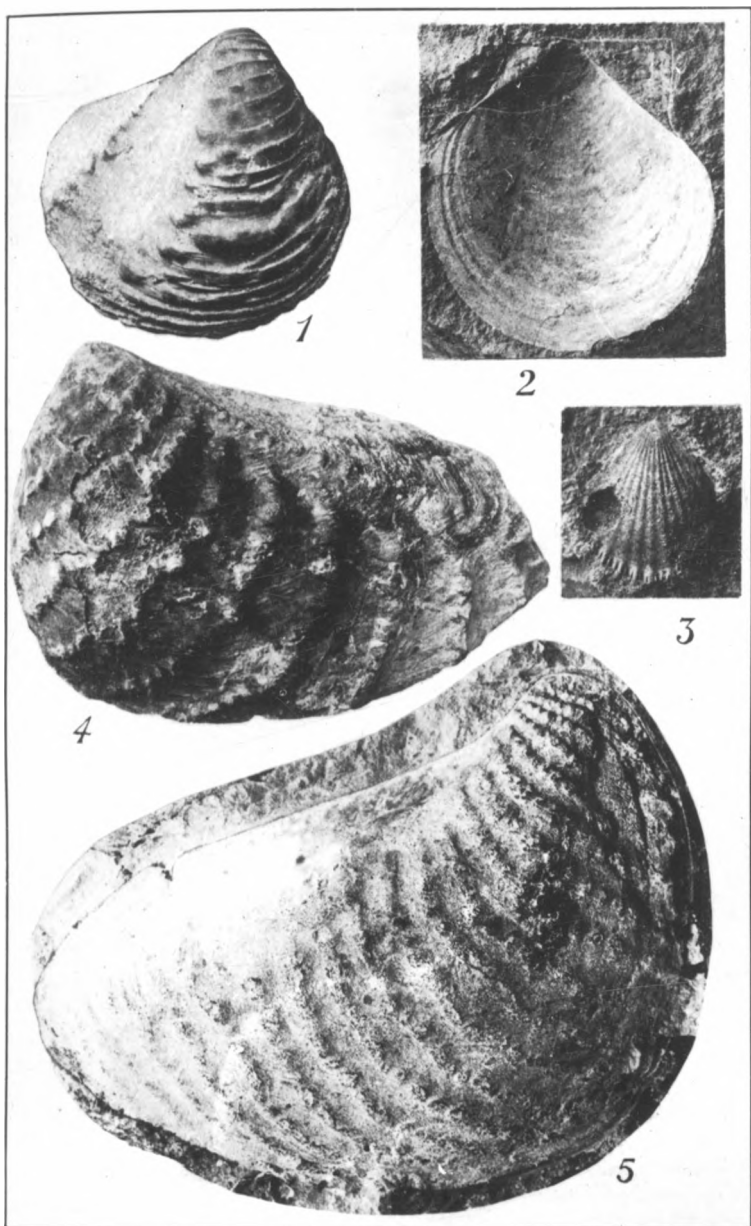
T. portlandensis Cox, 1925, p. 132, pl. iii, figs. 8 & 9a, b.

Occurrences. Portland Sand (Upper Sandstone) of Hounstout (C.H.W.). Shell-bed of Portland (type-occurrence). Portland Stone of St. Alban's Head (Lycett's figured specimen, wrongly localised as "Wilts." in his monograph). Portlandian of Crookwood, near Devizes (B.M., 88928, W. Cunnington). Portland Stone of Swindon, Lodge Hill, Quainton, and Aylesbury (M.P.G., W.F.H.).

28. *Trigonia dorsetensis*, n.sp. Pl. III, fig. 5.

Occurrence. Portland Stone of Dorset, precise locality unrecorded (Holotype, B.M., L. 52320, R.H.C.).

Specific characters. Shell large-medium, elongate, with its height rather less than two-thirds of its length; posterior taper moderately rapid; hinge-margin fairly long, forming an obtuse angle with the posterior margin, which truncates the shell obliquely. Umbones prominent, fairly anterior. Ventral and anterior margins moderately convex, meeting in an open, parabolic curve. Flanks ornamented with narrow and approximately concentric ribs, bearing fairly small, sub-equal tubercles, and extending in a gentle curve from the marginal carina to the anterior and ventral margins, those most remote from the umbo joining the latter margin almost tangentially. Spacing of rows of tubercles comparatively close, nine occurring in a distance of 50mm. on the central region of the shell. Marginal carina gently curved at its anterior end, where it probably



L. R. Cox, photo.

PLATE III.

bears small tubercles, and nearly straight towards its posterior end, where it is rounded off obtusely and is not tuberculate. Area flat, except for a median sulcus, moderately wide, and ornamented only with rather pronounced growth-rugae.

Dimensions. Length 90mm., height 58mm.

Remarks. Portland Stone specimens which have been identified as *T. muricata* Goldfuss by authors in the past probably belong partly to *T. portlandensis* and partly to the species now described. It bears a remote resemblance to *T. muricata* in the closeness of the spacing of its rows of tubercles, but otherwise is quite unlike that species, which occurs at a much lower horizon in Portugal (see Choffat, 1885, pl. v-vi). It is less elongate than *T. portlandensis*, and also differs in the closeness of the spacing of its rows of tubercles; in that species only seven rows occur in a distance of 50mm. on the central region of the shell. The holotype is a cast bearing the impression of the original external ornamentation of the shell.

29. *Trigonia aylesburiensis*, n.sp. Pl. III, fig. 4.

T. alina Lycett, 1877, p. 193, pl. xxxviii, fig. 3 (non Contejean).

Occurrences. Portland Sand of Portland (B.M., L.42128, R.H.C.). Portland Stone of Crouch's Pit, Aylesbury (Holotype, M.P.G., 48595, W.F.H.). Portland Stone of Shotover Hill, Oxford (original of Lycett's figure, Oxford Univ. Mus.).

Specific characters. Shell of medium size, moderately elongate, with its height about two-thirds of its length; posterior taper gradual; hinge-margin elongate, forming an obtuse angle with the posterior margin, which truncates the shell obliquely. Umbo prominent, fairly anterior. Ventral and anterior margins slightly convex, meeting in a fairly sharp parabolic curve. Flank of shell ornamented with fairly wide ribs, which are slightly sigmoidal or feebly convex, and bear tubercles very variable in size; the ribs extend from a short distance below the marginal carina to the opposite margin, remaining steeply inclined; they are from 7mm. to 9mm. apart, on the average, on the central region of the shell. Marginal carina gently concave, tuberculate except at its posterior end. Area very narrow, with a narrow median sulcus and with well-marked transverse growth-rugae. Escutcheon carina tuberculate; escutcheon feebly excavated.

Dimensions. Holotype: Length, 73mm., height, 50mm.; inflation (single valve), 13mm.

Remarks. The holotype and the specimen figured by Lycett as *T. alina* Contejean appear to belong to the same species, although the rows of tubercles are further apart in the former specimen and the tubercles themselves decrease in size, instead of increasing, towards the ventral margin. In the true *T. alina*, a Kimmeridgian species, the rows are very much closer together. The species now described is less elongate than *T. portlandensis*. *T. swindonensis* Blake, from the Swindon Sands, is closely comparable in its size and proportions, but its posterior area is wider and its rows of tubercles bend round on the middle of the shell so as to become nearly horizontal, while near the anterior margin they become very irregular. The Kimmeridge Clay species, *T. voltzi* Agassiz, as interpreted by Lycett (1872, p. 20, pl. x, figs. 1, 2), is less elongate, with more distant rows of tubercles; Blake's record of its occurrence in the *Trigonia*-beds of Swindon may, however, refer to the form now described. *T. intermedia* Fahrenkohl, as interpreted by Lewinski (1923, p. 73, pl. vi, figs. 2, 3) as a variety of *T. bronni* Agassiz, is less elongate. *T. thurmanni* Contejean (see below) is also less elongate, with wider-spaced rows of tubercles.

30. *Trigonia* cf. *thurmanni* Contejean.

1859, p. 280, pl. xvi, figs. 1-3.

Occurrences. Portland Sand ("Massive Bed") of Hounstout (C.H.W.). [Kimmeridgian of Montbéliard (type-occurrence). Shells from the "Virgulien" of the Haute Marne figured by de Loriol under this name differ in certain characters].

Remarks. The Portland Sand specimen tentatively referred to this species is about 88mm. in length and 65mm. in height and is characterised by a fairly well-marked angle of about 90° between its anterior and ventral margins, both of which are nearly straight. The rows of tubercles, which are very feebly convex, are more steeply inclined than in Contejean's type, but about the same distance apart (13mm. on the central region of the shell). This form differs from *T. aylesburiensis* in its more distant rows of tubercles and smoother marginal carina. In *T. voltzi*, as interpreted by Lycett, the rows of tubercles are less regular and the anterior margin more convex.

31. *Trigonia buckmani*, n.sp. Pl. II, fig. 9.

Occurrence. Portland Stone of Lodge Hill, Bucks. (Holotype, M.P.G., 48596, W.F.H.).

Specific characters. Shell of medium size, very high in proportion to its length, truncate-ovate in shape. Umbones probably at about the anterior third. Anterior and ventral margins strongly convex, joining in a regular curve and forming almost a semicircle. Hinge-margin short, sloping steeply. Posterior end of shell narrow, truncated slightly obliquely. Flank of shell ornamented with ribs which are straight near the umbo and gently curved on the more remote part of the shell, where they approach the inferior margin almost tangentially; ribs moderately wide-spaced, about 7mm. apart, on the average, on the central region of the shell, and ornamented with tubercles which are very irregular and variable in size. Marginal carina tuberculate. Area very rugose, the median sulcus being bordered by irregular, transversely elongate tubercles.

Dimensions. Holotype: Length, 81mm., height, 65mm., inflation (single valve), 14mm.

Remarks. The holotype is the only representative of this species which I have seen and, unfortunately, its umbonal region is broken away. Its original shape can, however, be restored approximately without difficulty. In its strongly and evenly convex anterior and ventral margins this species rather resembles *T. concentrica* Agassiz (cf. de Loriol, 1867, p. 80, pl. viii, fig. 2), but its rows of tubercles are more distant and less curved, while the shell is larger and rather higher in proportion to its length. The shell figured by de Loriol (1872, pl. xvii, fig. 5) as *T. alina* Contejean is rather reminiscent of this species, but its anterior and ventral margins are much flatter.

32. *Trigonia* cf. *concentrica* Agassiz.

Cox, 1925, p. 135, pl. i, fig. 8.

Occurrences. Shell-bed of Portland. Blake also records *T. concentrica* from the lowest beds at Tisbury. ["Portlandien" of Switzerland (type-locality); "Virgulien" and "Portlandien inférieur" of the Boulonnais, "Portlandien moyen" of the Haute Marne (de Loriol)].

Remarks. My record of this species from Portland was based on a single immature specimen, which differs from young specimens

of *T. portlandensis*, with which it was associated, in its very strongly curved concentric rows of tubercles. I leave the record standing, in the hope that further, and more mature, specimens will be found.

33. *Trigonia* sp.

Occurrence. Cement-stones, 45ft. from top of Portland Sand, below Blacknor, Isle of Portland (B.M., L.42119, R.H.C.).

Description. Shell large-medium, apparently high in proportion to its length, and tapering fairly quickly towards its posterior extremity. Umbones prominent, acute, anterior. Anterior margin feebly convex, extending very little to the anterior side of the umbones. Ventral margin moderately convex, joining the anterior margin in a fairly sharp curve. Flanks ornamented with wide-spaced rows of tubercles (about 12mm. apart on the central region of the shell), which descend steeply from the marginal carina, and are nearly straight until about two-thirds of the distance to the opposite margin, when they bend in an anterior direction at an obtuse angle and become very irregular, while additional rows become intercalated between them; the tubercles are very unequal in size. Area, escutcheon, etc., unknown in detail, owing to erosion; posterior end of shell unknown.

Dimensions. Length (rough estimate), 90mm., height, 70mm., inflation (single valve), 23mm.

Remarks. This is probably the new undulate species to which Blake refers (1880, p. 193). It is much larger than either *T. incurva* Benett or *T. carrei* Munier-Chalmas, while in shape it seems to be less elongate than the former and more elongate than the latter. Unfortunately, the only available specimen is too incomplete to be named.

34. *Trigonia incurva* Benett.

T. incurva Benett, 1831, p. 5, pl. xviii, fig. 2; J. de C. Sowerby, 1836, p. 347, pl. xxii, fig. 14; Damon, 1860, p. 83, pl. vii, fig. 1; de Loriol, 1867, p. 82, pl. viii, fig. 3; (?) 1868, p. 173; (?) 1872, p. 297; Lycett, 1872, p. 42, pl. ix, figs. 3, 5, 6 (*non* figs. 2, 4); (?) Schmidt, 1905, p. 168; (?) Lewinski, 1923, p. 75, pl. vi, fig. 5.

T. heberti Munier-Chalmas, 1865, p. 416, pl. iv, fig. 5.

Occurrences. Portland Stone of Tisbury (type-locality, Holotype probably in Philadelphia Museum), Swindon, Portland, Quainton, and most other localities. Col. Cunningham's collecting has shown

that the familiar internal casts from Portland come from the Curf; Blake records the species from the Flinty Series, but I have seen no specimens from that horizon. Blake also records the species from the Portland Sand of the Coast, but I have seen no specimens from these beds. "Portlandien supérieur" of the Boulonnais. I am not convinced that any of the numerous records of the occurrence of this species in the Kimmeridgian are to be accepted. The British specimens figured by Lycett (loc. cit., figs. 2 & 4) and the Polish one figured by Lewinski lack the characteristic ornamentation of the species, while de Loriol's records from the *Pinna suprajurensis* Zone of Yonne and the *Ammonites gigas* Zone of the Haute Marne were based on internal casts. Schmidt's record from the Upper Kimmeridgian of Pomerania is also probably due to a misidentification.

Remarks. Colonel Cunningham has collected external moulds associated with the internal casts of this species which are found in the Portland Curf. These show the characteristic ornamentation of the species, which seems to be variable in its shape, especially in the extent to which its posterior extremity is curved upwards. I have seen no British specimens which show this feature so well as Miss Benett's original figure, but it is often well developed in specimens from the Boulonnais.

35. *Trigonia carrei* Munier-Chalmas.

1865, p. 417; de Loriol, 1867, p. 86, pl. viii, fig 5; Lycett, 1874, p. 72, pl. xii, fig. 1.

Occurrences. Portland Stone of Tisbury, Crookwood (near Devizes), Swindon, and Quainton (Bucks.) (B.M.). "Portlandien supérieur" of the Boulonnais (type-occurrence).

36. *Trigonia radiata* Benett.

Cox, 1925, p. 136, pl. ii, figs. 8a, b & 9.

