That at some former period the ferruginous sand of Sheppey, though now limited in extent, was *coextensive with the London Clay beneath*, seems evident from the existence of the kilns at Scrap Gate, and of others which appeared to me to be on the Warden end of the cliffs. These clearly show, that although the arenaceous deposit does not exist in such localities as a distinct mass, yet there is, in the necessary loamy state of the brick clay, evidence of a transition state between the London Clay below and the commencement of some sandy bed above.

I do not attempt to prove the identity of the Sheppey sand with that of Bagshot. My wish is to bring those facts which I observed under the notice of others, who may have an opportunity of minutely investigating the subject. The discovery of fossils, or of lithological characteristics, or actual sequence, must be added to the present order of superposition before we can really prove that the high lands of Sheppey bear an outlier of the Bagshot Sand formation, in common with the other elevated portions of the London Clay.

The accompanying woodcut gives an approximate section of the cliffs on the N.E. coast of the Island.

Above the bed of ferruginous sand, and over the surface of the highest parts of the Isle of Sheppey, rounded pebbles are found, not deposited *en masse*, but detached and scantily scattered over the surface. Hence the boggy nature of the Island in wet weather, the London Clay coming up to the surface almost uncovered. These pebbles, both in their shape and mode of deposition, are precisely similar to those which are found in some localities N. of London, as at Muswell Hill and Mill Hill; and they appear to be quite distinct from the beds of gravel found in various parts of the valley of the Thames.

3. *On the THICKNESS of the LONDON CLAY; on the RELATIVE POSITION of the FOSSILIFEROUS BEDS of SHEPPEY, HIGHGATE, HARWICH, NEWNHAM, BOGNOR, &c.; and on the PROBABLE OCCURRENCE of the BAGSHOT SANDS in the ISLE of SHEPPEY.*
By JOSEPH PRESTWICH, Jun., F.R.S., F.G.S. &c.

§ 1. *Thickness of the Clay.*

HAVING frequently had my attention directed by Mr. Searles Wood to the question of the exact position in the London Clay of the peculiar and remarkable fossiliferous beds of Sheppey, and of the thickness of the London Clay itself at that place, I have, with that special object in view, made a further examination of the Island, and now beg to lay before the Society the result of these observations. I have availed myself of this opportunity to determine also more correctly the importance of the London Clay in other parts of its range, and to settle approximately the position of the strata of some other localities, well known for their fossils—separate lists of which I give at the end of this paper.

This question of the thickness of the London Clay remains nearly

in the state in which it was left by Phillips and Conybeare in 1822. The impression likely to be conveyed by the observation on this subject in their valuable work * is one which would suppose its development to be more irregular, and in places considerably greater, than will, I believe, prove to be the case. They state,—“The actual thickness of the London Clay in Sheppey may be estimated, by adding the height of the cliff to the depth of the wells, at 530 feet.” They then proceed to say that “it may be supposed to be much thicker in Essex,” estimating it at “High Beech to be about 700 feet thick;” and further, they report it to have been pierced at Wimbledon to the depth of 530 feet, without passing through it. They then give a number of lesser measurements, but without stating whether or not the upper beds have been denuded.

In the following estimates I have deemed it necessary to take only such lines of section as afford a definite upper horizon—the one obtained by the superposition of the Bagshot sands. The base of the London Clay I have ascertained in all cases practicable by means of well-sections.

The fine and complete coast sections in the Isle of Wight show that the total thickness of the London Clay at Alum Bay is 193 feet, and at White Cliff Bay 363 feet. The Artesian well at Southampton affords another exact measure of 320 feet. Passing over to the London Tertiary area, there exist no definite measurements in the neighbourhood of Hungerford or Newbury; taking, however, into consideration the dip of the beds and the height of the hills, I do not think that the entire thickness of the London Clay there exceeds 200 to 250 feet, which increases, as it ranges westward towards Basingstoke and Odiham, to 330 feet †. In the neighbourhood of Reading and Wokingham, judging from a well commenced at Bear Park, the London Clay cannot be less than 370 to 400 feet thick; whilst at Chobham, where it is overlaid by 265 feet of Bagshot sands, it was roughly estimated by the well-digger at 400 feet. In the north part of Windsor Forest it has been found about 350 feet thick, and if to this we add the height of the ground to where the Bagshot sands set in, it will also give us a thickness of about 400 feet. At the foot of Hampstead Hill, in the Tottenham Court Road, and Regent’s Park, the London Clay is from 70 to 140 feet thick; at the Lower Heath, 285 feet. If to this we add the depth from the top of the hill, and take off 25 feet, as the thickness of the capping of gravel and Bagshot sands, it will give, in round numbers, a total thickness of about 420 to 440 feet to the London Clay at that spot (see fig. 1, p. 404).

With regard to the exceptional thickness of 530 + and of 700 feet, assigned to the London Clay at Wimbledon and High Beech by Phillips and Conybeare, there are, I believe, errors in both instances. In the first case, the Mottled Clays beneath the London Clay are sometimes so largely developed, that in places not far distant (as at Chertsey and Chobham) there frequently is no sufficient mass of

* *Geology of England and Wales*, p. 33.

† *Well-section at Dogmersfield*, *Journ. Geol. Soc.* vol. x. p. 97.

interstratified sands to afford a water supply, so that wells have been carried through the London Clay, and then passed almost at once into the Mottled Clay, in consequence of which works have been given up and abandoned. This may have occurred at Wimbledon; and possibly no line of demarcation having been drawn between the two clays, they were put down together as one mass of London Clay*. We know the thickness of the London Clay to be 230 feet deep at the Asylum at Garrett, and 210 feet at Mortlake; if to these we add the height of the Wimbledon Hill above those places, it will hardly give a thickness of 400 feet to the London Clay at Wimbledon. The line of section (fig. 1, p. 404) between Hampstead and Wimbledon, which takes the evidence afforded by wells at intermediate stations, shows a structural result in conformity with the foregoing observations†.

The other case, at High Beech, arises from an error, originating apparently with the Trigonometrical Survey ‡, in which that spot is stated to be 750 feet high. Phillips and Conybeare, knowing the height of the ground at a well at Epping to be 340 feet above high water mark, and the thickness of the clay to be 392 feet, added to the latter the additional height of the ground at High Beech, or of 300 feet more,—giving an estimate, therefore, of about 700 feet. I find, however, by observations with the aneroid barometer, that the height of High Beech above the sea level can hardly exceed 440 feet; and further, I find that the hill is capped by a thin covering of gravel and Bagshot sands, amounting together probably to about 20 or 30 feet. In the valley of the Lea, to the west of High Beech, the depth to the base of the London Clay is about 50 feet § at Waltham Cross, 40 feet at Waltham Abbey, 122 feet at Sewardstone, and 80 feet at Turkey-street, Enfield, whilst at Northaw the chalk is at the surface in the valley to the east of the village. Again, at Loughton, a few miles east of High Beech, a well has traversed the London Clay, and reached the Chalk at a depth of 320 feet. Now, if we run a line of section (fig. 2, p. 404) from Northaw, across the valley of the Lea, through High Beech, to Loughton, and take a calculated thickness afforded by the several above-mentioned well-sections (though our line does not exactly pass through any of them), we may approximate very closely to the thickness of the London Clay at these places, and conclude that at High Beech it cannot exceed 430 to 440 feet. At Hunter's Hall, near Epping, and at a height, according to Conybeare and Phillips, of 410 feet above the Thames, the Lower Tertiary sands were reached at a depth of 350 feet. If

* Allowing for this, the reported thickness still seems 100 feet too much.

† Mr. Mylne informs me that the Chalk has recently been reached at Mr. Beaumont's, on the east side of Wimbledon Common, at a depth of 465 feet.—J. P., Jun., Sept. 1854.

‡ Vol. iii. p. 306. Langdon Hill, Essex, is given at 620 feet; but this hill surely cannot exceed about 400 feet above the sea level.

§ I am not quite satisfied as to the exact correctness of these measurements, since in some of the wells the Mottled Clay has, I suspect, been included in the thickness of the London Clay. Making, however, these corrections where they seem necessary, these numbers cannot be far from the truth.

we connect this well with others in the valley of the Lea, and add to it the extra height of the hill at High Beech (deducting the gravel and the Bagshot sands, and judging the beds to be almost level), it will still give about 440 feet as the thickness of the London Clay.

Figs. 1, 2.—Outline Sections of the London Clay.

[The vertical dotted lines in figs. 1, 2, 3, & 4 mark the position of well-sections.]

Scale.—Horiz. 1 inch to 6 miles. Vert. 1 inch to 2000 ft.

Fig. 1.—From Cheam to Hampstead.

Fig. 2.—From Northaw to Loughton.

A section from Havering-atte-Bower to Brentwood, at both of which places we have traces of the Bagshot sands, passes two points where the lower sands have been reached, and gives an average thickness of 450 feet to the London Clay. Warley Parsonage and Brook-street are both situated about 20 to 40 feet below the level of the Bagshot sands, which cap the summit of the hill at Brentwood, and at the former place the London Clay was found to be 390 feet thick, and at the latter about 400 feet.

Proceeding eastward, we approach the Sheppey and Southend district, and here the London Clay seems to expand. As the strata are apparently not much disturbed, and there are a considerable number of well-sections, we can form a tolerably approximate estimate, although we have no section which traverses this deposit at the points where the series is complete. I will first take an east and west section through Sheppey (fig. 3). At Cowling, near Gravesend, the chalk is at the surface. At Sheerness, $9\frac{1}{2}$ miles eastward from this place, three Artesian wells give respectively a thickness of 347, 356, and 347 feet to the London Clay. At Queensborough (two miles south of Sheerness, and on the same level,—and at the same distance from Cowling), the London Clay is 280 feet deep;

our section passes between these two places, and at a point, therefore, where we may estimate the London Clay to be about 320 feet deep*. A rough measurement by the aneroid barometer gave me 160 feet as the height of the ground at Minster Church (where a *Nautilus* was found at a depth of 16 feet, which shows the London Clay to rise to the surface, a bed of gravel excepted), and 180 feet as the height of the hill at "The Chequers," the highest point in the Island. Between these two places a thick bed of light yellow sand sets in, and attains, with the overlying gravel, a thickness of 20 to 30 feet. This bed, which possibly belongs to the lower part of the Lower Bagshot sands, does not extend much further†. As our section now runs parallel with the shore, we may take the dip of the strata along this part of the line from that of the beds in the corresponding portion of the cliffs, or as nearly level along their strike west and east for a distance of about two miles; further on, the strata rise slightly eastward. Passing over the bare London Clay, at the east end of the Island, and crossing the entrance of the Swale, we reach Herne Bay, where the London Clay still continues to rise eastward, at an inclination which, about $1\frac{1}{2}$ mile beyond this town, brings up the Lower Tertiary sands to the sea level. It would appear, therefore, that the centre of the Isle of Sheppey, from Minster to East Church, lies in the deepest part of the curve formed by this line of section; and, after deducting 30 feet for gravel and sand, it would seem that the thickness of the London Clay is here about 470 to 480 feet.

We will now take a line of section (fig. 4, p. 405), intersecting the former one in the centre of Sheppey, and prolonged in one direction south-east to Canterbury, and in the other north-west, crossing the Thames to the cliffs at Southend, and thence to the neighbourhood of Rayleigh. On this line we have a well-section on Blean Hill, where the chalk has been reached at a depth of 160 feet. At Graveney we find the Thanet sands at the surface. The London Clay sets in in the adjoining marshes; and at Harty, on the opposite shore of Sheppey, attains a depth of 133 feet. Thence, crossing the former line of section (fig. 3, p. 405), near East Church, this line reaches the shore at East End, the dip continuing apparently without much diminution as far as this point‡. The cliff between East End and Ramsley, like the hill to the east of Minster, also exhibits, at its highest points, sections of the sands which I refer

* The curve giving this depth is determined by taking the London Clay at its known outcrop, near Sittingbourne, again at King's Ferry, where it has been ascertained to be 200 feet deep, and continuing this line direct through Queensborough and Sheerness.

† In 1847, I noticed the extension of the Bagshot sands over the top of Langdon-hill to the hills at Rayleigh near Southend, and therefore nearly opposite Sheppey. They are more important at the former than at the latter place, attaining near Rayleigh and above Benfleet a thickness of 30 to 40 feet. I have not been able to find any fossils in these sands. It is therefore possible that they may belong to some drift bed, but the probabilities are, however, in favour of their belonging to the Bagshot series.

‡ In the bed of the Thames I have marked the probable prolongation of the slight anticlinal formed by the chalk at Cliff, Gravesend, and Purfleet.

to the Lower Bagshots; they are from 5 to 20 feet thick, and are overlaid by 5 to 10 feet of gravel. It is difficult to measure the exact height of these clay cliffs, owing to the continual fall of their upper portion, and to the broken and sloping surface which they consequently present. The mean of several observations with an aneroid barometer, and of an approximate measurement with a tape line, gave about 130 feet as the height of the cliff at the Coast-Guard station, East End.

Thence, passing over to Essex, we reach the London Clay cliffs of Southend. A few miles north of this town there are several deep Artesian wells. One at the Union at Rochford traverses the London Clay to a depth of 330 feet, before reaching the Lower Tertiary sands. In another, at Stroud-green, the London Clay is 390 feet deep, whilst at Rayleigh it is 400 feet deep. Allowing for the difference of level, and connecting these several well-sections, the London Clay will be 420 feet deep at the point of intersection with our plan. At a short distance from this spot, and nearer Rayleigh, the hills which there attain a height, by aneroid barometer, of about 180 to 200 feet, are capped by 20 to 30 feet of Bagshot sands. Descending into the valley of the Blackwater, at Battle-bridge, an Artesian well has been sunk through 350 feet of London Clay to the Lower Tertiary sands. Connecting together the different points determined or estimated on this line of section, we come to about the same result as in the previous instance, viz. that the London Clay at Sheppey is probably from 470 to 480 feet thick, and that it is about the same on the opposite coast of Essex.

At Foulness Island, in Essex, there are Artesian wells through the London Clay 400 feet deep. Beyond this place the London Clay gradually rises, its base coming apparently within 20 or 30 feet of the surface at the river level at Colchester, and at the sea level at Walton and Harwich; whilst at Ipswich the Lower Sands come to the surface.

From the foregoing observations it would appear that the London Clay gradually expands as it ranges from west to east, at first rather rapidly until it attains a thickness of from 300 to 400 feet, and then very gradually until, in the neighbourhood of London, it averages from 400 to 440 feet thick*. In the Isle of Sheppey, and on the opposite Essex coast, however, it reaches its greatest development, being there apparently as much as 470 to 480 feet thick. As the regularity of this development does not agree with opinions I have frequently heard expressed on this subject, I may mention in explanation, although probably hardly necessary, that the London Clay was not spread over a denuded land surface, but was a continuation of a series of marine and estuarine deposits, which had previously filled up and smoothed over the irregularity of the old chalk surface. The lenticular shape of this large mass of clay (for it thins off again eastward as it ranges through Belgium) is very striking, and has an interesting theoretical bearing.