Occurrences. Portland Stone of Tisbury (type-locality. Holotype probably in Philadelphia Museum, *vide* Lycett). Portland Stone of Aylesbury, Quainton, and Brill (M.P.G., W.F.H.). Shell-bed of Portland. "Portlandien supérieur" of the Boulonnais.

37. *Trigonia gibbosa* J. Sowerby.

T. gibbosa J. Sowerby, 1819, "Mineral Conchology," iii, pl. ccxxxv & ccxxxvi (upper figure); de Loriol, 1867, p. 70, pl. vii, figs. 1-3; Lycett, 1874, p. 84, pl. xviii, figs. 4-6, pl. xix, fig. 2.

Occurrences (type-form). Portland Sand ("Stinkstone") of Hounstout (C.H.W.). Portland Stone of Tisbury (type-locality) and of most English Portland Stone localities. "Portlandien supérieur" of Boulonnais.

Remarks. Four specimens were figured by Sowerby, two of which are now extant and in the British Museum collection. The original of the top figure of his pl. ccxxxv is here selected as holotype. This is an elongate shell, with its umbones at about the anterior third and its anterior margin making a well-defined angle with the ventral margin. The surface is ornamented with a few very pronounced undulations of growth, but there are no definite, regularly spaced concentric ribs, except near the umbo. There is no pronounced tuberculation of the surface, but there are a few very obscure tubercles near the ventral margin. Specimens corresponding to this type-form of the species are comparatively rare, the commoner form being that described by de Loriol as *T. damoniana*. For reasons explained below, it is here regarded as a variety of *T. gibbosa*.

38. *Trigonia gibbosa* J. Sowerby, var. *damoniana* de Loriol.

T. gibbosa J. Sowerby, 1819, loc. cit., pl. ccxxxvi (lower figure); Benett, 1831, pl. xviii, fig. 1 ("new var."); Damon, 1860, Supplement, pl. vii, fig. 2; Lycett, 1874, p. 84, pl. xviii, figs. 1 & 2, pl. xxi, fig. 1; *T. gibbosa* var. *benelli* Strand, 1928, *Archiv Naturgesch.*, xxix, A, 8, p. 71.

T. damoniana de Loriol, 1867, p. 72, pl. vii, figs. 4-5; Lycett, 1874, p. 88, pl. xviii, fig. 3, pl. xix, fig. 1, pl. xxi, figs. 2-5; de Loriol, 1875, p. 115.

Occurrences. Lower Portland Beds of Long Crendon, Bucks. (C.H.W.) Portland Stone of Tisbury (type-locality) and of virtually all British Upper Portlandian localities.

Remarks. It is easy enough to appreciate the distinction drawn between this form and *T. gibbosa* by de Loriol. When compared with the type-form of that species, described above, this variety, which is the most abundant *Trigonia* found in our Portlandian rocks, is seen to differ in its greater height in proportion to its length, in its more anterior umbones, in the more rounded junction of its anterior and ventral margins, in its ornamentation, which consists of definite and fairly regularly spaced concentric ribs, and in the more pronounced development of tubercles. Its ontogeny is seen to differ in the closer spacing of the concentric ridges near the umbo. I am, however,

quite unable to appreciate the distinctions drawn between the two forms by Lycett, and de Loriol himself remarked (1875) that some specimens attributed by Lycett to *T. gibbosa* belong to *T. damoniana*.

The question therefore resolves itself into whether the combination of characters regarded by de Loriol as distinctive of each form is constant, or whether the two forms intergrade. After examining a considerable number of specimens, I am driven to the latter conclusion, but think that perhaps *damoniana* may be worth retaining as a varietal name. Thus Sowerby's pl. ccxxxvi (top figure) depicts a specimen which, although elongate in form and with umbones which are not very anterior, has a rounded anterior extremity and a concentrically ribbed surface with well-developed tubercles. Other specimens have the high and very inequilateral shape of *damoniana*, but resemble the type-form of *gibbosa* in their irregularly undulating surface and in the absence of tuberculation. As regards ontogeny, some specimens with the normal ornamentation of *damoniana* have closely spaced concentric ridges near the umbo, but others have wider-spaced ridges, such as are found at the umbo of the typical *gibbosa*. The two forms occur in association, and so are not characteristic of different stratigraphical horizons. In their ornamentation, specimens of the var. *damoniana* vary considerably, the concentric ribs being much closer together and the tubercles much smaller in some than in others.

39. *Trigonia gibbosa* J. Sowerby, var. *manseli* Lycett.

T. manseli Lycett, 1874, p. 86, pl. xix, figs. 3 & 4.

Occurrences. Portland Stone of Portland (Holotype and Paratype, M.P.G., 11843-4), of Tisbury (B.M.), and of Quainton, Brill, Lodge Hill, and Aylesbury (M.P.G., W.F.H.).

Remarks. This form is characterised by the complete replacement, except near the anterior margin and umbo, of concentric ribs by clear-cut tubercles which form a diagonal pattern, but it appears to grade into the var. *damoniana*. Specimens with an intermediate type of ornamentation are common; in such

specimens, concentric ribs persist from the anterior margin until near the smooth posterior region; they are then replaced by tubercles arranged as in *T. manseli*. The type-specimens of this form are characterised by the smoothness of their posterior area and marginal carina, and by the concavity of the smooth, depressed region which borders the latter. These characters are, however, not constant in all the specimens which have the tuberculate, *manseli*-type of ornamentation. The ontogeny of different specimens with this ornamentation also varies considerably. In some, a fine concentric ribbing persists for a distance of about 20mm. from the umbo, but in others the tuberculate ornamentation has completely replaced the concentric ribbing at a distance of 5mm.

40 *Trigonia gibbosa* J. Sowerby, var. *tenuitexta* Lycett.

Trigonia tenuitexta Lycett, 1874, p. 90, pl. xx, figs. 1 & 1a.

Occurrences. Portland Stone of Portland (Holotype, M.P.G., 11845), Devizes, and Tisbury (Lycett); of Swindon, Quainton, Lodge Hill, Hartwell, and Aylesbury (M.P.G., W.F.H.).

Remarks. This variety, which is characterised by more numerous and closer-spaced concentric ribs, ornamented with small tubercles, also grades into the var. *damoniana*.

41. *Trigonia wightensis* Strand. Pl. III, fig. 1.

T. michelotti, var., Lycett, 1854, p. 92, pl. xx, fig. 7 (*non T. micheloti* de Lorient, 1867).

T. wightensis Strand, 1928, "Miscellanea nomenclatorica," *Archiv. Naturgesch.*, Jahrg. xcii, Abt. A, Heft 8, p. 71.

Occurrences. Portland Stone of Greenlands Farm, near Devizes (Holotype, figd. Lycett, B.M., 88928, W. Cunningham Coll.), of Chilmark, of Swindon, top beds (specimen here figured, M.P.G., 48594, W.F.H.), and of Quainton (M.P.G., W.F.H.).

Remarks. This form is characterised by its very irregular ornamentation, which consists of thick and fairly wide-spaced ridges; these are usually concentric, but at times form thick, irregular swellings, which are slightly transverse. Near the posterior region of the flank, which is wide, smooth, and pronouncedly concave, the ridges are replaced by thick, elongate,

irregular tubercles ; these occasionally may overstep the margin of the depressed region. The marginal carina also bears irregular tubercles. There is a fine, concentric ribbing near the umbo, but this is replaced by the coarser and more irregular type of ornamentation at a distance of about 5mm.

T. wightensis is not unlike the coarser-ribbed specimens of the var. *damoniana* (e.g. Lycett, pl. xviii, fig. 3) but its ornamentation appears to be sufficiently distinctive for it to be regarded as a separate species. The learned German professor who was responsible for naming it evidently thinks that Devizes is in the Isle of Wight.

FAMILY PECTINIDAE.

42. *Chlamys* sp. Pl. III, fig. 3.

Occurrence. "Portland Oolite, below Fovent" (? Fovant, Wilts.) (M.P.G., Geol. Soc. Coll. 2867, Fitton Coll.).

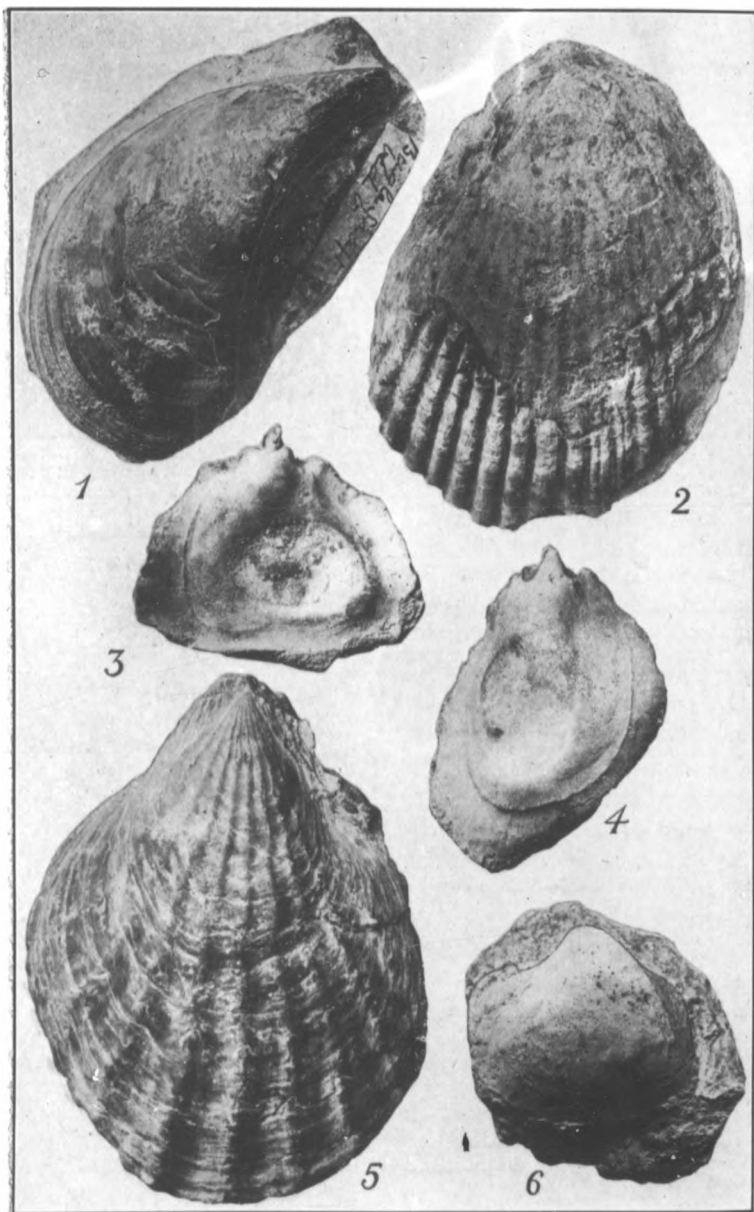
Remarks. This species is represented by a unique specimen, which is the mould of the interior of a single valve, preserved in a sandy matrix. It is about 19.5mm. in length and 21.5mm. in height, sub-equilateral, and ornamented with about 14 equidistant costae, each of which ends in a wide, tripartite denticulation of the inferior margin. There is no described species to which this mould could be referred, and it is to be hoped that further specimens will be found.

43. *Camptonectes nudus* (Buvignier). Pl. III, fig. 2.

Pecten nudus Buvignier, 1852, p. 25, pl. xx, figs. 1-3; de Loriol, 1867, p. 106; 1868, p. 207; 1872, p. 378.

Occurrences. Portland Sand of Portland (B.M., L.52425, R.H.C.). "Portlandien supérieur" and "Portlandien moyen" of the Meuse (type-locality). "Portlandien inférieur" of the Boulonnais, "Portlandien moyen" of Yonne and the Haute Marne.

Remarks. This species is characterised by its orbicular shape and by its smooth exterior, on which, however, radiating lines may sometimes be seen with the aid of a lens. The specimen here recorded only shows the interior of a left valve, but in its shape it resembles *C. nudus* rather than *C. morini* or *C. supra-jurensis*. The figure which Buvignier gives of a right valve is



L. R. Cox, photo.

PLATE IV.

Occurrences. Portland Sand of Portland (*Exogyra*-bed) (B.M., R.H.C.), of Hounstout ("Massive Bed" and Cement-stone) (C.H.W.) etc. Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Portland Stone of Chicks Grove (Holotype, B.M., 43299) and of most localities. Hartwell Clay (H.B. Woodward). "Portlandien moyen" of the Boulonnais.

FAMILY SPONDYLIDAE.

47. *Plicatula boisdini* de Loriol.

P. boisdini de Loriol, 1867, p. 109, pl. x, fig. 10.

P. echinoides Blake, 1880, p. 233, pl. x, fig. 6; Cox, 1925, p. 138, pl. ii, fig. 4.

P. cf. beaugrandi de Loriol, Cox, 1925, p. 138, pl. ii, fig. 3.

Occurrences. Portland Sand (*Exogyra*-bed) of Portland (B.M., R.H.C.). Shell-bed of Portland. Creamy Limestones and Rubbly Beds of Bucks. (J.F.B.). "Portlandien moyen" of the Boulonnais (type-occurrence).

Remarks. Since describing the Portland Shell-bed fauna, I have examined a much larger series of *Plicatula* from the Portland *Exogyra*-bed and elsewhere, and am now convinced that the three forms regarded by me previously as different species are merely varieties of one and the same variable species. Apparently this species usually grew attached to other shells and, when the attachment-surface is moderately large, the ornamentation consists of rows of spines, which sometimes dichotomise, but remain usually about 3mm. apart, as in the typical *P. boisdini*. Sometimes they become a little more distant, as in the variety described by Blake as *P. echinoides*. Where the attachment-surface is smaller or not obvious at all, the ornamentation is of a much finer type on the earlier growth-stages of the shell, and consists of numerous closely-spaced threads, which occasionally bear bud-like spines; a shell of this type was described by me previously as *P. cf. beaugrandi* de Loriol. This finer ornamentation changes at a distance of 20mm. to 30mm. from the umbo to ornamentation of the usual *boisdini* type. Occasional specimens show a further kind of ornamentation in the young shell; in this type, radial ornamentation is replaced almost completely by foliaceous, imbricating growth-layers,

which are rather reminiscent of the ornamentation of some species of *Chama*. When eroded, the more strongly ribbed specimens of this species look very much like an *Ostrca*, and seem to be the basis of the numerous records of *Ostrea solitaria* from our Portland beds; the type-specimen of Damon's *O. flabellosa* is suspiciously like an eroded *Plicatula*.

48. *Plicatula lamellosa*, n.sp. Pl. IV, figs. 3 & 4.

Plicatula sp., Damon, 1860, p. 82 (list), Supplement, pl. vii, fig. 5.

Occurrence. Roach of Portland (Holotype, B.M., L.20457, J.F.B. Figured paratype, M.P.G., Geol. Soc. Coll., 2868, Fitton Coll.).