* I am now of course speaking of it apart from the local diminution of its thickness produced by denudation, which necessarily gives it at present a very variable thickness.

§ 2. *Position of the Fossils.*

The organic remains of the London Clay are distributed in groups marking particular zones. Of these zones we may take as types—Sheppey, Highgate*, Copenhagen-fields and Primrose-hill, and Bognor. In consequence of the debris masking the surface of the Sheppey cliffs, and from the circumstance of the fossils always being sought for amongst the shingle on the beach, where the sea leaves them after washing away the clay, their exact position in these cliffs has not yet been determined. One fact, however, is apparent; the fossil seeds and fruits, which constitute so peculiar a feature in the organic remains of this locality, are found in the greatest profusion here where the cliffs are capped by the Bagshot sands; the inference, therefore, is, that this singular flora belongs mainly to some of the highest beds of the London Clay, probably chiefly to the upper 50 to 60 feet. At least, I presume that it may be owing to the absence of these highest beds, which alone are wanting at Southend, that the fossil fruits and seeds are so much scarcer there, though well-preserved specimens of shells and crustacea, similar to those found at Sheppey, abound. Otherwise there is a general community of species, which induces me to include them in one zone, whilst the position of the beds, as determined in fig. 4, p. 405, shows them to be nearly in the same horizon. The few fossils found at Brentwood (in the railway cutting) and at Egham Hill belong to this zone.

The Highgate fossils belong to a rather lower portion of the London Clay; they occur chiefly near the level of the road at the Archway in beds of sandy clay, which are about 110 to 130 feet below the outlier of Bagshot sands capping the hill. The faunas of Newnham† and of Clewet's-green‡ near Basingstoke agree very closely with that of Highgate, whilst the position of the beds is also similar§. There is, however, a greater admixture of some of the forms which prevail in the lower zones.

The Chalk-farm, Primrose-hill, and Copenhagen-fields fossils form another zone, about 100 feet still lower in the London Clay. The fossils of Kew and Brentford belong to this zone, whilst further westward these beds are probably represented by the fossiliferous beds of Cuffell, near Basingstoke||; but here again there is a greater community of species in the several zones.

The Harwich and Bognor group of fossils belongs to the lowest part of the London Clay, as do also the fossils of the lower strata at Potter's-bar near Barnet, of Sherfield and Old Basing near Basing-

* That different beds of the London Clay are characterized by peculiar groups of fossils was a fact first noticed in the neighbourhood of London by Mr. Wetherell, in 1836, in an interesting paper published in the Lond. and Edinb. Phil. Mag. vol. ix. He there shows that the Highgate fossils are many of them peculiar to that spot, that the fossils of Primrose-hill and Regent's-park constitute another group on a lower level, and considers that the beds at Islington and west of Herne Bay form a third level.

† Quart. Journ. Geol. Soc. vol. iii. p. 371.

‡ Ibid. p. 370.

§ Some fossils found at the railway station of the Crystal Palace indicate the occurrence of these beds near the summit of the Norwood hills.

|| Quart. Journ. Geol. Soc. vol. iii. p. 369.

stoke, and part of the sections at Pebble-hill near Hungerford, and of Clarendon-hill near Salisbury*.

At Alum Bay, in the Isle of Wight, where the London Clay is not so thick, its palæontological divisions are less marked, and similar fossils are more generally prevalent throughout its entire mass.

Confining ourselves to the London district, it would appear, that, although a great proportion of the fossils range at intervals vertically throughout the London Clay, yet their development is very different in different zones, being abundant in some and scarce in others, whilst each zone is further marked by a few characteristic species, thus forming distinct, although nearly related groups;—that plant remains occur sparingly throughout the mass of the London Clay, but that their chief development is in the uppermost, or perhaps superadded, beds in the eastern area, in which also are entombed the great bulk of the reptilian and fish remains;—that a profusion of molluscs indicating waters of a more moderate depth characterise its second descending stage;—that deeper-sea forms prevail in the third stage in the eastern area, but are replaced by a shallower water fauna, more nearly allied to the fossils of the second stage, as we proceed westward;—and that the same change takes place also in the fourth and lowest stage, many of the forms of the upper divisions being common to it in the westward area, where the sea was evidently shallow, whilst eastward we have indications of the maximum depth of the London Clay sea, with a very scanty fauna of deep-sea forms.

It must not, however, be supposed that the fossils are dispersed either vertically or horizontally with any uniformity as to numbers: although, as before mentioned, certain zones are characterized by certain groups of organic remains, yet the fossils tend to occur in greater or less abundance in certain beds. This is especially the case in the lower zone, which is frequently almost totally unfossiliferous; the third zone, likewise, is often marked by the absence of fossils, and so again with the upper zone; the fossils appear more permanent in the second zone. These zones are necessarily artificial, as no actual division exists, and the organic remains and mineral characters are continuous; but they serve to mark the distinct conditions of the fauna and flora at particular periods, and show the prevalence generally of like forms on the same levels; they are not, however, to be taken, by any means, as constant, but merely as local centres for convenient reference and grouping.

The following table shows this general order of succession, and the position of the several fossiliferous zones. The divisions are not given as very definite; they may vary 50 feet either one way or the other, according to the thickness of the London Clay itself in different parts of its area; but they will serve to show generally the relative position of the beds at the different places named. Only the principal localities are given.

* Quart. Journ. Geol. Soc. vol. ii. p. 235, 236, and vol. iii. p. 367.

Zones.	General average thickness.		Fossiliferous localities.
	Westward area. Feet.	Eastward area. Feet.	
First (uppermost).	70	150	{ Cliffs of Sheppey and of Southend; Brent- wood-hill; Egham-hill.
Second.	80	100	Margaretting-street, near Chelmsford; High- gate Archway*; Wandsworth Common; Railway station, Crystal Palace; Newn- ham; Clewet's-green.
Third.	100	140	Cliffs between Herne Bay and Whitstable; Colchester; Chalk-farm; Primrose-hill; Copenhagen-fields; Islington; Whetstone; Hornsey; Colney Hatch; Kew; Brentford; Cuffell.
Fourth.	50	90	Harwich; Walton; Cliff east of Herne Bay(?); Potter's-bar (?); Hedgerly; Old Basing; Sherfield; upper part of Pebble-hill and of Clarendon-hill; Bognor.
	<hr/> 300	<hr/> 480	

A question arises, whether the upper beds of the London Clay in Kent and Essex may not represent some portion of the Lower Bagshot or Bracklesham sands of Berkshire and Hampshire, or whether the 200 to 300 feet of London Clay of the latter district represents, in mass as well as in time, the 460 to 480 feet of the former district. I am inclined to take the latter view, and to consider the eastern district to have derived its superadded features from its proximity to the sources of the river supply of the period, and to the greater depth of the sea in that area (or to a more rapid subsidence of the bed of the sea), so as to allow of a larger accumulation of sediment, and to result in a greater depth of strata.

§ 3. *Lists of Organic Remains.*

As no separate and complete lists of the fossils of Sheppey, Highgate, and other localities mentioned in the text have been published, I have endeavoured to determine with some accuracy these different faunas. There are, fortunately, several special collections of great value to assist an inquiry of this nature; Mr. Wetherell, who has materially assisted me in this inquiry, having for many years zealously collected all the fossils found at Highgate and its vicinity (the road at the Archway on Highgate-hill, the railway cuttings at Primrose-hill, Copenhagen-fields, Hornsey, and Whetstone, &c.); whilst Mr. Bowerbank, on his side, has amassed a like unrivalled series of the Sheppey fishes, reptiles, crustacea, and plants. The collection of Mr. Edwards from both these places, although subordinate to his admirable collection of Bracklesham Bay fossils, is very important. More recently Mr. Lunn has formed a valuable collection of the Southend fossils. My own attention has been chiefly turned to such less important localities and sections, as from their distance or temporary nature have not come within the examination of such assiduous collectors.

Further, the valuable publications of the Palæontographical Society

* The beds at Finchley and at Haverstock-hill would seem to occupy a position intermediate between these second and third zones. The zones may possibly be multiplied.

have, during the last few years, advanced most materially, and given an unusual completeness to most branches of Tertiary palæontology*. The Report also by Professor Agassiz, in 1844, on the fossil fishes of the London Clay is a monograph of the greatest value, and presents us with a research such as few other strata have undergone†. The Crustacea yet offer a rich and almost unexplored field; Professor McCoy has, however, described a few species‡. Mr. R. Jones has commenced an examination of the Foraminifera and Entomostraca, which will, it is hoped, be continued.

[Parts of these lists will be found more complete than the rest, in consequence of some groups of fossils and some beds having been the object of more especial research than others. Many species will probably be found to have a greater range. The prevalence, however, of certain fossils at certain levels is the essential and prominent feature. An asterisk marks the common and characteristic *shells*; I cannot at present safely apply it to the other groups.]

FIRST ZONE.—*Isle of Sheppey Fossils (cliff-section).*

AVES.

Halcyornis Toliapicus, Owen.
(*Larus, Kön.*)

Lithornis vulturinus, Owen.
— (?) *Emuinus, Bowerb.*

REPTILIA.

Chelone breviceps, Owen.
— *convexa, Owen.*
— *cuneiceps, Owen.*
— *latiscutata, Owen.*
— *longiceps, Owen.*
— *subcarinata, Owen.*
— *subcristata, Owen.*
Emys bicarinatus, Bell.
— *Comptoni, Bell.*

Emys Delabechii, Bell.
— *lævis, Bell.*
— *testudiniformis, Owen.*
Platemys Bowerbankii, Owen.
— *Bullockii, Owen.*
Trionyx pustulatus, Owen.
Crocodylus champsoides, Owen.
— *Toliapicus, Owen.*
Palæophis Toliapicus, Owen.

PISCES.

Acestrus ornatus, Ag.
Acipenser Toliapicus, Ag.
Ætobatis irregularis, Ag.
— *subarcuatus, Ag.*
Ampheristus Toliapicus, Kön.

Auchenilabrus frontalis, Ag.
Bothrosteus minor, Ag.
Brachygnathus tenuiceps, Ag.
Brychetus Mulleri, Ag.
Calopomus porosus, Ag.

* The following very important monographs on the Eocene fossils have already been published :—

Professor Owen and Professor Bell, "On the Chelonia of the London Clay," 1849.
Mr. F. E. Edwards, "On the Cephalopoda of the Eocene Formations," 1849.
Professor Owen, "On the Crocodilia and Ophidia of the London Clay," 1850.
Milne-Edwards and J. Haimes, "On the Corals of the Tertiary Formations," 1850.
Mr. Charles Darwin, "On the Fossil Lepididæ of Great Britain," 1851.
Mr. Thos. Davidson, "On the British Tertiary Brachiopoda," 1852.
Professor E. Forbes, "On the Echinodermata of the British Tertiaries," 1852.

Where the London Clay is spoken of in these monographs it is generally understood to include the Bracklesham sands and the Barton clays. I restrict the term to the lower deposits of London and of Hampshire.

† Report of the Brit. Assoc. for the Advancement of Science, 1845, p. 279. This has been further revised and added to by Sir Philip Egerton in Mr. Dixon's "Geology of Sussex," and in the edition just published of Morris's Catalogue. I avail myself of the assistance afforded by this latter very valuable work, which has reached me as this paper is going through the press, in the final revision of the lists in the text—J. P., August 1854.

‡ Ann. and Mag. Nat. Hist. 2nd Ser. 1849, vol. iv. p. 161.

- Carcharodon angustidens*, *Ag. C. Toli-*
apicus & *C. heterodon*, *Ag.*
 — *suberratus*, *Ag.*
Cœlocephalus salmoneus, *Ag.*
Cœloperca latifrons, *Ag.*
Cœlopoma Colei, *Ag.*
 — *læve*, *Ag.*
Cœlorhynchus rectus, *Ag.*
Cybius macropomum, *Ag.*
Elasmodus Hunteri, *Eger.*
Eurygnathus cavifrons, *Ag.*
Glyphis hastalis, *Ag.*
Goniognathus coryphænoïdes, *Ag.*
 — *maxillaris*, *Ag.*
Gyrodus lævior, *Ag.*
Halecopsis lævis, *Ag.*
Hypsodon oblongus, *Ag.*
 — *Toliapicus*, *Ag.*
Labrophagus esocinus, *Ag.*
Lamna compressa, *Ag.*
 — *elegans*, *Ag.*
 — *Hopei (Odontaspis)*, *Ag.*
 — *verticalis (Odontaspis)*, *Ag.*
Laparus alticeps, *Ag.*
Loxostomus mancus, *Ag.*
Megalops priscus, *Ag.*
Merlinus cristatus, *Ag.*
Myliobatis acutus, *Ag.*
 — *canaliculatus*, *Ag.*
 — *Colei*, *Ag.*
 — *Dixonii*, *Ag.*
 — *goniopleurus*, *Ag.*
 — *gyratus*, *Ag.*
 — *heteropleurus*, *Ag.*
 — *jugalis*, *Ag.*
 — *lateralis*, *Ag.*
 — *nitidus*, *Ag.*
Myliobatis Oweni, *Ag.*
 — *punctatus*, *Ag.*
 — *striatus*, *Ag.*
 — *Toliapicus*, *Ag.*
Myripristis Toliapicus, *Ag.*
Notidanus serratissimus, *Ag.*
Otodus macrotus, *Ag.*
 — *obliquus*, *Ag.*
Pachycephalus cristatus, *Ag.*
Percostoma angustum, *Ag.*
Periodus Kœnigii, *Ag.*
Phalacrus cybioides, *Ag.*
Phasganus declivis, *Ag.*
Phyllodus irregularis, *Ag.*
 — *marginalis*, *Ag.*
 — *medius*, *Ag.*
 — *planus*, *Ag.*
 — *polyodus*, *Ag.*
 — *Toliapicus*, *Ag.*
Pisodus politus, *Owen. P. Owenii*, *Ag.*
Podocephalus nitidus, *Ag.*
Pomopræctus Egertoni, *Ag.*
Pristis bisulcatus, *Ag. (?)*
Psaliodus compressus, *Eger.*
Ptychocephalus radiatus, *Ag.*
Pycnodus Toliapicus, *Ag.*
Rhinocephalus planiceps, *Ag.*
Rhipidolepis elegans, *Ag.*
Rhonceus carangoides, *Ag.*
Rhynchorhinus branchialis, *Ag.*
Sciænurus Bowerbanki, *Ag.*
 — *crassior*, *Ag.*
Scombrinus nuchalis, *Ag.*
Sphyrænodus crassidens, *Ag.*
 — *priscus*, *Ag. Dictyodus*, *Owen.*
Teratichthys antiquitatis, *Kön.*
Tetrapterus priscus, *Ag.*

MOLLUSCA.