Specific characters. Shell of medium size, thick, irregularly ovate, usually higher than long, but occasionally longer than high, not very inequilateral. Surface smooth; texture lamellose and oyster-like. Hinge-teeth long and conspicuous. Adductor muscle-scar large and prominent. Internal margins delicately denticulate.

Dimensions. Holotype: Length, 32mm., height, 44mm. Paratype (fig. 3): Length, 40mm., height, 32mm.

Remarks. This is one of the most familiar of the casts found in the Roach. When it was originally figured by Damon, it was listed below *Pecten lamellosus* in the explanation of his plate and, evidently by a misprint, was named "*Plicatula* ", the *ditto* symbol being placed under the word *lamellosus*. Specimens have accordingly sometimes been named *P. lamellosa* in collections and, since the name does not appear to have been used for any other species of the genus, it is here adopted as being quite appropriate. The specimen figured by Damon seems to be lost, so that a comparable specimen in the J. F. Blake collection is taken as holotype. A number of specimens, collected by Col. Cunningham, show the rock enclosing the internal cast, and some of these give an indication of the original shell structure, although I have seen no complete specimens of the shell. It invariably seems to have been riddled and largely destroyed by boring sponges.

The Alpine Corallian species, *P. coralligena* (Greppin) (1870, p. 352, pl. vi, figs. 2-4; de Loriol, 1893, p. 332, pl. xxxiv, figs. 12-13, pl. xxxv, fig. 1, is closely comparable to the form now

described in its external appearance, and was originally described under *Ostrea* on account of its oyster-like structure ; it also resembles the new species in possessing very long hinge-teeth, but it attains much larger dimensions.

FAMILY LIMIDAE.

49. *Lima (Plagiostoma) rustica* (J. Sowerby).

P. rusticum J. Sowerby, 1822, "Mineral Conchology," iv, pl. cclclxxxi.
L. (P.) rustica Cox, 1925, p. 139.

Occurrences. Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Portland Stone of most localities. Upper Kimmeridgian, *pectinatus*-Zone, of Shotover Hill, near Oxford (type-locality). "Portlandien supérieur" of the Boulonnais.

Remarks. The original of the top figure of Sowerby's plate (B.M., 43287) is now selected as holotype of the species. This specimen, from the Upper Kimmeridgian, has more numerous and more elevated ribs than the one depicted in his lower figure ; the latter specimen is preserved in a glauconitic limestone matrix and evidently came from the Portland Stone, possibly of Chilmark. Although these two specimens, both of which are preserved in the British Museum, came from beds differing in age, the differences between them are not of specific importance, since both can be matched by specimens from one and the same Portland Stone horizon, e.g. from the Portland Shell-bed.

50. *Lima (Plagiostoma) blakei*, n.sp. Pl. IV, fig. 2.

Occurrence. Portlandian (base of Rubbly Beds) of Birtton, Bucks. (Holotype, B.M., L.20329, J.F.B.).

Specific characters. Shell of medium size, with a length to height ratio of about 5:6, rather oblique, with a comparatively long anterior margin. Ornamentation consisting of about 22 very prominent, convex, rounded costae, which are separated by rounded interspaces of about half their own width ; costae usually simple, but occasionally bifurcating near the inferior margin.

Dimensions. Length, 49mm., height, 62mm.

Remarks. This species is known to me only by the holotype, a specimen which is an internal cast except near the ventral margin of the left valve, where some of the shell remains ; the

general shape and the ornamentation can, however, be seen sufficiently well. It is certainly distinct from *L. rustica*, since its ribs are much more prominent, and are rounded instead of flat-topped; it is also more oblique, with a longer anterior margin. *L. boloniensis* de Loriol is a smaller shell, with more numerous ribs.

51. *Lima (Plagiostoma) boloniensis* (de Loriol).

Lima boloniensis de Loriol, 1867, p. 102, pl. ix, fig. 5.

Occurrences. Portland Sand of Dorset (J.F.B.). Upper Portland Beds of Aylesbury (H.B. Woodward). Whit Bed of Portland (B.M., L.52319, R.H.C.). "Portlandien moyen" of the Boulonnais (type-occurrence).

Remarks. According to de Loriol's description, this species has 36 rather flattened ribs, which are separated by interspaces of about their own width. His figure, however, shows only 30 ribs, but probably this discrepancy is due to a mistake on the part of the artist. In the Portland Whit Bed specimen which I refer to this species the ribs number rather more than 40 and their interspaces are narrower. The height of this specimen is about 45mm.

52. *Lima (Mantellum) cf. ornata* Buvignier.

Lima ornata Buvignier, 1852, p. 23, pl. xviii, figs. 17-19.

Occurrences. *Trigonia*-beds of Swindon and Rubbly Beds of Bucks. (J.F.B.). [Corallian of the Meuse (type-occurrence)].

Remarks. This species is a comparatively small *Lima* of the *duplicata*-group. I have not seen any of the specimens recorded by Blake under this name, but his records show that a species of this group occurs in our Portland rocks, and it is to be hoped that further specimens will be found.

53. *Lima* (" *Ctenoides* ") *cunningtoni*, n.sp. Pl. IV, fig. 5.

Occurrence. Portland Stone of Dorset; locality unrecorded, but possibly the Portland Shell-bed (Holotype, Dorset County Mus., W.F.H.).

Specific characters. Shell of medium size, irregularly sub-ovate, with a length to height ratio of about 5:6; only slightly inequilateral, with the anterior and posterior margins short, and the latter rather more

produced than the former. Hinge-margin short. Ventral margin strongly convex, forming a very irregular, asymmetrical, rather sinuous curve, which meets the lateral margins in a very dorsal position. No excavated lunular region. Anterior auricle small, obtusely triangular; posterior auricle larger, also obtusely triangular, but rather crumpled in the specimen studied. Ornamentation of each valve consisting of eight depressed, obtuse, irregular, rather wavy ribs, which are separated by interspaces slightly wider than themselves; interspaces wider on the anterior than on the posterior side of the shell, where very faint, wide, depressed, median secondary riblets are just visible; primary ribs angular near the umbo, but rounded on the major part of the shell. Adjacent to the lateral margins are comparatively wide, flattened spaces, on each of which traces of a very faint additional rib are visible. Growth-stages pronounced at irregular intervals, the surface of the shell also being puckered concentrically in an irregular manner.

Dimensions. Holotype: Length, 56mm., height, 69mm., inflation, 19mm.

Remarks. This peculiar species has long been exhibited in the Dorset County Museum, bearing the MS. name of W. H. Hudleston's which is here adopted; it was dedicated to Mr. William Cunnington, of Devizes, who made extensive collections from the Portlandian rocks of that district about eighty years ago. Its short anterior margin gives it a very distinctive appearance, and it is not very closely comparable to any other known Jurassic species. It is referred to "*Ctenoides*" in the sense of authors, although there are certain nomenclatorial objections to this name, which cannot here be discussed.

54. *Lima bifurcata* Blake.

1880, p. 234.

Occurrences. Rubbly Beds of Coney Hill and Aylesbury (J.F.B.).

Remarks. This species was not figured by Blake, nor are there any specimens preserved in his collection which could be identified with it. Its description leaves much to be desired, but it was compared with *L. rudis* J. Sowerby (a *Ctenostreon*), and was stated to have great, rounded ribs, which bifurcate near their ends. It thus seems to be distinct from the other species of *Lima* listed above. It is to be hoped that further specimens will be found.

FAMILY ANOMIIDAE.

55. *Anomia suprajurensis* Buvignier.

Buvignier, 1852, p. 26, pl. xx, figs. 25-27; de Loriol, 1867, p. 117, pl. xi, figs. 6, 7; 1868, p. 214, pl. xiii, fig. 6; 1872, p. 411; 1875, p. 231, pl. xxv, figs. 2-5.

Occurrences. Portland Sand of Portland (B.M., L.52406, R.H.C.). "Portlandien inférieur" to "Portlandien supérieur" of the Boulonnais. "Portlandien moyen" of the Meuse (type-occurrence), of Yonne, and of the Haute Marne. Kimmeridgian of Germany, Switzerland, etc.

FAMILY MODIOLOPSIDAE.

56. *Myoconcha portlandica* Blake.

Blake, 1880, p. 231, pl. ix, fig. 10; Lewinski, 1923, p. 68, pl. v, fig. 1; Cox, 1925, p. 143, pl. iv, figs. 10a, b.

Occurrences. Shell-bed of Portland, Rubbly Beds of Coney Hill, Bucks. (type-occurrence, location of Holotype unknown) and of Aylesbury (M.P.G., W.F.H.). Upper Kimmeridgian, *pectinatus*-Zone, of Swindon (J.F.B.). Uppermost Kimmeridgian of Poland.

FAMILY MYTILIDAE.

57. *Mytilus suprajurensis* Cox. Pl. IV, fig. 1.

1925, p. 140, pl. i, fig. 9, pl. iii, fig. 2.

Occurrences. Shell-bed of Portland (type-occurrence). *Trigonia*-beds and Freestone of Swindon (J.F.B.). Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Rubbly Beds of Aylesbury, Brill, Quainton, etc. (M.P.G., W.F.H.).

Remarks. This is the species which has usually been recorded as *M. unguiculatus* Phillips, a pre-occupied name.

58. *Mytilus blacknorensis*, n.sp. Pl. II, fig. 6.

Occurrence. Shell-bed of Portland, below Blacknor (Holotype, B.M., L.39117, R.H.C.).

Specific characters. Shell small, trapeziform, very wide in proportion to its length, with a length to height ratio of about 4:3. Umbones terminal; hinge-margin long. Anterior margin feebly sinuate immediately below the umbo, then curving round so as to be perpendicular to the hinge-margin for a short distance, and making a well-defined angle with the ventral margin. Ventral margin very feebly convex, diverging fairly rapidly from the hinge-margin, and

making a moderately well defined angle with the convex posterior margin. Ornamentation consisting of conspicuous, rounded, radial riblets, which increase in number towards the ventral margin by dichotomisation or by intercalation, and are separated by rounded interspaces of about their own width. Riblets crossed by fairly regularly spaced concentric ridges or undulations, which are about three times as far apart as the riblets, and produce small, vaulted scales where they cross them.

Dimensions. Holotype : Length, 11.8mm., height, 9.3mm.

Remarks. This peculiar little species appears to be a *Mytilus*, although it differs in shape considerably from normal representatives of that genus. *M. furcatus* Münster (in Goldfuss, 1837, p. 170, pl. cxxix, fig. 6) is rather similarly ornamented, but is not so high in proportion to its length.

59 *Mytilus* [*vel Modiolus*] *pallidus* (J. Sowerby). Pl. II, fig. 8.
Cox, 1925, p. 142.

Occurrences. Shell-bed and Roach of Portland. Portland Stone of Swindon (specimen here figured, J. W. Tutcher Coll.). Uppermost Portland Stone of Fonthill, Bucks. (Holotype, B.M., 43237, original of Sowerby's middle figure, now selected). Portland Stone of Brill (B.M., P.B. Brodie) and Aylesbury (M.P.G., W.F.H.).

Remarks. The specimens figured by Sowerby, like those found in the chert-bed of the Portland Roach, are small shells, less than 30mm. in length, but I regard them as dwarfed representatives of the species (the whole fauna of these chert-beds appears to be dwarfed), and include in *M. pallidus* much larger shells, like the one figured in the present paper. Such shells may have been the basis of the records of *Mytilus jurensis* "Merian" from our Portland rocks. The species in question figured as a *nomen nudum* in various lists prior to 1836, when descriptions and figures were published by Roemer (p. 89, pl. iv, fig. 10) and Bronn ("Lethaea Geognostica," p. 359, pl. xix, fig. 14). Their figures differ considerably and cannot represent the same species, but the shell figured by Roemer, from the "Portland-Kalke" of the Arensburg, near Rinteln, appears to be very close to *M. pallidus*, differing mainly in its less gibbose buccal region. *M. pallidus* lies on the border-line between

Mytilus and *Modiolus*, and shows how artificial is the generic distinction between them. In some specimens the umbones are quite terminal, as in *Mytilus*, but in others the buccal region projects very slightly, as in *Modiolus*.

60. *Modiolus boloniensis* (de Loriol).

Mytilus boloniensis de Loriol, 1867, p. 92, pl. ix, fig. 3.

Occurrences. Lowest Portland Beds (above Lydite-bed) of Swindon (Bristol Univ. Coll., W.F.H.). Hartwell Clay (de Loriol). "Portlandien moyen" of the Boulonnais (type-occurrence).

Remarks. The original figures of this species depict a shell with a very gibbose anterior end, but they may be inaccurate. The Swindon specimens which appear to represent *M. boloniensis* are over 100mm. in length; de Loriol gives 91mm. as the length.

61. *Modiolus huddlestoni* Cox.

1925, p. 141, text-fig. 2.

Occurrences. Shell-bed of Portland (type-occurrence). Portland Stone of Quainton, Lodge Hill, and Aylesbury (M.P.G., W.F.H.).

Remarks. This shell has probably been listed as *M. boloniensis* in the past (Blake cites that species from the Flinty Series of Dorset and from the Rubbly Beds of Bucks., as well as from Swindon). Besides the obvious difference in size, *M. huddlestoni* lacks the faint radiating ridges of the dorsal region which are described as occurring in *M. boloniensis*. The Swindon specimens of that species are, however, too poorly preserved to show such a feature, and until better material can be examined it cannot be said whether it is a constant specific character.

62. *Musculus autissiodorensis* (Cotteau).

Modiolaria autissiodorensis Cox, 1925, p. 143, pl. iv, fig. 11.

(The replacement of the generic name *Modiolaria* by *Musculus* Bolten results from Iredale's selection of *Mytilus discors* Linné as the genotype of Bolten's genus, which was very heterogeneous (1915, *Journ. Conch.*, xiv, p. 342)).

Occurrences. Portland Sand (all horizons) of Portland, Gad Cliff, Hounstout, etc. *Virgatites*-Zone of Upper Kimmeridgian upwards.

in Kent borings (Lampugh, Kitchin & Pringle). Shell-bed of Portland. Rubbly Beds of Quainton, Aylesbury, etc. (J.F.B. and M.P.G., W.F.H.). "*Virgulien*" and "*Portlandien inférieur*" of the Boulonnais, "*Portlandien moyen*" of Yonne, "*Virgulien*" and "*Portlandien moyen*" of the Haute Marne. Kimmeridge-Portland boulders of Denmark.

Remarks. *Mytilus morinicus* de Lorient (1867, p. 91, pl. ix, fig. 4), which comes typically from the "*Portlandien supérieur*" of the Boulonnais, and has been recorded by Lewinski (1923, p. 68) from the Upper Kimmeridgian of Poland, is probably a synonym of this species.

63. *Lithophaga portlandica* (Morris & Lycett).

Lithodomus portlandicus Morris & Lycett, in Damon, 1860, p. 173, p. 79, text-fig. 35, & Supplement, pl. vii, fig. 11.

Occurrences. "*Curf*" and "*Base-bed*" of Portland (type-occurrence; Holotype missing).

FAMILY PLEUROMYACIDAE.

64. *Pleuromya tellina* Agassiz.

P. tellina Agassiz, 1845, p. 250, pl. xxix, figs. 1-10; de Lorient, 1867, p. 45, pl. v, fig. 3; 1868, p. 76, pl. v, fig. 10; 1872, p. 157, pl. x, figs. 5-8; 1875, p. 14, pl. xi, fig. 34; Lewinski, 1923, pp. 80-82, pl. vii, figs. 1-4.

P. voltzii Agassiz, 1845, p. 249, pl. xxvi, figs. 1, 2, pl. xxix, figs. 12-14. *Myaciles jurassi* var. *portlandica* Damon, 1888, Supplement, 3rd. edit., pl. xix, fig. 9.

Occurrences. Portland Sand of Portland (*Exogyra*-bed), Gad Cliff, Hounstout, etc. (B.M., R.H.C., L.R.C.). Shell-bed and Roach (chert-bed) of Portland (B.M., R.H.C.). Chalky beds of Chilmark; Freestone of Tisbury and Swindon; *Trigonia*-beds of Swindon (J.F.B.). Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Rubbly Beds and Creamy Limestones of Oxon. and Bucks. (Coney Hill, Quainton, etc.) (J.F.B.). Corallian to Portlandian of France, Germany, Switzerland, etc.

Remarks. The specific identity of *P. tellina* and *P. voltzi* is now generally admitted, and I adopt the former name as having been used by de Lorient when he first united the two forms. Lewinski distinguishes between four varieties of the species.

FAMILY PHOLADOMYACIDAE.

65. *Pholadomya rustica* Phillips. Pl. V, fig. 1.

P. tumida de Loriol, 1867, p. 47, pl. iv, fig. 9; 1875, p. 23, pl. xii, fig. 3 (non Agassiz).

P. rustica Phillips, 1871, p. 333, pl. xv, fig. 12.

P. lorioli Moesch, 1874, p. 73, pl. xxvi, figs. 1-4.

Occurrences. Portland Stone of Chicks Grove, near Tisbury (M.P.G., 48584, W.F.H.) and Portland (B.M., L.21714, J. J. R. Short). Upper Kimmeridgian (*pectinatus*-Zone) of Shotover Hill, near Oxford (type-occurrence). "Portlandien moyen" and "Séquanien" (?) of the Boulonnais.

Remarks. It is not surprising that Moesch overlooked Phillips' *Ph. rustica* when he proposed a new name, *Ph. lorioli*, for *Ph. tumida* de Loriol, non Agassiz. According to Moesch (although de Loriol in 1875 would not admit it), the true *Ph. tumida* is a synonym of *Ph. canaliculata* Roemer, while de Loriol's species, from the Boulonnais, differs in having more prominent ribs. I find it difficult to understand Moesch's interpretation of *Ph. tumida*, but *Ph. rustica*, which is certainly the same species as *Ph. lorioli*, differs from *Ph. tumida*, as figured by Agassiz, in having ribs which are much sharper near the ventral margin.

66. *Plectomya rugosa* (Roemer).

Tellina rugosa Roemer, 1836, p. 120, pl. viii, fig. 4.

Plectomya rugosa de Loriol, 1868, p. 89, pl. vi, figs. 2-5; 1872, p. 193, pl. xii, figs. 6-7; 1875, p. 27.

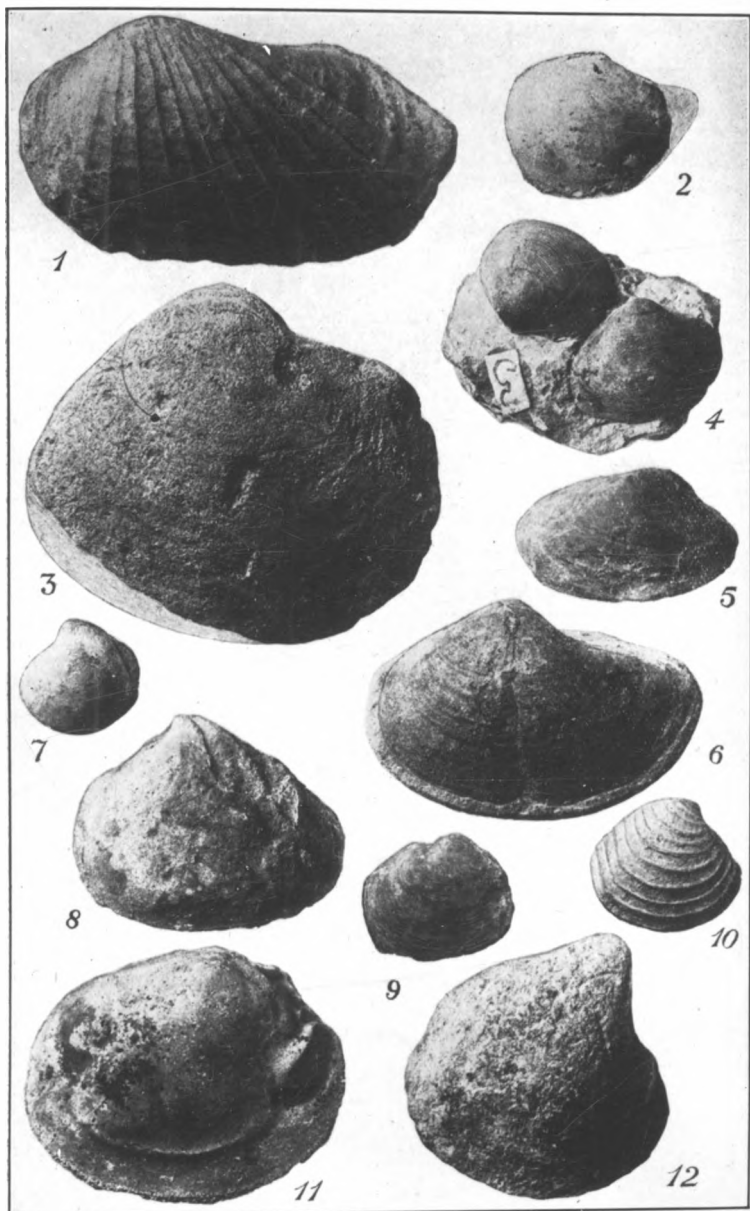
Occurrences. Upper part of Portland Sand of Dorset; Upper Kimmeridgian, *pectinatus*-Zone, of Swindon (J.F.B.). "Portlandien inférieur" of the Boulonnais and Haute Marne. "Portlandien moyen" of Yonne. Upper Kimmeridgian of Germany, Switzerland, etc.

Remarks. This species is listed on Blake's authority.

FAMILY THRACIIDAE.

67. *Thracia depressa* (J. de C. Sowerby). Pl. V, fig. 3.

Mya depressa J. de C. Sowerby, 1823, "Mineral Conchology," v, pl. ccccxviii, fig. 1; *Thracia depressa* de Loriol, 1867, p. 48; 1872, p. 206, pl. xi, fig. 11; 1875, p. 33, pl. xii, figs. 6-8; Lewinski, 1923, p. 84, pl. vii, fig. 7.



Corimya tenera Agassiz, 1846, p. 271, pl. xxxiv, figs. 4-9.

Occurrences. Portland Sand of Dorset (very abundant). *Trigonia*-beds of Swindon (J.F.B., e.g. B.M., L.20242). Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Rubbly Beds of Bucks. (J.F.B.). Ranges in England from the Kellaways Rock upwards (H.B. Woodward). Equivalent beds in France, Germany, Switzerland, Poland, etc.

Remarks. Sowerby's type-specimen, which I have been unable to trace, came from the Oxford Clay of the Weymouth district. Specimens from the type-locality and horizon are characterised by the position of their umbones, slightly posterior to median; the anterior dorsal margin is slightly convex and slopes steeply. In the Kimmeridge Clay all intermediate gradations occur between specimens of this shape and those with much more anterior umbones and a correspondingly lengthened posterior region. In specimens from the Portland Sand the umbones are median or slightly anterior to median. In the single specimen which I have seen from the Portland Stone the umbones are very anterior, even more so than in Agassiz's *Corimya tenera*, which, following de Loriol and other authors, I unite with Sowerby's species. Until more specimens from the same horizon can be studied it cannot be said whether or not this is rather an abnormal specimen; in view of the known variability of *Th. depressa*, it is best referred to that species for the present.

68. *Thracia incerta* (Thurmann). Pl. V, fig. 6.

Tellina incerta Thurmann, in Roemer, 1836, p. 121, pl. viii, fig. 7. *Thracia incerta* de Loriol, 1868, p. 100, pl. viii, figs. 3-5; 1872, p. 203, pl. xi, figs. 9-10; 1875, p. 32; Lewinski, 1923, p. 84, pl. vii, fig. 6.

Corimya studeri Agassiz, 1846, p. 269, pl. xxxv.

Occurrences. Roach of Portland (B.M., L.52314, R.H.C.). Chalky beds of Chilmark; Portland Stone ("middle bed") of Crouch's Pit, Aylesbury (M.P.G., W.F.H.). Sequanian to Portlandian of France, Germany, Switzerland, etc. Upper Kimmeridgian of Poland.

Remarks. This species is more elongate than *Th. depressa*, with a less steeply sloping anterior dorsal margin.

FAMILY CUSPIDARIIDAE.

69. *Cuspidaria portlandica* (de Loriol).

Neaera portlandica de Loriol, 1868, p. 73, pl. v, fig. 5.

Occurrences. Creamy Limestones of Bucks. (J.F.B., identification queried). "Portlandien moyen" of Yonne (type-occurrence).

Remarks. I have seen no specimens referable to this species. Its recorded occurrence in England needs verification.

FAMILY CYPRINIDAE.

70. *Isocyprina pringlei* Cox.

1925, p. 146, pl. i, fig. 19, pl. iv, figs. 3a, b.

Occurrences. Shell-bed of Portland (type-occurrence). Portland Stone of Coney Hill, Lodge Hill, and Aylesbury, Bucks. (M.P.G., W.F.H.).

71. *Isocyprina elongata* Cox. Pl. V, fig. 4.

1925, p. 147, pl. iv, figs. 4a, b.

Occurrences. Shell-bed of Portland (type-occurrence). Portland Stone of Crouch's Pit, Aylesbury (M.P.G., 43579, W.F.H.).

72. *Isocyprina compressa* Cox.

1925, p. 147, pl. iv, figs. 5a, b.

Occurrence. Shell-bed of Portland.

Remarks. Since my previous paper was written, a much larger representative of this species (B.M., L.39207, R.H.C.) has been collected; its length, height, and inflation are respectively 25mm., 20mm., and 6mm. (single valve).

73. *Isocyprina obesa* Cox.

1925, p. 148, pl. iv, figs. 6a, b.

Occurrence. Shell-bed of Portland.

74. *Anisocardia* cf. *autissiodorensis* (Cotteau). Pl. V, fig. 12.

Isocardia autissiodorensis Cotteau, 1854, "Moll. Foss. de l'Yonne," p. 83; de Loriol, 1868, p. 109, pl. viii, figs. 8-9; 1872, p. 229.

Occurrences. Portland Sand of Gad Cliff and of Portland (*Exogyra*-bed) (B.M., R.H.C.). Blake lists this species from both the lower and upper part of the Sand. "Portlandien moyen" of Yonne (type-occurrence) and of the Haute Marne.

Remarks. The specimens from the Portland Sand are merely moulds, and they differ from de Loriol's figure in being more truncate posteriorly and less gibbose. The Gad Cliff specimen bears traces of concentric ribbing.

75. *Anisocardia buckmani* Cox. Pl. V, fig. 7.

1925, p. 148, pl. iv, figs. 7a, b.

Occurrences. Shell-bed of Portland (type-occurrence). Creamy Limestones of Coney Hill, Bucks. (M.P.G., W.F.H.). Portland Stone of Bugle Pit, Hartwell (B.M., L.R.C.).

Remarks. This species is more definitely truncate posteriorly than the figure in my former paper indicates, since the posterior margin of the holotype is slightly broken.

76. *Neomiodon cuneatus* (J. Sowerby). Pl. V, fig. 10.

Astarte cuneata J. Sowerby, 1816, "Mineral Conchology," ii, pl. cxxxvii, fig. 2.

Cytherea rugosa J. de C. Sowerby, in Fitton, 1836, pp. 268, 299, 347, pl. xxii, fig. 13; Damon, 1860, p. 83, pl. vii, fig. 10. *Cyrena rugosa* de Loriol, 1867, p. 49, pl. v, figs. 4-7; 1872, p. 212, pl. xiii, figs. 1-7; 1875, p. 37, pl. xii, fig. 17; Brauns, 1874, p. 277; Sandberger, 1870, "Land- und Süsswasser-Conch. Vorwelt," p. 24, pl. i, fig. 15; Struckmann, 1878, p. 46, pl. vi, figs. 5-7. *Miodon rugosum* Maillard, 1884, p. 97, pl. iii, figs. 13, 14; Douvillé, 1921, p. 119, text-fig. 10.

Occurrences. Portland Stone of Chilmark (type-locality. Holotype, B.M., L.52487), Chicks Grove, Swindon, and various localities in Oxon. and Bucks. Damon figures a specimen stated to come from Portland, but I have not seen any authentic Dorset Portland Stone specimens. "Portlandien inférieur" and "Portlandien supérieur" of the Boulonnais, top zone of the "Portlandien" of the Haute Marne. Throughout the Kimmeridgian of Germany (Brauns). "Purbeckien" of the Swiss Jura (Maillard), etc.

Remarks. This well-known species is, unfortunately, usually known by the trivial name *rugosus*, most authors having overlooked the fact that J. Sowerby had described a poorly preserved representative as *Astarte cuneata*. Blake, however (1880, p. 231), remarked that he could see no difference between *C. rugosa* and *A. cuneata*. Its generic affinities have always been doubtful, but Maillard and Douvillé have shown that its dentition is

of the same type as that of the Purbeckian freshwater forms which were formerly referred to *Cyrena*, but which Sandberger placed in a new genus, *Miodon*. Since *Miodon* was a pre-occupied name, P. Fischer (1887, "Manuel de Conchyliologie", p. 1187) replaced it by the new name, *Neomiodon*. The typical species of this genus are smooth sub-orbicular shells, but, for the present, our Portland Stone species is retained in it. In its ontogeny, this species undergoes a remarkable change in ornamentation and shape, young shells (pl. v, fig. 10) being *Astarte*-like in shape and having a regular concentric ribbing. The classification of *Neomiodon* in the Cyprinidae is in accordance with Douvillé's views.

FAMILY ASTARTIDAE.

77. *Astarte kitchini* Cox.

1925, p. 149, pl. i, figs. 11a, b & 12, pl. iv, fig. 8.

Occurrences. Portland Sand (*Exogyra*-bed) and Shell-bed of Portland (B.M., R.H.C.).