- Cephalopoda.*
Belosepia sepioidea, *Blainv.*
 **Nautilus centralis*, *Sow.*
 * — *imperialis*, *Sow.*
 — *regalis*, *Sow.*
 — *urbanus*, *Sow.*
 * — (*Aturia*) *zic-zac*, *Sow.*
Gasteropoda.
Acteon simulatus, *Sow.*
Ancillaria.
Aporthais Sowerbii, *Mant. Rostel-*
laria, *Sow.*
Buccinum junceum, *Sow. ?*
 **Bulla attenuata*, *Sow.*
Cancellaria quadrata, *Sow.*
Cassidaria nodosa, *Brand.*
Buccinum, *Brand.; C. carinata*, *Desh.*
 — *striata*, *Sow.*
 **Cerithium Charlesworthii*, *n.s. ¶*
Corbula.
 **Conus concinnus*, *Sow.*
Cypræa oviformis, *Sow.*
Dentalium nitens, *Sow.*
 **Fusus bifasciatus*, *Sow.*
 — *coniferus*, *Sow.*
Murex cristatus, *Sow.*
 — *spinulosus*, *Desh.*
 **Natica labellata*, *Lam.*
 **Pleurotoma prisca*, *Sow. Murex*, *Br.*
 — *rostrata*, *Sow. Murex*, *Brand.*
 **Phorus extensus*, *Sow.*
Pyrgula tricostrata, *Desh. ?*
 — *angulata*, *Edw.*
 **Rostellaria lucida*, *Sow.*
Scaloria reticulata, *Sow., non Brand.*
 **Solarium patulum*, *Sow.*

¶ I give this name to a beautifully sculptured *Cerithium*, figured, but not described, by Mr. Charlesworth in 1849, amongst some illustrated Barton specimens (card fig. f). At Barton it is an extremely rare species, but it is very common and characteristic at Sheppey and Southend.

Solarium canaliculatum, Lam.
Terebra striata.
Triton.

**Turritella imbricataria*, Lam.
Voluta nodosa, Sow.

Lamellibranchiata.

Arca.
**Astarte rugata*, Sow.
**Avicula papyracea*, Sow.
— *media*, Sow.
Cardita.
**Cardium nitens*, Sow.
**Cryptodon Goodhallii* (*Lucina*), Sow.
Cyprina planata, var., Sow. (?)
— *nana*, Sow.

Cytherea obliqua, Desh. *Venus tenuistriata*, Sow. ?

Isocardia sulcata, Sow.
Modiola, n. sp. ?
**Neæra inflata* (*Nucula*), Sow.
Nucula amygdaloides, Sow.
— *Bowerbankii*, Sow. ?

Ostrea.
**Pectunculus decussatus*, Sow.
Pinna arcuata, Sow. ?
Syndosmya splendens (*Tellina*), Sow.
**Teredo antenautæ*, Sow.
Teredina personata, Lam.

Brachiopoda.

**Terebratulina striatula*, Sow.

ARTICULATA.

Zanthopsis Leachii (*Cancer*), Desm.
B. gibbosus (?), Schlot.
— *nodosa*, M^c Coy. *Cancer tuberculatus* (?), Kön.
— *unispinosa*, M^c Coy.

Annelida.

Serpula.
Vermicularia Bognoriensis, Mant.
(*Vermetus*, Sow.)

Crustacea.
Archæocarabus Bowerbanki, M^c Coy.
Basinotopus Lamarckii (*Inachus*), Desm.
Hoploparia Bellii, M^c Coy.
— *gammaroides*, M^c Coy.
Zanthopsis hispinosa, M^c Coy.
— *hispidiformis* (*Brachyurites*), Schlot.

ECHINODERMATA.

Astropecten armatus, Forb.
— (?) *Colei*, Forb.
— *crispatus*, Forb.
Cœlopleurus Wetherelli, Forb.
Goniaster Stokesii, Forb.

Goniaster marginatus, Forb.
— *tuberculatus*, Forb.
Hemiaster Bowerbankii, Forb.
— *Prestwichii*, Forb.
Pentacrinus subbasaltiformis, Mill.

ZOOPHYTA.

Graphularia Wetherelli, M.-Edw.
Trochocyathus sinuosus (*Turbinolia*), Brong.

Paracyathus brevis, M.-Edw.
— *caryophyllus* (*Turbinolia*), Lam.

PLANTÆ.

Lycopodiaceæ.
Lycopodites squamatus, Brongn.
Coniferæ.
Callitrites, Endl. (*Cupressinites*, Bow.), 4 species.
Frenelites, Endl. (*Cup.*, Bow.), 4 sp.
Solenostrobus, Endl. (*Cup.*, Bow.), 5 sp.
Aurantiaceæ ?
Wetherellia variabilis, Bowerbank.
Cucurbitaceæ.
Cucumites variabilis, Bowerb.
Leguminosæ.
Faboidea, Bowerb., 25 species.

Leguminosites, Bowerb., 18 species.
Xulionospirionites, Bowerb., 2 species.
Malvaceæ.
Hightea, Bowerb., 10 species.
Nipaceæ.
Nipadites, Bowerb., 12 species.
Proteaceæ.
Petrophiloides oviformis, Bowerb.
Sapindaceæ.
Cupanoides, Bowerb. (*Amomocarpum*, Brongn.), 8 species.
Tricarpellites, Bowerb., 7 species.

Mr. Bowerbank has in his collection 1 or 2 new species of Turtles, 10 or 12 new fishes, about 14 undescribed species of Crustacea (10 *Zanthopsis*, 4 *Hoploparia*, and *Archæocarabus* ?), and probably as many as 300 to 400 undescribed fossil seeds and fruits, including Palmacean fruits, a few cones, fruits of *Potentillas*, and 1 *Cocos*, with seeds of 2 or 3 species of *Anana*.

In consequence of the Sheppey shells occurring so generally in the state of pyritous internal casts, it is often difficult to determine the species. The number I believe to be greater than given above. It is to be observed also that the Sheppey shells have not yet been worked out with the same care as those of Highgate.

414 PROCEEDINGS OF THE GEOLOGICAL SOCIETY. [May 24,
SECOND ZONE.—*Highgate Fossils (Road-cutting at the Archway).*

REPTILIA.

Vertebra of Palæophis? Small Reptilian teeth?

PISCES.

Carcharodon.
Cœlorhynchus.
Lamna elegans, *Ag.*

Myliobatis Dixoni, *Ag.*?
Notidanus.
Otodus obliquus, *Ag.*

MOLLUSCA.

Cephalopoda.
Belemnitis plicata, *Edw.*
Beloptera Levesquei, *D'Orb.*
Belosepia sepioidea, *Blainv.*
*Nautilus imperialis, *Sow.*
— Sowerbyi, *Weth.*
— zic-zac, *Sow.*

Gasteropoda.
Acteon crenatus, *Sow.*
*— simulatus, *Sow.* Bulla, *Brand.*
Ancillaria.
Aporrhais Sowerbii, *Mant.* Rostellaria
Margerini, *Kön.*
Buccinum junceum, *Sow.*
*Bulla attenuata, *Sow.*
*Cancellaria læviuscula, *Sow.*
*Cassidaria nodosa, *Brand.*
*— striata, *Sow.*
Cerithium concinnum, *Charlesw.*
Cypræa oviformis, *Sow.* Ovulum re-
tusum, *Sow.*
*Conus concinnus, *Sow.*
*Dentalium nitens, *Sow.*
Eulima subulata, *Sow.*
Fusus bifasciatus, *Sow.*
*— coniferus, *Sow.*
*— curtus (*Murex*), *Sow.*
— complanatus, *Sow.*
— interruptus (*Murex*), *Sow.*
— porrectus (*Murex*), *Brand.*
(*F. rugosus*, *Sow.*)
*— trilineatus (*Murex*), *Sow.*
— tuberosus (*Murex*), *Sow.*
Hipponyx.
*Melania.
Mitra pumila, *Sow.*
*Murex coronatus, *Sow.*
— cristatus, *Sow.*
— frondosus, *Sow.* (non *Lam.*)
— minax, *Brand.*
— spinulosus, *Desh.*
*Natica labellata, *Lam.* N. glauci-
noides, *Sow.*
— Hantoniensis, *Sow.*
— sigaretina, *Sow.*
Odostomia.
*Phorus extensus (*Trochus*), *Sow.*
Pyramidella.
*Pyrula angulata, *Edw.* MSS.