Remarks. The specimens from the Portland Sand have a more rounded posterior margin and less anterior and more rounded umbones than those from the Shell-bed, but they probably represent the same species. This seems to be the species which occurs commonly in the "Portlandien moyen" of the Boulonnais and was described by de Loriol (1875, p. 79, pl. xv, figs. 5-7) as *A. scalaria* Roemer. I am unable to accept this species as identical with Roemer's, which is much more ovate, as illustrated by the fact that Brauns (1874, p. 297) places *A. pesolina* Contejean (1859, pl. xi, figs 20-22) in its synonymy. Maillard, also (1884, pl. iii, fig. 24), figures a comparable species from the "Purbeckien" of the Swiss Jura as *A. scalaria*. A very similar small *Astarte* occurs in our own Purbeck beds, and is represented by a specimen in Fitton's collection, from Whitchurch (M.P.G., Geol. Soc. Coll., 2728).

78. *Astarte* sp. Pl. V, fig. 11.

Occurrence. Portland Roach (B.M., L.4790, P.B. Brodie).

Remarks. In the material studied by me this species is represented by a single internal cast, and it therefore cannot be identi-

fied specifically. It is ovate, 44mm. in length and 34mm. in height, with its umbones situated at about its anterior third. There is no trace of any crenulation of the margin. It is more elongate and has less prominent umbones than *A. saemanni* de Loriol (1867, p. 68, pl. vi, figs. 9, 9a), which occurs in the Hartwell Clay. It may be the species which Blake records from the Rubbly Beds of Bucks. as *A. ovata* Phillips, but I have not seen the specimens upon which this record was based. The true *A. ovata* occurs in the Corallian and is rather less elongate than the cast now described.

79. *Astarte* (?) *salfeldi* Cox.

1925, p. 150, pl. i, figs. 13a, b.

Occurrence. Shell-bed of Portland.

Remarks. This species, which is known only by the holotype, resembles *Corbicellopsis lorioli* Cox in its general shape, but its umbones are quite flush with the posterior dorsal margin, instead of rising slightly above them, as in that species, and it has certainly not the prominent ligament of a *Corbicellopsis*. I leave it provisionally in the genus to which it was referred in my original description.

FAMILY TANCREDIIDAE.

At the time of writing, a paper describing the British Portlandian species which are referable to this family is in course of publication in the *Annals and Magazine of Natural History*. In that paper a new genus, *Eodonax*, is proposed for the well-known Roach species, "*Sowerbya*" *dukei*, and certain related forms, while, for nomenclatorial reasons, the new generic name, *Corbicellopsis* (type, *Corbis laevis* J. de C. Sowerby), is proposed for the *Corbicella* of authors.

80. *Tancredia chicksgrovensis* Cox. Pl. V, fig. 8.

Occurrence. Portland Stone of Chicks Grove, Wilts. (Holotype in Mr. J. W. Tutchers collection).

81. *Corbicellopsis swindonensis* Cox.

Occurrences. Portlandian (?) of Crookwood, south of Devizes. Upper Kimmeridgian (*pectinatus*-Zone) of Swindon (Holotype,

M.P.G., 45845, W.F.H.). The sequence at Crookwood deserves further investigation ; it seems possible that the bed which yielded this species may be contemporaneous with the Swindon beds, in which case the record of *C. swindonensis* as a Portlandian species would not stand.

82. *Corbicellopsis unioides* (de Loriol). Pl. V, fig. 5.

Occurrences. Portland Stone of Tisbury, Chilmark, and Swindon. "Portlandien inférieur" of the Boulonnais (type-occurrence).

83. *Corbicellopsis lorioli* Cox. Pl. VI, fig. 2.

Occurrences. Chert-bed of Portland Roach (Holotype, M.P.G., 48534, W.F.H.). Portland Stone of Towersey, near Thame. "Portlandien supérieur" of the Boulonnais (de Loriol).

84. *Corbicellopsis moreana* (Buvignier).

Occurrences. Upper beds of Portlandian of Swindon and Tisbury (J.F.B.). "Portlandien moyen" of the Meuse (type-occurrence) and Yonne ; "Virgulien" and "Portlandien inférieur" of the Haute Marne (de Loriol). Upper Kimmeridgian of Hanover (Struckmann). "Purbeckien" of the Swiss Jura (Maillard).

Remarks. I have not seen any specimens of this species from the English Portlandian, but quote Blake's record.

85. *Corbicellopsis portlandica* (Morris & Lycett).

Occurrence. Portland Roach and associated chert-bed (Holotype missing, topotypes, B.M., L.52283-5, R.H.C.).

86. *Eodonax dukei* (Morris & Lycett). Pl. VI, fig. 7.

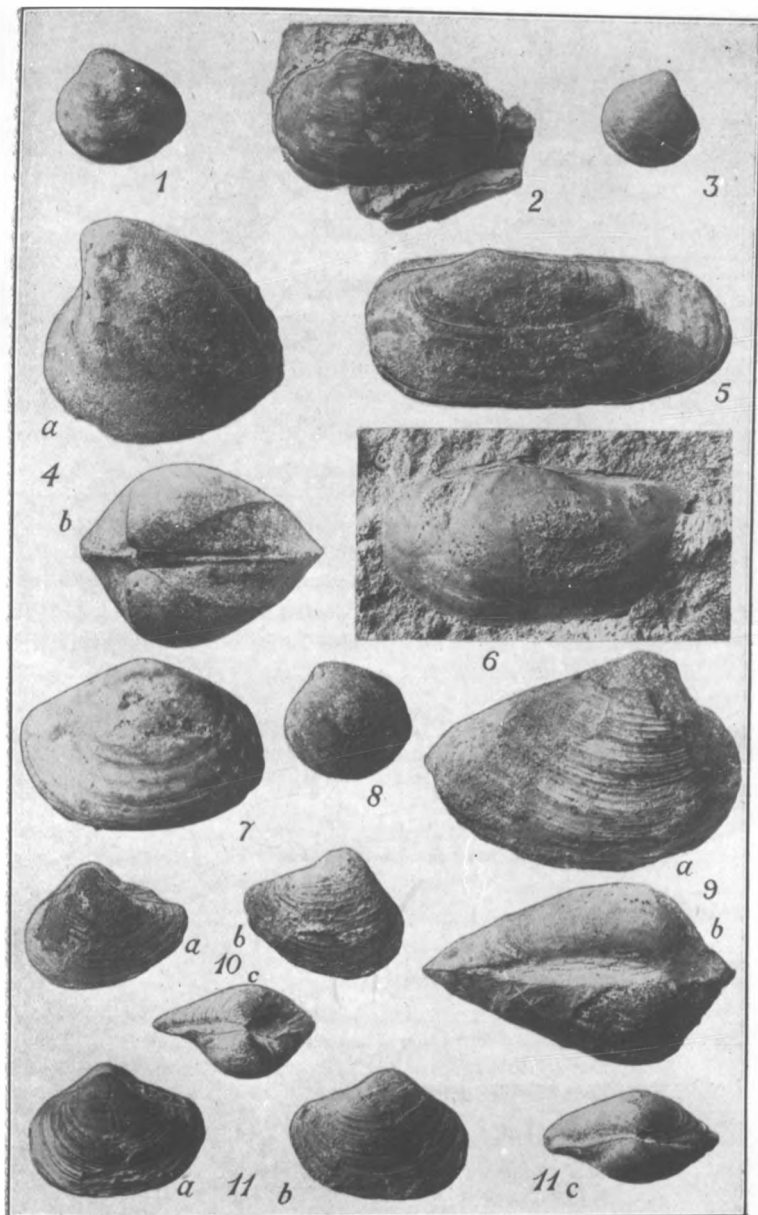
Occurrences. Portland Roach (Holotype missing, Neotype, B.M., L.6790, Damon Coll.) and associated chert-bed. Portland Stone of Swindon. "Portlandien supérieur" of Boulonnais (de Loriol, as *Corbicella pellati*).

87. *Eodonax pellati* (de Loriol).

Occurrences. Chert-bed of Portland Roach. Rubbly Beds of Coney Hill, Bucks. "Portlandien supérieur" of the Boulonnais (type-occurrence). "Purbeckien" of the Swiss Jura (Maillard). Middle and Upper Kimmeridgian of northern Germany (Brauns).

88. *Eodonax ovum* Cox.

Occurrence. Portland Roach and associated chert-bed (Holotype, B.M., L.52290, R.H.C.).



89. *Eodonax* (?) *eastonensis* Cox. Pl. V, fig. 2.

Occurrence. Portland Roach and associated chert-bed (Holotype, B.M., L.39283, R.H.C.).

FAMILY MACTROMYIDAE (=UNICARDIIDAE.)

90. *Mactromya verioli* (Buvignier).

Unicardium verioli Cox, 1925, p. 150, pl. iii, fig. 1.

(The generic name *Mactromya* Agassiz, 1843 (type, *Lutvaria concentrica* Münster in Goldfuss, selected by Herrmannsen, 1847, "Indicis Generum Malacozoorum," ii, p. 10), replaces *Unicardium* d'Orbigny, 1850).

Occurrences. Shell-bed of Portland. Rubbly Beds of Aylesbury, Coney Hill, Lodge Hill, and Long Crendon, Bucks. (B.M., J.F.B. and M.P.G., W.F.H.). Upper Kimmeridgian (*pectinatus*-Zone) of Shotover Hill, near Oxford (B.M., L.R.C.). "Portlandien" (all stages) of France (Buvignier, de Loriol), "Virgulien" and "Pterocérien" of the Boulonnais (de Loriol). Upper Kimmeridgian of Poland (Lewinski), etc.

FAMILY LUCINIDAE.

91. *Lucina portlandica* J. de C. Sowerby.

1836, p. 347, pl. xxii, figs. 12; Damon, 1860, Supplement, pl. vii, figs. 7, 8; (?) de Loriol, 1867, p. 65, pl. vi, fig. 12; 1872, p. 262, pl. xv, figs. 12, 13; 1875, p. 70, pl. xiii, fig. 48.

Occurrences. Shell-bed and Roach of Portland (B.M., R.H.C.). Chalky beds of Chicksgrove, Wilts.; *Trigonia*-beds of Swindon and uppermost beds of Portland Stone of Tisbury and Swindon; Creamy Limestones of Bucks. and Oxon. (J.F.B.). De Loriol's records from France seem doubtful (*see below*).

Remarks. This species was founded on two specimens, an internal cast from Swindon and an external mould from the Portland Roach, both of which seem unfortunately to be lost. Blake does not record it from Portland at all, but he lists the species *L. plebeia* Contejean from both the Flinty Series and the Building Stone. *L. plebeia*, which was first described from the French Kimmeridgian, is a smaller shell than *L. portlandica* and is more elongate and more excavated in front of the umbones than full-grown specimens of that species. I am, however, convinced that the English Portland Stone specimens which

agree in shape with *L. plebeia* are merely young specimens of *L. portlandica*. It can easily be seen by examining a series of specimens that the latter species changes in shape considerably during growth, full-grown specimens being more orbicular and less excavated in front of the umbones than the young shells. It is probable that de Loriol's *L. alpreckensis* (1875, p. 69, pl. xiv, fig. 4) is also merely a young *L. portlandica*.

The surface-ornamentation of *L. portlandica* consists of not very delicate concentric ridges, which are rather unevenly spaced, but are usually about .5mm. apart on the central region of the shell; in each interspace there are about six very fine concentric threads. De Loriol seems to have misinterpreted this species, since the specimens from several horizons of the French Upper Kimmeridgian and Portlandian which he describes as *L. portlandica* seem to have much finer and more closely spaced concentric ridges. He also states that the species is without a lunule, but in the true *L. portlandica* there is a very narrow, but deep lunule, which is limited by a sharp ridge. A left valve of *L. portlandica*, from the Portland Shell-bed, kindly lent to me by Professor A. Morley Davies, shows the hinge-teeth, which have not previously been described. This specimen leaves no doubt that the species belongs to *Lucina* s. str. (type, *L. jamaicensis* Lamarck, selected by Children, 1823, synonym, *Phacoides* Blainville, same genotype). Its chief characters, from a classificatory point of view, are its fairly well-developed concentric sculpture, its small but deeply impressed lunule, its narrow, impressed escutcheon, its external ligament, the presence (in the left valve) of two cardinal teeth, the lunular one of which is small, but prominent, and the posterior one elongate, the presence of a definite anterior lateral tooth, which is not very prominent, and the smooth pallial margins.

92. *Lucina arenaria*, n.sp. Pl. V, fig. 9.

Occurrence. Portland Sand (*Exogyra*-bed), below Blacknor, Portland (Holotype, B.M., L.52366, R.H.C.).

Specific characters. Shell small, sub-rectangular, with a length to height ratio of about 5:4. Umbones moderately prominent, situated

at the posterior third. Lunule small, deeply excavated. Anterior end of shell high, sub-quadrate, that part of the antero-dorsal margin which lies beyond the lunule being straight and horizontal, making a well-defined angle with the anterior margin. Anterior margin straight and sub-vertical for some distance before curving round to meet the ventral margin, which is feebly convex; posterior end of shell rounded. Ornamentation consisting of delicate, closely spaced, subequal, concentric threads. Interior unknown.

Dimensions. Holotype: Length, 12.0mm., height, 9.5mm., inflation, 5.3mm.

Remarks. The sub-rectangular shape and the delicate, filose ornamentation distinguish this species from *L. portlandica*. *L. plebeia* Contejean, from the Kimmeridgian, is more like it in shape, although not quite so rectangular, but its ornamentation is less delicate. None of the French Upper Kimmeridgian or Portlandian species described by de Loriol can be matched with it.

93. *Lucina blacknorcensis*, n. nom.

"*Venus*" *portlandica* Cox, 1925, p. 151, pl. i, figs. 14a, b & 15, pl. iv, fig. 9 (non Greppin, 1870, p. 346, pl. iv, figs. 4a-c).

Occurrence. Shell-bed of Portland.

Remarks. In my previous paper I regarded this small species as a representative of the Veneridae and described it under a name which was unfortunately pre-occupied. A re-examination suggests that its affinities are lucinoid, although it does not fit into any of the subgenera into which the Tertiary and Recent representatives of the Lucinidae have been divided. Until the classification of all the Jurassic representatives of the family can be revised, it seems preferable to refer it to *Lucina* s. lat. The chief characters which should guide its ultimate generic reference are its filose sculpture, the shallowness of its lunule, the absence of an escutcheon, its sub-internal ligament, its two well-developed, divergent cardinal teeth in the left valve (the lunular one is small and the more posterior one thick and triangular), the absence of a definite lateral tooth, and the denticulate pallial margins. The pallial line and muscle-scars cannot be seen in the specimen studied.

FAMILY CARDIIDAE.

94. *Protocardia dissimilis* (J. de C. Sowerby).

Cardium dissimile J. de Sowerby, 1827, "Mineral Conchology," vi, pl. dluii, fig. 2; Damon, 1860, Supplement, pl. vii, fig. 9; de Loriol, 1867, p. 57, pl. v, fig. 13; (?) 1872, p. 238, pl. xiv, figs. 6, 6a. *Protocardia dissimilis* Skeat & Madsen, 1898, p. 131, pl. iii, figs. 1a-c.

Cardium pellati de Loriol, 1867, p. 58, pl. vi, figs. 1-2.

Occurrences. (?) Upper beds of Portland Sand of St. Alban's Head (B.M., L.R.C.). Shell-bed of Portland, but not the Roach. Portland Stone of most inland localities. Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). "Portlandien supérieur" of the Boulonnais. "Portlandien moyen" of the Haute Marne (this record of de Loriol's seems doubtful). Derived Portlandian boulders of Denmark (Skeat & Madsen).

Remarks. This is a very variable species. The type-form, as figured by Sowerby, is sub-equilateral and quadrate, with its length and height nearly equal. All intermediate gradations occur between shells of this shape and others which are much more elongate and inequilateral, and usually less gibbose; such shells have a pronounced anterior taper and a well-defined angularity of the ventral margin towards its anterior end. This latter variety was described by de Loriol as a distinct species, *Cardium pellati*, and was recorded under this name by Blake from the *Trigonia*-beds of Swindon and the Rubbly Beds of Bucks. De Loriol states that *C. pellati* is smooth, lacking the posterior striation which is characteristic of the genus *Protocardia*. English specimens which agree with *C. pellati* in shape are undoubtedly striated, although sometimes the striation may be so faint as to be scarcely visible. I am unable to accept *C. pellati* as specifically distinct from *P. dissimilis*.

It is possible that some of the crushed specimens of *Protocardia* which occur near the top of the Portland Sand of St. Alban's Head may belong to this species.

95. *Protocardia calcarea* (Blake). Pl. IV, fig. 6.

Cardium calcareum Blake, 1880, p. 232, pl. ix, fig. 15.

Occurrences. Chalky beds at Chicksgrove, near Tisbury (Holotype, B.M., L.20342, J.F.B.). Creamy Limestones of Bucks. and Oxon. (J.F.B.) (?) Portland Sand ("Stinkstone" and Cement Stones) of Hounstout, etc. (B.M., L.R.C., C.H.W.).

Remarks. Blake's original figure of this species was very inaccurate, and looks more like *Eocallista implicata* than like a *Cardium*; it makes the dorsal margins slope much too steeply. A photograph of his type-specimen is here published. Although this is merely an internal cast, traces of fairly regular, fine, concentric ribbing can be discerned. The species is therefore certainly distinct from *P. dissimilis*. It seems to be very close to *Cardium pesolinum* Contejean (1859, p. 277, pl. xv, figs. 6-8), a typically Kimmeridgian species, which de Loriol (1868, p. 118, pl. vii, fig. 13; 1872, p. 240, pl. xiv, figs. 7,8) records from the "Portlandien moyen," but its posterior carination is more pronounced. I am unable to decide whether the *Protocardia* which is very abundant as internal casts in the upper beds of the Portland Sand belongs to this species (it was so recorded by Blake). It appears to be smoother and also less carinate posteriorly, and to be closer to *C. pesolinum*.

FAMILY ISOCARDIIDAE.

96. *Pseudisocardia* (?) *rotunda*, n.sp. Pl. VI, fig. 8.

Occurrence. Portland Roach and associated chert-bed (Holotype, M.P.G., 48592, W.F.H.).

Specific characters. Shell fairly small, not very gibbose, sub-orbicular, slightly longer than high. Umbones broad, depressed, feebly prosogyrous, situated at about the anterior quarter, and rising but slightly above the dorsal margins. Margins of shell forming an even, uninterrupted curve, which is almost a circle; no excavated lunular region. Surface smooth. Interior unknown.

Dimensions. Holotype: Length, 10.1mm., height, 9.1mm., inflation (single valve), 4.0mm.

Remarks. The affinities of this species, which is fairly abundant in the Roach, are at present uncertain. Its umbones are more depressed and its lunule less defined than in *Isocyprina*, and the only described Upper Jurassic species to which it is at all comparable are *Isocardia cottaldina* de Loriol (1868, p. 110, pl. vii, figs. 1-4) and *I. letteroni* de Loriol (1868, p. 112, pl. vii, figs. 5-6), both from the "Portlandien moyen" of Yonne. These appear to be referable to *Pseudisocardia* Douvillé (1912, *Bull. Soc.*

Géol. France (4) xii, p. 459; 1921, p. 120), founded on the Inferior Oolite species, *Isocardia cordata* Buckman.

They are larger and have more prominent umbones than the species now described.

97. *Pronocella nuculaeformis* (Roemer). Pl. VI, figs. 9a, b.

Venus nuculaeformis Roemer, 1836, p. 110, pl. vii, fig. 11; *Cyprina nuculiformis* Thurmann & Étallon, 1859, p. 176, pl. xxi, fig. 4; *Gresslya nuculaeformis* Credner, 1863, p. 19, pl. xi, figs. 27 a-d; *Pronoe nuculaeformis* Brauns, 1874, p. 274, pl. ii, fig. 21; *Cyprina nuculaeformis* Struckmann, 1878, p. 98, pl. vi, fig. 1.

Occurrences. Portland Sand of Portland (doubtful cast, B.M., L. 52410, R.H.C.). Portland Stone of Chilmark (M.P.G., 48586, W.F.H.). Kimmeridgian of Germany and Switzerland.

Remarks. This is the first record of this species from this country, although it is very common in the Kimmeridgian of northern Germany. It is not recorded from France in any of de Loriol's monographs, but the *Isodonta venusta* of that author (1868, p. 104, pl. viii, figs. 7, 7a), from the "Portlandien moyen" of Yonne, seems to be closely comparable. *I. venusta* is certainly not an *Isodonta*, but appears to have the hinge of a *Pronocella*. The hinge of *nuculaeformis* does not seem to have been described, but the species has the shape of a *Pronocella*. The single specimen from Chilmark agrees very well with specimens from the German Kimmeridgian in its size and shape and, notwithstanding its later horizon, I see no reason for regarding it as a distinct species.

98. *Pseudotrapezium swindonense*, n.sp. Pl. VI, figs. 4a, b.

Occurrences. Upper Portlandian ("Cockly Bed"?) of Swindon (Holotype, B.M., 24810, W. Cunningham). Shell-bed of Portland (broken specimen, B.M., L.39206, R.H.C.).

Specific characters. Shell of medium size, fairly gibbosc, ovate-trigonal, slightly longer than high, very inequilateral, carinate posteriorly. Umbones acute, prominent, strongly prosogyrous, situated at the anterior fifth. Posterior dorsal margin slightly convex and sloping; posterior margin feebly convex, truncating the shell obliquely, and making a rounded-off, obtuse angle with the posterior dorsal margin and a sharp, slightly obtuse angle with the ventral margin. Ventral

margin moderately convex, curved in continuity with the strongly convex anterior margin. Carina of posterior slope sharp and strongly curved. Interior unknown.

Dimensions. Holotype: Length, 32.5mm., height, 29.7mm., inflation, 23.1mm.

Remarks. In its external characters this species is very similar to the Inferior Oolite species, *Cardium acutangulum* Phillips (1829, "Geology of Yorkshire," i, pp. 150, 156, pl. xi, fig. 6), which is a characteristic *Pseudotrapezium*. This genus, however, has not definitely been recorded from the Upper Jurassic, and certain posteriorly carinate species, which are very similar to its representatives in their external characters, are referred by Rollier (1913, pp. 171-2) to *Venilicardia*. Of the species in question, *V. contejeani* Rollier (= *Cyprina securiformis* Contejean, 1859, p. 259, pl. xxvi, fig. 10, *non* Sharpe) is very similar to the Swindon species, but it is less elongate and is higher at its posterior end. De Loriol (1872, p. 230) regards Contejean's species as a young specimen of *Isocardia cornuta* Kloeden, and (pl. xiv, fig. 2) figures a shell which Rollier accepts as the young of Kloeden's species. Like Contejean's species, the young *I. cornuta* is slightly less elongate than the Swindon form and higher at its posterior end. It can scarcely be said that Rollier's attribution of these species to *Venilicardia* is much more than a guess, and the species now described is referred provisionally to *Pseudotrapezium*, which it resembles externally.

99. *Pseudotrapezium* (?) *costiferum* (Blake).

Cypricardia costifera Blake, 1880, p. 231, pl. ix, fig. 11.

Occurrence. Creamy Limestones of Coney Hill, Bucks. (J.F.B.).

Remarks. This species is unrepresented in any of the collections which I have examined, and Blake's type is, unfortunately, not extant. From the figure and description, this species appears to be congeneric with *Ps. swindonensis*, but it is much smaller, lower at its posterior end, and higher at its anterior end. A raised rib corresponds to the posterior carina. It is to be hoped that further specimens will be found.

There is, however, a remote possibility that *C. costifera* may be my *Anisocardia buckmani* (No. 75), and the figure published by Blake hopelessly inaccurate and misleading. This point could never be settled definitely unless the undoubted original of Blake's figure could be found.

FAMILY VENERIDAE.

100. *Eocallista brongniarti* (Roemer). †

Venus brongniarti Roemer, 1836, p. 110, pl. viii, fig. 2. *Cyprina brongniarti* de Loriol, 1867, p. 53, pl. v, fig. 10; 1868, p. 106, pl. viii, fig. 10; 1872, p. 215, pl. xiii, figs. 11, 12; 1875, p. 41. *Eocallista brongniarti* Douvillé, 1921, p. 123.

Venus sassurii Goldfuss, 1840, "Petrefacta Germaniae," ii, p. 244, pl. cl, fig. 12 (*non* Brongniart).

Occurrences. Portland Sand (Cement-stone?) of Hounstout (C.H.W.). Rubbly Beds of Bucks. (doubtful record, J.F.B.). "Pterocérien" and "Portlandien inférieur" of the Boulonnais; "Portlandien moyen" of the Boulonnais, Haute Marne, and Yonne. Upper Kimmeridgian of Germany, Switzerland, etc.

Remarks. This is the genotype of *Eocallista* Douvillé. The Hounstout specimen is an internal cast, but I have no doubt as to the correctness of the identification.

101. *Eocallista implicata* (de Loriol).

Cyprina implicata de Loriol, 1875, p. 43, pl. xiii, figs. 10, 11; Blake, 1880, p. 232, pl. ix, figs. 13, 13a; *Venilicardia implicata* Cox, 1925, p. 144.

Venilicardia subquadrata Cox, 1925, p. 145, pl. iv, figs. 1a, b.

Occurrences. Portland Sand (chiefly upper beds) of Portland, St. Alban's Head, Hounstout, etc. (B.M., L.R.C.). Shell-bed of Portland. Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Rubbly Beds and Creamy Limestones of Bucks. (J.F.B.). "Portlandien moyen" of the Boulonnais (type-occurrence).

Remarks. A left valve from the Portland Shell-bed (B.M., L.42124) shows a fairly well-preserved hinge. There are three cardinal teeth, namely, a narrow, elongate posterior cardinal, diverging from the nymph at a small angle; a short, but fairly narrow, median cardinal, inclined in a posterior direction; and a narrow anterior cardinal, which forms a V with the median

cardinal and is sub-parallel to the anterior dorsal margin ; it passes without any break, other than a slight constriction, into a narrow, elongate anterior lateral. A very inconspicuous protuberance from the margin appears to represent a posterior lateral. An imperfectly preserved right valve from the same bed (B.M., L.39175) shows two thin and widely divergent cardinal teeth, the posterior of which is obscurely bifid ; there is also a very thin anterior cardinal tooth just visible below the margin, from which it diverges at a very small angle. Unfortunately, the posterior dorsal margin of this valve is broken away. The observed characters of the hinge of this species seem to correspond with those of the genus *Eocallista*.

I now think that the *Venilicardia subquadrata* of my previous paper was founded on rather an abnormal specimen of this species ; its chief feature is its unusually quadrate posterior end. The other extreme is illustrated by the shell from Aylesbury figured by Blake ; in that specimen there is no defined angle between the posterior and dorsal margins, so that the slope of the latter is unusually steep.

102. *Eocallista implicata* (de Loriol), var. *elongata* (Blake).

Cyprina elongata Blake, 1880, p. 232, pl. ix, figs. 14, 14a. *Venilicardia elongata* Cox, 1925, p. 144.

Occurrences. Portland Sand (upper beds) of Gad Cliff, St. Alban's Head, Hounstout, etc. (B.M., L.R.C. & C.H.W.). Lower Portland Beds of Long Crendon, Bucks. (C.H.W.). Shell-Bed of Portland. *Trigonia*-beds of Swindon (Holotype, B.M., L.19988). Creamy Limestones of Bucks. (J.F.B.).

Remarks. As suggested in my previous paper, this form and *E. implicata* intergrade in every character and it is impossible to draw any line between the two. The more elongate specimens may perhaps be referred to as "var. *elongata* Blake."

103. *Eocallista pulchella* (de Loriol). Pl. VI, fig. 1.

Cyprina pulchella de Loriol, 1867, p. 55, pl. iv, figs. 10, 11 ; (?) *Anisocardia pulchella* de Loriol, 1875, p. 45, pl. xiii, figs. 13-15 ; *Eocallista pulchella* Douvillé, 1921, p. 123 ; *Venilicardia pulchella* Cox, 1925, p. 144, pl. ii, figs. 5a, b & 6a, b.

Occurrences. Shell-bed and Roach (chert-bed) of Portland (B.M., R.H.C.). Freestone of Tisbury (J.F.B.). *Trigonia*-beds and Freestone of Swindon (J.F.B.). Portland Stone of Towersey, near Thame, Oxon. (B.M., T. H. Withers). Upper Kimmeridgian (*pectinatus*-Zone) of Swindon (J.F.B.). "Portlandien supérieur" of the Boulonnais (type-occurrence). "Portlandien inférieur" of the Boulonnais. Struckmann's record (1878, p. 97, pl. v, figs. 6a, b) from the Kimmeridgian of Hanover and Alth's record (1882, p. 267, pl. xxix, figs. 1a, b) from beds of the same age in Poland seem to refer to other species.

Remarks. Well-preserved specimens of this species abound in the chert-bed of the Portland Roach. The hinge agrees very well with the figures given by de Loriol when he first describes the species, but, in his later work, he states that his earlier description of the hinge needs correction, and gives figures which I am unable to reconcile with the hinge of the Portland specimens; in particular, the details of the left valve seem quite different. The localities of the actual specimens figured in 1867 are not mentioned by him, but, from his remarks on p. 56, it seems possible that the specimen showing the hinge may have come from Tisbury. Those figured in 1875 come from the "Portlandien supérieur" of the Tour Croi, that is, from the same horizon as the Portland Roach; but, if the figures and description are accurate, these specimens cannot belong to our Roach species, which is undoubtedly identical with the *Cyprina pulchella* of the earlier work. The specimens from the Portland Shell-bed seem to belong to the same species as those from the Roach, but they differ in the slight emargination of the ventral margin.