Ringicula turgida, *Sow.*
*Rostellaria lucida, *Sow.*
— macroptera, *Lam.*
(*Strombus amplus*, *Brand.*)
Pleurotoma acuminata, *Sow.*
*— colon, *Sow.*
*— comma, *Sow.*
— fusiformis, *Sow.*
— plebeia, *Sow.*
— rostrata, *Sow.*
— semicolon, *Sow.*
— Waterkeynii, *Nyst.*
— Volgeri, *Phil.*
Sclaria reticulata, *Sow.*
— undosa, *Sow.*
Skenea?
Solarium canaliculatum, *Lam.*
*— patulum, *Sow.*
Sigaretus canaliculatus, *Sow.*
Triton fasciatus, *Edw.*
Typhis muticus, *Sow.*
Turritella imbricataria, *Lam.* (*Turbo*,
Brand. T. conoidea, elongata, brevis,
Sow.)
— scalaroides, *Sow.*
Volvaria?
*Voluta nodosa, *Sow.*

Lamellibranchiata.

Anatina?
Astarte rugata, *Sow.*
Arca impolita, *Sow.*
Anomia lineata, *Sow.* A. striata,
Sow.; A. tenuistriata, *Desh.*
*Avicula media, *Sow.*
— papyracea, *Sow.*
*Cardium nitens, *Sow.*
Cardita?
*Corbula globosa, *Sow.*
— cardiiformis, *Edw.* MS.
*Cytherea obliqua, *Desh.*
Cryptodon Goodhalli, *Sow.*
*Lucina.
Modiola depressa, *Sow.*
*— elegans, *Sow.*
— subcarinata, *Sow.*
Neæra inflata, *Sow.*
Nucula minima, *Sow.*
— trigona, *Sow.* N. similis, *Sow.*
Ostrea.

Panopæa intermedia (<i>Mya</i>), <i>Sow.</i> ?	Teredina personata, <i>Lam.</i>
(<i>Corbula dubia</i> , <i>Desh.</i>)	*Teredo antenautæ, <i>Sow.</i>
*Pecten corneus, <i>Sow.</i>	<i>Brachiopoda.</i>
*Pectunculus decussatus, <i>Sow.</i>	Lingula tenuis, <i>Sow.</i>
Pholadomya?	<i>Bryozoa.</i>
Pinna affinis, <i>Sow.</i>	*Flustra.
—— arcuata, <i>Sow.</i>	Eschara, undet. sp.
Sanguinolaria compressa, <i>Sow.</i>	Cellepora, undet. sp.
*Solen affinis (<i>Cultellus</i>), <i>Sow.</i>	Crisia, undet. sp.
*Syndosmya splendens (<i>Tellina</i>), <i>Sow.</i>	

ARTICULATA.

<i>Crustacea.</i>	<i>Annelida.</i>
Archæocarabus?	Serpula heptagona, <i>Sow.</i> ?
Basinotopus.	—— crassa, <i>Sow.</i>
Zanthopsis nodosa, <i>M^r Coy.</i>	Vermicularia Bognoriensis, <i>Mant.</i>
—— Leachii, <i>Desm.</i>	Ditrupea incrassata (<i>Dentalium</i>), <i>Sow.</i>
	(<i>D. strangulatum</i> , <i>Desh.</i>)
<i>Cirripedia.</i>	
Scalpellum quadratum, <i>Dir.</i>	

ECHINODERMATA.

Cœlopleurus Wetherelli, <i>Forb.</i>	Pentacrinus Sowerbii, <i>Weth.</i>
Ophiura Wetherelli, <i>Forb.</i>	Hemiaster?

ZOOPHYTA.

- Graphularia Wetherelli, *M.-Edw.* Pennatula, *Weth.*

FORAMINIFERA.

Cristellaria.	Robulina.	Rotalina.
Dentalina.	Rosalina.	Truncatulina.

PLANTÆ.

A species of Nipadites and a few other rare fruits resembling those of Sheppey.

In Mr. Wetherell's collection there are, besides, a considerable number of new and undescribed shells, especially of the genera *Fusus* and *Pleurotoma*; also a few undetermined species of bony fishes.

THIRD ZONE.—*Fossils from Primrose Hill, P.; Copenhagen Fields, C.; Whetstone, W. (railway cuttings); Islington, I. (canal tunnel); Haverstock Hill, Hav. (?) ; Hornsey, Ho.; Holloway, H. (general surface sections and wells); Hampstead Well, Ha. §*

AVES.

Sternum of a small Wader, *Owen P.*

REPTILIA.

Trionyx..... *P.*

§ The well on the Lower Heath, Hampstead, traverses the lower 285 feet of the London Clay, but the exact position of the fossils was not noted; only the probable position of a portion of them is therefore given in this list. Some others, not placed, are given at page 419. For particulars of the well and list of fossils, see Mr. Wetherell's paper, *Trans. Geol. Soc.* 2 ser. vol. v. p. 131.

PISCES.

<i>Lamna elegans</i> , <i>Ag.</i>	P.H.	<i>Notidanus</i>	Kensal Green.
<i>Otodus obliquus</i> , <i>Ag.</i>	P.W.	<i>Ætobatis</i>	" "
<i>Myliobatis</i>	W.Ha.		

MOLLUSCA.

Cephalopoda.

<i>Belosepia</i>	W.
* <i>Nautilus centralis</i> , <i>Sow.</i>	P.C.H.W.
— <i>regalis</i> , <i>Sow.</i>	P.H.W.Ho.
— <i>Sowerbii</i> , <i>Weth.</i>	P.
— <i>urbanus</i> , <i>Sow.</i> ...	P.W.
— <i>zic-zac</i> , <i>Sow.</i>	P.W.

Gasteropoda.

<i>Acteon simulatus</i> , <i>Sow.</i>	P.Ho.W.
— <i>crenatus</i> , <i>Sow.</i> ...	P.H.W.
* <i>Aporrhais Sowerbii</i> , <i>Ma.</i>	P.C.Ho.W.
<i>Buccinum junceum</i> , <i>Sow.</i>	P.Ho.W.
<i>Bulimus</i>	P.
* <i>Bulla attenuata</i> , <i>Sow.</i>	P.
* <i>Cassidaria striata</i> , <i>Brand.</i>	P.C.W.Ho.
— <i>nodosa</i> , <i>Sow.</i>	P.
<i>Cancellaria læviuscula</i> .	P.
<i>Chemnitzia</i> ?	P.
<i>Cerithium Charlesworthii</i> ..	P.W.Ho.
<i>Cypræa Wetherellii</i> , <i>Edw.</i>	P.
* — <i>oviformis</i> , <i>Sow.</i> ...	P.W.Ho.
<i>Dentalium anceps</i> , <i>Sow.</i>	P.W.Ho.Ha.
— <i>acuticosta</i> , <i>Desh.</i> ? Hav.	
<i>Eulima subulata</i> , <i>Sow.</i> ...	P.
<i>Fusus carinella</i> , <i>Sow.</i> ...	P.C.H.W.
— <i>curtus</i> , <i>Sow.</i>	P.C.Ho.W.
— <i>bifasciatus</i> , <i>Sow.</i> ...	P.
* — <i>interruptus</i> , <i>Sow.</i> ..	P.
— <i>coniferus</i> , <i>Sow.</i> ...	P.
— <i>trilineatus</i> , <i>Sow.</i>	P.C.
— <i>tuberosus</i> , <i>Sow.</i> ...	P.W.
* <i>Natica labellata</i> , <i>Lam.</i> ...	P.H.Ho.W.
<i>Murex cristatus</i> , <i>Sow.</i>	P.Ho.W.
<i>Nerita globosa</i> , <i>Sow.</i> ?...	P.
<i>Phasianella</i> ?	P.
<i>Phorus extensus</i> , <i>Sow.</i> ...	P.Ho.
* <i>Pyrula Smithii</i> , <i>Sow.</i> ...	P.C.W.Ho.
* — <i>angulata</i> , <i>Edw.</i> ...	P.W.
— <i>tricostata</i> , <i>Desh.</i> ...	P.
* <i>Pleurotoma acuminata</i> ...	P.W.H.
— <i>plebeia</i> , <i>Sow.</i>	P.C.H.W.
<i>Rissoa</i> ?	P.
* <i>Rostellaria lucida</i> , <i>Sow.</i> ..	P.W.I.C.Ho.
— <i>macroptera</i> , <i>Lam.</i> ..	P.
* <i>Scalaria reticulata</i> , <i>Sow.</i> ?	P.C.W.
* <i>Solarium patulum</i> , <i>Sow.</i>	P.Ho.W.

<i>Sigaretus canaliculatus</i> .	P.Ho.W.
<i>Triton fasciatus</i> , <i>Edw.</i> ...	P.W.
<i>Trivia</i>	P.W.
<i>Turritella</i> ? <i>scalaroides</i> ..	C.P.Ho.W.
— <i>imbricataria</i> , <i>Lam.</i>	P.Ho.
<i>Typhis muticus</i> , <i>Sow.</i>	P.W.
<i>Voluta elevata</i> , <i>Sow.</i> ...	P.
* — <i>protensa</i> , <i>Sow.</i> ...	P.W.
— <i>tricornis</i> , <i>Sow.</i> ...	P.W.
* — <i>Wetherellii</i> , <i>Sow.</i> ...	P.C.H.W.Ho.

Lamellibranchiata.

<i>Anomia lineata</i> , <i>Sow.</i>	P.C.W.Ha.
<i>Arca impolita</i> , <i>Sow.</i> ...	P.C.Ho.W.Ha.
— <i>nitens</i> , <i>Sow.</i>	P.Ha.
<i>Astarte rugata</i> (var.) ...	P.Ho.W.
<i>Avicula media</i> , <i>Sow.</i> ...	P.Ho.W.
— <i>arcuata</i> , <i>Sow.</i>	P.W.Ha.
* <i>Cardium Plumsteadense</i>	P.Ho.C.I.
— <i>nitens</i> , <i>Sow.</i>	C.
* <i>Corbula globosa</i> , <i>Sow.</i> ..	P.Ho.
— <i>Regulbiensis</i> , <i>Mor.</i>	W.Ha.
* <i>Cryptodon angulatus</i>	P.C.W.Ho.I.
(<i>Axius</i> , <i>Sow.</i>)	
* — <i>Goodhalli</i> , <i>Sow.</i>	P.C.Ho.W.Ha.
* <i>Cyprina planata</i> , <i>Sow.</i> ...	P.W.
<i>Isocardia sulcata</i> , <i>Sow.</i> ...	P.Ho.W.
<i>Lucina</i>	P.H.
<i>Modiola elegans</i>	P.
* <i>Nucula amygdaloides</i> ...	P.C.W.Ho.H.
— <i>minima</i> , <i>Sow.</i> ? ...	P.
* — <i>Bowerbankii</i> , <i>Sow.</i>	P.C.H.W.Ho.
— <i>Wetherellii</i> , <i>Sow.</i> .	P.W.Ha.
* <i>Neæra inflata</i> , <i>Sow.</i>	P.C.H.Ho.W.
<i>Ostrea</i>	P.W.
<i>Pecten duplicatus</i> , <i>Sow.</i>	P.H.W.Ha.
* <i>Pinna affinis</i> , <i>Sow.</i>	P.C.Ho.W.
* <i>Pholadomya margari-</i>	
<i>tacea</i> , <i>Sow.</i>	P.W.Ho.
* <i>Syndosmya splendens</i> ...	P.C.Ho.W.
<i>Teredo antenautæ</i>	P.C.W.H.I.

Brachiopoda.

* <i>Terebratulina striatula</i> ..	P.W.C.
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Bryozoa.

<i>Flustra crassa</i> , <i>Desm.</i>	P.
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ARTICULATA.

<i>Crustacea.</i>		Hoploparia Bellii, <i>M^cCoy</i>	} P.W.H. } Ha.C. } P.
Cythere, 3 n. sp.	C.	Zanthopsis Leachii, <i>M^cCoy</i> ..	
— (Bairdia) subdeltoidea, <i>Mün.</i>	C.	Archæocarabus.....	
— (Cythereis) angulatorea (?),		<i>Annelida.</i>	
<i>Reuss</i>	C.	Ditrupa plana (<i>Dentalium</i>), <i>Sow.</i>	P.H.
— horrescens, <i>Bosq.</i>	C.	— incassata, <i>Sow.</i>	W.H.
— (Cytherella) Munsteri, <i>Roem.</i>	C.	Serpula prismatica, <i>Sow.</i>	P.H.
— — ovata (?), <i>Roem.</i>	C.	— trilineata, <i>Sow.</i>	P.
		Vermicularia Bognoriensis.....	P.Ho.W.

ECHINODERMATA.

Bourgueticrinus Londinensis, <i>Forb.</i>	C.	Pentacrinus Oakshottianus, <i>Forb.</i>	P.
Cainocrinus tintinnabulum, <i>Forb.</i>	Ho.C.	— subbasaltiformis, <i>Mill.</i>	C.Ho.P.Ha.
Hemiasiter Branderianus, <i>Forb.</i>	Hav.	— Sowerbii, <i>Weth.</i>	I.Ha.

ZOOPHYTA.

Dasmia Sowerbii, <i>M.-Edw.</i>	... P.W.Ha.	Stephanophyllia discoides, <i>M.-E.</i>	Hav.
Graphularia Wetherellii, <i>M.-E.</i>	P.H.Ha.	Turbinolia Prestwichii, <i>M.-Edw.</i>	Hav.
Leptocyathus elegans, <i>M.-Edw.</i>	Hav.	Websteria crinoides, <i>M.-Edw.</i>	... Hav.
Mopsea costata, <i>M.-Edw.</i>	 H.		

FORAMINIFERA.