The dentition of the Roach specimens is as follows: Left valve with a thick, triangular, longitudinally sulcate, median cardinal tooth, which is separated by a deep pit from a narrow posterior cardinal, projecting from the nymph; from the apex of the median cardinal there diverges a very thin, curved anterior cardinal, which passes into a thick, elongate, prominent anterior lateral; this curves round so as to be parallel to the margin of the hinge-plate, and extends to the end of the latter.

Posterior lateral small, formed by a thickening of the margin rather remote from the umbo. Right valve with three divergent, triangular cardinal teeth, the most anterior of which is elongate and very thin, but is visible in most specimens as a projection from the hinge-plate just below the margin (in some specimens it is very feebly developed). Between this tooth and the margin of the hinge-plate is an elongate recess for the reception of the anterior lateral of the other valve. The median and posterior cardinals are triangular; the latter is the stronger and is separated by a shallow groove from the nymph. An elongate lamina, parallel to the margin, represents a posterior lateral tooth; the groove between this tooth and the margin receives the corresponding tooth of the other valve. The pallial line is not clearly visible in any of the specimens, but there seems to have been a shallow, rounded sinus.

This dentition agrees very well with that of *E. brongniarti* (Roemer), the genotype of *Eocallista*; the differences between the hinge of this genus and that of *Anisocardia* are illustrated in Douvillé's paper. *E. pulchella* is very close to the well-known German Kimmeridgian species, *Venus parvula* Roemer (1836, p. 111, pl. vii, fig. 13), but it attains much larger dimensions.

+ 104. *Eocallista cunningtoni* (Cox).

Venilicardia cunningtoni Cox, 1925, p. 145, pl. iv, figs. 2a, b.

Occurrence. Shell-bed of Portland.

Remarks. This is much more inequilateral and cuneiform than *E. pulchella*, but may possibly be an extreme variety of that species.

105. *Eocallista courcellensis* (de Loriol). Pl. VI, fig. 3. *occurrence reported (see 145)*

Cyprina courcellensis de Loriol, 1872, p. 220, pl. xiii, fig. 8; *Venilicardia courcellensis* Cox, 1925, p. 145, pl. ii, figs. 7a, b.

Occurrences. Shell-bed of Portland. "Portlandien moyen" of the Haute Marne (type-occurrence).

Remarks. The specimens referred to this species differ from *E. pulchella* in their greater convexity, in their higher and obscurely truncate, rather than rounded, posterior end, and in

being ornamented with fine, concentric threads instead of being smooth. The dentition is unknown. De Loriol's holotype was larger than the British specimens, but otherwise closely comparable. The dimensions of the largest British specimen examined (M.P.G., 48587, W.F.H.) are : Length, 13.4mm., height, 12.8mm., inflation, 9.6mm.

106. *Eocallista intermedia* (de Loriol).

Anisocardia intermedia de Loriol, 1875, p. 46, pl. xiii, figs. 20a-c & 21 (non fig. 22) ; (?) Alth, 1882, p. 266, pl. xxv, fig. 21.

Occurrences. Chert-bed of Portland Roach (B.M., L.42103, R.H.C.). "Portlandien supérieur" of the Boulonnais (type-occurrence). Kimmeridgian of Poland.

Remarks. This species is less convex, narrower, more elongate, and more tapering posteriorly than *E. pulchella*. Probably the original of de Loriol's fig. 22 belongs to another species, since it is more ovate than the other specimens figured and came from a much lower horizon. The identity of Alth's species is also rather doubtful ; the species figured by him (loc. cit., pl. xxv, fig. 22) as *Anisocardia parvula* (Roemer) is rather more like the true *E. intermedia*. The specimen from the Portland Shell-bed figured in my previous paper (1925, pl. i, figs. 10a, b) as *Veniliocardia intermedia* appears, on re-examination, to be a young shell of *E. implicata*.

107. *Eocallista socialis* (d'Orbigny).

Astarte socialis d'Orbigny, 1850, *Prodrome*, ii, p. 60 ; de Loriol, 1867, p. 69, pl. vi, figs. 8a, b (non figs. 7a, b).

Occurrences. Chert-bed of Portland Roach. Uppermost bed of Portlandian (possibly Purbeckian) of the Boulonnais (type-occurrence).

Remarks. It is impossible to accept the two specimens figured by de Loriol as representing the same species ; the original of his figs. 7a, b is rather closer to the small shells here identified as *E. intermedia* than to the species represented in his other figures, which is here interpreted as the true *E. socialis*.

Small specimens of *Eocallista* abound in the Roach chert-bed, but their specific determination presents a difficult problem.

Some are undoubtedly the fry of *E. pulchella*, but others differ in being more ovate in shape, tapering less towards their posterior extremity. Such specimens appear to represent d'Orbigny's *Astarte socialis*, which occurs in abundance at about the same horizon in the Boulonnais. These specimens measure only 3-4mm. in length.

FAMILY **QUENSTEDTIIDAE**, nov.

108. *Quenstedtia portlandica*, n.sp. Pl. VI, figs. 5, 6.

Occurrences. Portland Stone of Quainton, Bucks. (Holotype, M.P.G., 48582, W.F.H.). Roach of Portland and associated chert-bed (B.M., R.H.C.). "Cockly Bed" of Swindon; Portland Stone of Haddenham, Oxon., and Lodge Hill and Aylesbury, Bucks. (M.P.G., W.F.H.).

Specific characters. Shell of medium size, compressed, elongate, with the length nearly three times the height, sub-rectangular. Umbones very obtuse, depressed, situated at the anterior third. Posterior dorsal margin straight, horizontal; posterior margin feebly convex, truncating the shell slightly obliquely; posterior slope with an obtuse ridge. Ventral margin long and straight, parallel to posterior dorsal margin. Anterior dorsal margin sloping very slightly towards the rounded anterior extremity. Surface smooth, except for growth-lines. Hinge (left valve) with a single elongate, fairly narrow, posteriorly inclined cardinal tooth, which is obscurely bifid; no lateral teeth. Pallial sinus reaching nearly to the middle of the shell, its lower limb confluent with the lower part of the pallial line. Posterior adductor scar deeply impressed. Interior of right valve unknown.

Dimensions. Holotype: length, 49mm., height, 20mm., inflation 3.5mm.

Remarks. The holotype and the other specimens from inland localities have their shell preserved, but the Roach specimens are merely moulds; fortunately, they show the details of the hinge and other internal characters. The most closely comparable species described previously is *Mactromya koeneni* Struckmann (1882, p. 22, pl. iv, figs. 5-6), from the Corallian of Hanover, but that species is less elongate.

FAMILY SOWERBYIDAE, ROY.

109. *Sowerbya longior* Blake.

Blake, 1880, p. 231, pl. ix, fig. 8a (*non* fig. 8); Cox, 1925, pl. iii, fig. 3.

Occurrences. Portland Sand (30ft. from top) and Shell-bed of Portland (B.M., R.H.C.). Rubbly Beds of Coate, Lodge Hill, Hartwell, and Aylesbury, Bucks. (M.P.G., W.F.H.). Upper Kimmeridgian, *pectinatus*-Zone, of Swindon (type-occurrence).

Remarks. The specimen from Aylesbury figured under this name in Blake's fig. 8 is a *Barbatia*. The original of his fig. 8a (B.M., L.20372) is selected as holotype.

FAMILY CORBULIDAE.

110. *Corbula dammariensis* Buvignier.

Buvignier, 1852, p. 9, pl. xii, figs. 43-45; de Loriol, 1868, p. 69, pl. v, figs. 8-9; 1872, p. 154, pl. x, fig. 1.

Occurrences. Portland Sand (*Exogyra*-bed) and Shell-bed of Portland (B.M., R.H.C.). Chert-bed of Portland Roach (B.M., R.H.C., identification doubtful). *Trigonia*-beds of Swindon; Creamy Limestones of Bucks. (J.F.B.). "Portlandien supérieur" of the Meuse (type-occurrence). "Portlandien moyen" of Yonne and the Haute Marne.

Remarks. The following is a description of the specimens from the Portland Sand which I identify as this species: The shell is sub-equivalve, trigonally ovate, measuring 4.5mm. in length, 3.3mm. in height, and about 3.0mm. in inflation. The umbones are rounded, but fairly prominent; they appear to be only slightly anterior to median in the lateral aspect of the shell, but they are strongly prosogyrous, so that their actual tips lie at about the anterior third. The posterior dorsal margin is nearly straight and slopes at a moderately steep angle, making a well-defined angle with the posterior margin. The latter is straight, fairly long, and truncates the shell slightly obliquely. From the umbo to the postero-ventral angle there passes a well-marked carina, which has a pronouncedly sigmoidal curve. The ventral margin is evenly convex and not at all sinuate. The anterior end of the shell is rounded, with a pronounced concavity in front of the umbones. The surface is ornamented

with rather irregular concentric ribs, which are most prominent near the ventral margin.

These details agree very well with the descriptions of the species given by Buvignier and de Loriol. Some small shells from the Roach chert-bed are referred with doubt to this species. They are only 2mm. in length, while their posterior carina is less marked and their surface appears to be smooth; it is possible that they may be slightly eroded.

111. *Corbula saltans* Blake.

Blake, 1880, p. 230, pl. ix, fig. 9; Cox, 1925, p. 152, pl. i, figs. 17a, b.

Occurrences. Shell-bed of Portland. Building Stone of Portland (J.F.B.). Freestone of Tisbury and Swindon (J.F.B.). Creamy Limestones of Coney Hill (type-occurrence, Holotype missing), Quainton, etc. (J.F.B.).

Remarks. This is more inequilateral and elongate than *C. dammariensis*, but may be merely a variety of that species, since the two forms occur together in the Portland Shell-bed and appear to intergrade.

112. *Corbula* cf. *bayani* de Loriol.

De Loriol, 1875, p. 9, pl. xi, figs. 8-11; Cox, 1925, p. 152, pl. i, figs. 18a, b.

Occurrences. Portland Shell-bed. ["Portlandien moyen" of the Boulonnais (type-occurrence).]

Remarks. The Portland specimen referred provisionally to this species is larger than those identified as *C. dammariensis* (its length, height, and inflation are respectively 5.7mm., 3.8mm., and 3.5mm.), and it also differs in being slightly more inequilateral, and more definitely rostrate at its posterior end, with the ventral margin definitely sinuate. The left valve is slightly smaller than the right. The posterior carina of the right valve (that of the left is obscured by matrix) is well marked and has a pronounced sigmoidal curve. The concentric ridges are very fine near the umbo, but become stronger near the ventral margin.

Compared with the original figures of *C. bayani*, this shell is smaller and relatively more elongate, while its posterior

carina seems to be better defined ; otherwise it is closely comparable, both in shape and in ornamentation. *C. autissiodorensis* Cotteau (de Loriol, 1867, p. 44, pl. iv, fig. 8) is smaller and less gibbose, while *C. deshayesea* Buvignier (1852, p. 9, pl. x, figs. 15-17), although similar in shape, differs in its smooth exterior.

113. *Corbula chilmarkensis*, n.sp. Pl. VI, figs. 10a, b, c, 11a, b, c.

(?) *Leda* sp., Blake, 1880, p. 233, pl. ix, fig. 16.

Occurrences. Portland Stone of Chilmark (Holotype, M.P.G., 48589, figured paratype, M.P.G., 45926, W.F.H.). (?) Freestone of Swindon (Blake's "*Leda*" sp., B.M., L.20330).

Specific characters. Shell fairly large for the genus, moderately gibbose, sub-equivalve, rather variable in shape, trigonally ovate, rounded anteriorly, more or less tapering posteriorly to a pointed extremity, which lies well above the median line. Umbones rounded, prominent, somewhat anterior to median, that of the right valve higher than that of the left. Posterior dorsal margins of the two valves sloping at a gentle angle, the right one being higher than the left ; elsewhere the valve-margins are level with one another. Ventral margin moderately convex, not emarginate posteriorly, but curving up to the rostrum-like extremity. No posterior carination or sulcus. Surface ornamented with coarse and very irregular concentric threads. Interior unknown.

Dimensions. Holotype : Length, 22.0mm., height, 17.3mm., inflation, 12.2mm.

Remarks. The most closely comparable species from France described in de Loriol's monographs is his *Corbula ferruginea* (1875, p. 7, pl. xi, figs. 2-5), the types of which came partly from the ironstone of Écaux (figs. 2-4), of Wealden age, and partly from the Upper Portlandian of Wimille (fig. 5). According to Parent (1893, *Ann. Soc. Géol. Nord*, xxi, p. 72), the Wealden species, to which he restricts the name, is not identical with the Portlandian one. De Loriol, although admitting that the species was based on the moulds of isolated valves, states that *C. ferruginea* is pronouncedly inequivalve. It also differs from the species now described in the well-marked sulcus which runs from the umbo to near the posterior end of the ventral margin

in the right valve. *C. inflexa* Roemer, the well-known Kimmeridgian species, is much more elongate than the new form now described.

Blake's "*Leda* sp." from Swindon is a *Corbula*, and may be a small specimen of *C. chilmarkensis*.

114. *Corbula* sp.

C. cf. ferruginea de Loriol, Cox, 1925, p. 152, pl. i, fig. 16.

Occurrence. Shell-bed of Portland.

Remarks. This species is known to me only by a single left valve, about 10mm. in length and 6mm. in height. It is moderately gibbose and very inequilateral, tapering posteriorly to end in a long rostrum, the extremity of which is broken away. The ventral margin is not at all sinuate at the beginning of the rostrum. The ornamentation consists of fine and very regular concentric ribs, together with two pronounced interruptions in growth, one of which is quite near the ventral margin. Its much finer and more regular sculpture distinguish this species from *C. chilmarkensis*. In *C. ferruginea* also the sculpture is much coarser. *C. sulcosa* (Roemer) (see Struckmann, 1880, "Wealden-Bildungen der Umgegend von Hannover," p. 78, pl. ii, figs. 6a, b) is closely comparable, but more elongate.

115. *Corbula mosensis* (Buvignier).

Cox, 1925, p. 152.

Occurrences. Shell-bed of Portland. Portland Stone of Hartwell, Bucks. (M.P.G., W.F.H.). "Portlandien moyen" and "Portlandien supérieur" of the Meuse (type-occurrence). "Portlandien moyen" of Yonne and the Haute Marne (de Loriol). Upper Kimmeridgian of Germany (Struckmann), etc.

BIBLIOGRAPHY.