Cristellaria	Hav.	Nodosaria Badenensis, <i>D'Orb.</i>	... C.
Dentalina acuta, <i>D'Orb.</i>	C.	— longiscata, <i>D'Orb.</i>	 C.
— Adolphina, <i>D'Orb.</i>	C.Hav.	— rustica, <i>Jones</i>	 C.Hav.
— consobrina, <i>D'Orb.</i>	C.Hav.	Quinqueloculina (<i>Mikolites</i> , pars)	C.Hav.
— pauperata, <i>D'Orb.</i>	C.Hav.	Robulina	C.Hav.
Glandulina	C.	Rotalina (<i>Rotalia</i>)	C.
Globulina	C.	Spirillina	C.Hav.
Globigerina	C.	Textularia carinata?, <i>D'Orb.</i>	... C.Hav.
Marginulina Wetherellii, <i>Jones.</i>	C.Hav.	— lævigata?, <i>D'Orb.</i>	 C.
Nodosaria affinis, <i>D'Orb.</i>	C.H.	Triloculina (<i>Mikolites</i> , pars)	... C.H.Hav.
— bacillum, <i>Defr.</i>	C.Hav.	Truncatulina	P.

PLANTÆ.

A very few specimens of Nipadites, and of fruits and seeds similar to those of Sheppey	} C.P.W.Ha.
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Mr. Wetherell's collection contains a beautiful series of Crustacea from this zone, most of them new; also several new and undescribed shells.

Some of the clay at the railway cutting at Copenhagen Fields was found by Mr. R. Jones to be rich in Entomostraca and Foraminifera; the other zones have not been submitted to so careful an examination, which may account for the comparative poverty of the other lists. From a recent examination of specimens in Mr. Wetherell's collection, Mr. R. Jones has observed that the clay at Finchley yields a very similar group of Foraminifera to that obtained from the clay at Copenhagen Fields.

As there is no place in the London Tertiary district where the beds of the fourth or lower zone have afforded the opportunity of so thorough an examination of their organic remains as at Bognor, on the Sussex coast, I have added a list of the fossils found there. This list is chiefly taken from the 'Geology of Sussex' of the late Mr.

Dixon, of Worthing, whose valuable collection from this locality was the result of many years' careful and continued research.

FOURTH ZONE.—*Bognor Fossils (from the rocks and clays exposed on the shore at low tide).*

REPTILIA.

Chelone declivis, Owen.

Crocodilus Spenceri?, Buckl. (*Dixon*)†.

PISCES.

Lamna subulata, Ag.

Otodus obliquus, Ag.

MOLLUSCA.

Cephalopoda.

Nautilus imperialis, Sow.

*— *regalis*, Sow.

*— *Sowerbii*, Weth.

*— *centralis*, Sow.

Gasteropoda.

Acteon simulatus, Sow.

**Aporrhais Sowerbii*, Mant.

Buccinum?

**Cassidaria nodosa*, Brand.

— *striata*, Sow.

Fusus tuberosus, Sow.

— *nodusus*, Sow.

**Infundibulum trochiforme*, Sow.

Calyptrea, Lam. *I. tuberculatum*,

I. spinulosum, *I. echinulatum*, Sow.

Trochus apertus, *T. opercularis*, Brand.

Littorina sulcata, Pilk.?

Natica Hantoniensis (*N. striata*), Sow.

— *microstoma*, Sow.

*— *labellata*, Lam.

*— *patula*, Desh.

*— *sigaretina* (*Ampullaria*), Sow.

— *subdepressa*, Mor.

Pleurotoma prisca.

Pseudoliva semicostata (*Buccinum*), Desh.

**Pyrula Smithii* (*Murex*), Sow.

Solarium bistratum, Sow.

**Turritella imbricataria*, Lam.

— *scalarioides*, Sow.

**Voluta denudata*, Sow.

Lamellibranchiata.

**Anomia lineata*, Sow.

**Cardita Brongniartii*, Sow.

*— *quadrata*, Sow.

Cardium Plumsteadense, Sow.

Corbula globosa, Sow.

Cultellus affinis, Sow.

Cyprina planata, Sow.

— (?) *nana*, Sow.

Cytherea obliqua, Desh.

— *suberycinoides*, Desh.?

**Modiola elegans*, Sow.

— *simplex*, Sow.

**Ostrea elephantopus*, Sow.

— *cariosa*, Desh.

*— *tabulata*, Sow.

**Panopæa intermedia*, Sow.

— *puella*, Sow.?

*— *corrugata*, Sow.?

**Pectunculus terebratularis*, Lam.

*— *decussatus*, Sow.

Pinna margaritacea, Sow.?

*— *affinis*, Sow.

Pholas Pechellii, Sow.

Pholadomya Dixoni, Sow.

— *Koninckii*, Nyst.

— *margaritacea*, Sow.

— *virgulosa*, Sow.

**Teredo antenautæ*, Sow.

Teredina personata, Desh.

Thracia oblata, Sow.

Brachiopoda.

Lingula tenuis, Sow.

ARTICULATA.

Crustacea.

Hoploparia Bellii, M^c Coy.

**Zanthopsis Leachii*, M^c Coy.

Cirripedia.

Scalpellum quadratum, Dir.

Annelida.

**Ditrupa plana*, Sow.

Serpula flagelliformis, Sow.?

**Vermicularia Boguoriensis*, Mant.

Note.—To complete the enumeration of the described organic remains of the London Clay, I annex a list of those species, not

† This species is now merged in Prof. Owen's *C. champsoides* and *C. Toliapicus*. I have no means of knowing to which of the two this Bognor specimen belongs.

1854.]

PRESTWICH—LONDON CLAY.

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embraced in the above lists, found in other localities of the London Tertiary district (see some local lists in Quart. Journ. Geol. Soc. vol. iii. p. 369–371).

MAMMALIA.

Coryphodon eocænus, Owen. Off the coast between Harwich and St. Osyth.
Hyracotherium leporinum, Owen. Cliff W. of Herne Bay.

REPTILIA.

Chelone crassicaudata, Owen. (*Testudo plana*?, Kön.) ... Harwich.
— *planineutum*, Owen. (*C. Harvicensis* (?), Woodw.) Harwich.

MOLLUSCA.

Gasteropoda.

Cypræa Prestwichii, Edw. Cuffell, near Basingstoke.
Bulimus ellipticus, Sow. Ha.
Fusus angusticostatus, Mell. ? Cuffell, near Basingstoke.
— *bulbus*, Brand. (*F. bulbiformis*, Lam.) Newnham, near Basingstoke.
Marginella bifidoplicata, Charlesw. London Clay (Stratum No. 4), Alum Bay.
Pleurotoma elegans, Mell. Cuffell.
Scalaria semicostata, Sow. Ha.
Turritella sulcifera, Desh. Cuffell and Newnham.

Lamellibranchiata.

Astarte donacina, Sow. Old Basing.
Ostrea Bellovacina, Desh. (var. *pulchra*, Sow.) Newnham, and Clewet's Green.
Nucula compressa, Sow. Ha.
— *striata*, Lam. Ha.

ENTOMOSTRACA AND FORAMINIFERA.

Cythere barbata, Sow. Ha. *Rotalina*, 4 sp. Ha.
Dentalina soluta (?), Reuss. Ha. *Cristellaria Wetherellii*, Jones. ... Ha.
— *elegans* (?), D'Orb. Ha.

PLANTÆ.

Petrophiloides (Proteaceæ), 5 sp., Bowerb. Herne Bay.

NOTE. (See page 403.)

My friend Mr. R. W. Mylne has just informed me that, from actual survey, he finds the height of High Beech to be 393 feet above the level of Trinity high-water mark at London Bridge.—J. P., Oct. 28, 1854.

JUNE 7, 1854.

Thomas Wynne, Esq., was elected a Fellow.

The following communications were read :—