- Agassiz, L., 1841. "Mémoire sur les Trigonies."
1842-5. "Monographie des Myes."
- Alth, A. v., 1881-2. "Versteinerungen des Nizniower Kalksteines."
Beitr. Pal. Österr.-Ungarn, i, pp. 183-332,
pl. xviii-xxix.
- Benett, E., 1831. "Organic Remains of Wilts."
- Bigot, A., 1893. "Sur les Trigonies." *Mém. Soc. Linn. Normandie*, xvii, pp. 261-345, pl. viii-xvii.
- Blake, J. F., 1880. "On the Portland Rocks of England." *Quart. Journ. Geol. Soc.*, xxxvi, pp. 189-236, pl. viii-x.
- Boehm, G., 1881. "Die Fauna des Kelheimer Dicerat-Kalkes.
Bivalven." *Palaeontogr.*, xxviii, Lief. 4.
1883. "Bivalven der Stramberger Schichten." *Palaeontogr.*, Supplement ii, pp. 493-680, pl. liii-lxx.
- Brauns, D., 1874. "Der obere Jura im nordwestlichen Deutschland."
- Buckland, W., & "Geology of the Neighbourhood of Weymouth."
De la Beche, H. *Trans. Geol. Soc.* (2) iv, pp. 1-46.
T., 1835.
- Buvignier, A., 1852. "Statistique géol., etc., du Département de la Meuse," Atlas.
- Choffat, P., 1885. "Faune Jurassique de Portugal, ii, Asiphonida." *Mém. Trav. Géol. Portugal*.
- Cox, L. R., 1925. "Fauna of the Basal Shell-bed of the Portland Stone, Isle of Portland." *Proc. Dorset Field Club*, xlv, pp. 113-172, pl. i-v.
- Contejean, C., 1859. "L'Étage Kimméridien dans les Environs de Montbéliard." *Mém. Soc. Émul. Doubs* (3) iv, pp. 1-352, pl. i-xxvii.
- Credner, H., 1863. "Gliederung der oberen Juraformation im nord-westlichen Deutschland."
- Damon, R., 1860. "Handbook to the Geology of Weymouth and the Island of Portland," and Supplement. (New editions, 1880 & 1884-8).
- Douvillé, H., 1921. "La Charnière dans les Lamellibranches hétérodontes." *Bull. Soc. Géol. France* (4) xxi, pp. 116-124.
- Dutertre, A. P., 1927. "Les Aculles des Terrains Jurassiques supérieurs du Boulonnais." *Bull. Soc. Géol. France* (4) xxvi, pp. 395-422, pl. xx.

- Goldfuss, A., 1833-40. "Petrefacta Germaniac," ii.
- Greppin, J. B., 1870. "Description Géologique du Jura Bernois." *Mat. Carte Géol. Suisse*, viii.
- Lamplugh, G.W.,
Kitchin, F. L., &
Pringle, J., 1923. "The Concealed Mesozoic Rocks in Kent." *Mem. Geol. Surv.*
- Lewinski, J., 1923. "Monogr. du Bononien de la Pologne." *Mém. Soc. Géol. France* (Pal.), No. 56.
- Loriol, P. de, 1867. "Monogr. de l'Étage Portlandien des Environs de Boulogne-sur-Mer." *Mém. Soc. Phys. Genève*, xix, pp. 1-200, pl. i-xi.
1868. "Monogr. de l'Étage Portlandien du Département de l'Yonne." *Bull. Soc. Sci. Yonne*, xxi, pp. 437-696, pl. ii-xv (pagination of reprint, pp. 1-260, quoted).
1872. "Monogr. des Étages supérieurs de la Formation Jurassique du Département de la Haute Marne." *Mém. Soc. Linn. Normandie*, xvi, pp. 1-484, pl. i-xxvi.
- 1874-5. "Monogr. des Étages supérieurs de la Formation Jurassique des Environs de Boulogne-sur-Mer." *Mém. Soc. Phys. Genève*, xxiii, pp. 253-405, pl. i-x & xxiv, pp. 1-326, pl. xi-xxvi.
- 1889-93. "Mollusques des Couches Coralligènes Inférieures du Jura Bernois." *Mém. Soc. Pal. Suisse*, xvi-xix.
- Lycett, J., 1872-83. "Monogr. of the British Fossil Trigonidae." *Palaeont. Soc.*
- Maillard, G., 1884. "Invertébrés du Purbeckien du Jura." *Mém. Soc. Pal. Suisse*, xi.
- Moesch, C., 1874. "Monogr. der Pholadomyen." *Mém. Soc. Pal. Suisse*, i.
- Munier-Chalmas, E.,
1865. "Quelques Espèces nouvelles du Genre *Trigonia*." *Bull. Soc. Linn. Normandie*, ix, pp. 415-421, pl. iv.
- Oppel, A., 1856-8. "Die Juraformation."
- Pavlow, A. P., 1907. "Enchainement des Aucelles et Aucellines du Crétacé Russe." *Nouv. Mém. Soc. Imp. Nat. Moscou*, xvii, Livr. 1.
- Phillips, J., 1871. "Geology of Oxford."
- Roemer, F. A., 1835-9. "Versteinerungen des Norddeutschen Oolithen-Gebirges."

- Schmidt, M., 1905. "Über Oberen Jura in Pommern." *Abh. Preuss. Geol. Landesanst.*, n. F., xli.
- Scebach, K. v., 1864. "Der Hannoversche Jura."
- Skcat, E. G., & Madsen, V., 1898. "Jurassic, Neocomian and Gault Boulders found in Denmark." *Danmarks Geol. Unders.* (2) viii.
- Sowerby, J. and J. de C., 1812-46. "Mineral Conchology of Great Britain."
- Sowerby, J. de C., 1836. Palaeont. Appendix to Fitton, "Strata below the Chalk," *Trans. Geol. Soc.* (2) iv. Portland fossils, pp. 346-7, pl. xxii-xxiii.
- Struckmann, C., 1878. "Der obere Jura der Umgegend von Hannover." 1882. "Neue Beiträge zur Kenntniss des oberen Jura und der Wealdenbildungen der Umgegend von Hannover." *Pal. Abhandl.*, i, pp. 1-37, pl. i-v.
- Thurmann, J. & Étallon, A., 1861-4. "Lethaea Bruntrutana."
- Woodward, H. B., 1895. "Jurassic Rocks of Britain : v, Middle and Upper Oolitic Rocks of England (Yorkshire excepted)." *Mem. Geol. Surv.*
-

EXPLANATION OF PLATES.

(All the figures are of natural size, except where it is otherwise stated).

PLATE I.

	PAGE
Figs. 1a, b. <i>Isoarca</i> (?) sp. B.M., L.52339, R.H.C. Portland Sand (<i>Exogyra</i> -bed) of Blacknor, Portland	141
Fig. 2. " <i>Arca</i> " <i>foetida</i> , n.sp. Paratype, C.H.W. Coll. Portland Sand ("Stinkstone") of Hounstout	140
Fig. 3. " <i>Arca</i> " <i>foetida</i> , n.sp. Holotype, same collection and locality	140
Fig. 4. <i>Parallelodon dorsetensis</i> Cox. M.P.G., 48581, W.F.H. Portland Stone of Quainton, Bucks.	142
Figs. 5a, b. <i>Parallelodon</i> cf. <i>nobilis</i> (Contejean). M.P.G., 48765. Portland Stone of Aylesbury.	142

PLATE II.

Fig. 1. <i>Pteria chilmarkensis</i> , n.sp. Holotype, M.P.G., 48585, W.F.H. Portland Stone of Chilmark.	145
Fig. 2. <i>Buchia mosquensis</i> (v. Buch). M.P.G., Geol. Soc. Coll., 2931, Buckland and De la Beche Coll. Portland Sand of Corton. ($\times 1\frac{1}{2}$)	146
Fig. 3. <i>Ostrea chicksgrovensis</i> , n.sp. Holotype, B.M., 24809, Mantell Coll. Portland Stone of Chicks Grove	148
Fig. 4. <i>Ostrea chicksgrovensis</i> , n.sp. Paratype, B.M., 10143, Mantell Coll. Portland Stone of Chicks Grove.	148
Fig. 5. <i>Pseudomonotis portlandica</i> , n.sp. Holotype, M.P.G., 48764, Shell-bed (?) of Portland. ($\times 1\frac{1}{2}$)... ..	146
Fig. 6. <i>Mytilus blacknorensis</i> , n.sp. Holotype, B.M., L.39117, R.H.C. Shell-bed of Portland ($\times 1\frac{1}{2}$)	168
Fig. 7. <i>Ostrea chicksgrovensis</i> , n.sp. Paratype, M.P.G., 48597, coll. Miss E. Benett, Portland Stone of Chicks- grove... ..	148

PLATE II—continued,

		PAGE
Fig. 8.	<i>Mytilus pallidus</i> (J. Sowerby). J. W. Tutchter Coll. Portland Stone of Swindon	169
Fig. 9.	<i>Trigonia buckmani</i> , n.sp. Holotype, M.P.G., 48596, W.F.H. Portland Stone of Lodge Hill, Bucks. ...	155

PLATE III.

Fig. 1.	<i>Trigonia wightensis</i> Strand. M.P.G., 48594, W.F.H. Portland Stone (top beds) of Swindon. ...	160
Fig. 2.	<i>Camptonectes nudus</i> (Buvignier). B.M., L.52425, R.H.C. Portland Sand of Portland.	161
Fig. 3.	<i>Chlamys</i> sp. M.P.G., Geol. Soc. Coll., 2867, Fitton Coll. Portland Stone, below Fovant.	161
Fig. 4.	<i>Trigonia aylesburiensis</i> , n.sp. Holotype, M.P.G., 48595, W.F.H. Portland Stone of Crouch's Pit, Aylesbury	153
Fig. 5.	<i>Trigonia dorsetensis</i> , n.sp. Holotype, B.M., L.52320, R.H.C. Portland Stone of Dorset.	152

PLATE IV.

Fig. 1.	<i>Mytilus suprajurensis</i> Cox. M.P.G., 48593, W.F.H. Portland Stone of Bugle Pit, Hartwell. ...	168
Fig. 2.	<i>Lima</i> (<i>Plagiostoma</i>) <i>blakei</i> , n.sp. Holotype, B.M., L.20329, J. F. B. Rubbly Beds of Birtton, Bucks.	165
Fig. 3.	<i>Plicatula lamellosa</i> , n.sp. Paratype, M.P.G., Geol. Soc. Coll., 2868, Fitton Coll. Portland Roach. ...	164
Fig. 4.	<i>Plicatula lamellosa</i> , n.sp. Holotype, B.M., L.20457, J.F.B. Portland Roach.	164
Fig. 5.	<i>Lima</i> (<i>Ctenoides</i>) <i>cunningtoni</i> , n.sp. Holotype, Dorset County Mus., W.F.H. Portland Stone of Dorset.	166
Fig. 6.	<i>Protocardia calcarea</i> (Blake). Holotype, B.M., L. 20342, J. F. B. Chalky beds of Chicksgrove. ...	182

PLATE V.

Fig. 1.	<i>Pholadomya rustica</i> Phillips. M.P.G., 48584, W.F.H. Portland Stone of Chicksgrove. ...	172
Fig. 2.	<i>Eodonax eastonensis</i> . Cox. M.P.G., 48591, W.F.H. Chert-bed of Portland Roach.	179

PLATE V—continued.

	PAGE
Fig. 3. <i>Thracia depressa</i> (J. de C. Sowerby). B.M., L.20242, J.F.B. Trigonia-beds of Swindon.	172
Fig. 4. <i>Isocyprina elongata</i> Cox. M.P.G., 48579, W.F.H. Portland Stone of Crouch's Pit, Aylesbury. ($\times 1\frac{1}{2}$)	174
Fig. 5. <i>Corbicellopsis unioides</i> (de Loriol). Bristol Univ. Coll. Portland Stone of Tisbury	178
Fig. 6. <i>Thracia incerta</i> (Thurmann). M.P.G., 48580, W.F.H. Chalky beds of Chilmark.	173
Fig. 7. <i>Anisocardia buckmani</i> Cox. M.P.G., 48583, W.F.H. Creamy Limestones of Coney Hill, Bucks. ...	175
Fig. 8. <i>Tancredia chicksgrovensis</i> Cox. Holotype, J.W. Tutchet Coll. Portland Stone of Chicks Grove, ...	177
Fig. 9. <i>Lucina arenaria</i> , n.sp. Holotype, B.M., L.52366 R.H.C. Portland Sand (<i>Evogyra</i> -bed) of Blacknor, Portland. ($\times 1\frac{1}{2}$)	180
Fig. 10. <i>Neomiodon cuneatus</i> (J. Sowerby). Immature specimen. Sedgwick Mus., W.F.H. Portland Stone of Shotover Hill, Oxford. ($\times 1\frac{1}{2}$)	175
Fig. 11. <i>Astarte</i> sp. B.M., L.4790, P.B. Brodie Coll. Portland Roach.	176
Fig. 12. <i>Anisocardia</i> cf. <i>autissiodorensis</i> (Cotteau). B.M., L.52407, R.H.C. Portland Sand (<i>Evogyra</i> -bed) of Blacknor, Portland.	174

PLATE VI.

Fig. 1. <i>Eocallista pulchella</i> (de Loriol). M.P.G., 48588, W.F.H. Chert-bed of Portland Roach.	187
Fig. 2. <i>Corbicellopsis lorioli</i> Cox. Holotype, M.P.G., 48534, W.F.H. Chert-bed of Portland Roach.	178
Fig. 3. <i>Eocallista courcellensis</i> (de Loriol). M.P.G., 48587, W.F.H. Shell-bed of Portland. ($\times 1\frac{1}{2}$).	189
Figs. 4a, b. <i>Pseudotrapezium swindonense</i> , n.sp. Holotype, B.M., 24810, W. Cunnington Coll. Portland Stone of Swindon.	184
Fig. 5. <i>Quenstedtia portlandica</i> , n.sp. Holotype, M.P.G., 48582, W.F.H. Portland Stone of Quainton, Bucks.	191

PLATE VI—continued.

PAGE

Fig. 6.	<i>Quenstedtia portlandica</i> , n.sp. Paratype, B.M., L.52315, R.H.C. Portland Roach.	191
Fig. 7.	<i>Eodonax dukei</i> (Morris & Lycett). M.P.G., 48539, W.F.H. Chert-bed of Portland Roach. ...	178
Fig. 8	<i>Pseudisocardia</i> (?) <i>rotunda</i> , n.sp. Holotype, M.P.G., 48592, W.F.H. Chert-bed of Portland Roach. ($\times 1\frac{1}{2}$)	183
Figs. 9a, b.	<i>Prionoella nuculaeformis</i> (Roemer). M.P.G., 48586, W.F.H. Portland Stone of Chilmark.	184
Figs. 10a, b, c.	<i>Corbula chilmarkensis</i> , n.sp. Holotype, M.P.G., 48589, W.F.H., Portland Stone of Chilmark. ...	194
Figs. 11a, b, c.	<i>Corbula chilmarkensis</i> , n.sp. Paratype, M.P.G., 45926, W.F.H. Portland Stone of Chilmark. ...	194

