

# VIII.—*Observations on a Well dug on the South Side of Hampstead Heath.*

By NATHANIEL THOMAS WETHERELL, Esq., F.G.S.

[Read June 4, 1834.]

A WELL dug at Lower Heath, Hampstead, in 1833, yielded a considerable number of fossils, and in consequence of the London clay having been cut entirely through, and the plastic clay to some depth, it became an object of interest to the geologist.

It is well known that a great part of the heath is covered with sand, which has been described as belonging to the upper marine formation\*. At the southern part, however, the sand gradually disappears, and the clay is met with on the surface, and it is at this part that the well was made.

The following is a section of the well.

London Clay .....	285 feet.
Rock .....	5
Plastic Clay .....	40
	<hr/>
	330 feet.

The London clay for the first thirty feet, was of a loose texture and reddish brown colour, and contained a good deal of decomposing pyrites and selenite. From 30 feet to 200 feet it varied in colour from blue to dark brown, and contained many septaria. The lower part was as usual very sandy. At 260 feet there were a few fruits and seeds, the former being of the same description as fruits found at Sheppy, and the latter being similar to the seeds obtained at the Highgate Archway. I have a cylindrical piece of pyrites, radiating from the centre, very like that which occurs in the chalk. I mention this circumstance, because the pyrites I had hitherto met with in the London clay were irregular nodules, or flat masses, without any radiation internally. It was found 265 feet from the surface. Between the last-mentioned depth and 285 feet, the bottom of the formation, the clay abounded with vegetable remains in a compressed and decomposing state. The fossil copal, or Highgate resin, I believe was not met with.

\* Outlines of the Geology of England and Wales, p. 14, 1822.

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Between the London and plastic clays a hard rock, five feet thick, was bored through. It abounded with green, siliceous particles; and contained numerous shells, disposed in layers, but the greater part were in a very chalky, decomposing state.

A list of the organic remains obtained in the London clay, is given at the end of this paper; and on perusal it will be found to contain many fossils which have been met with in distant localities of the same formation, as Sheppy, Bognor, and Barton. I mention this as an important fact, but by no means as a new discovery, since Mr. Parkinson states in a most able paper on the Strata and Fossil Remains near London\*, that at Kew and at Highgate Hill, fossils had been found of the same description as those of Sheppy and Hampshire.

In the Hampstead Well were obtained some interesting remains of the class Radiaria. The portions of *Asterias* in my possession, consist of a considerable number of ossiculæ. The largest, being granulated, probably belonged to the sides of the animal; and some of the smaller, without granulations, to the middle or inner part. The ossiculæ were irregularly distributed on the surface, and within a piece of clay, but by immersing the mass in water, I was enabled to save the greater part.

Of the genus *Pentacrinites*, I have remains of two species; one is evidently described by Miller in his *Crinoidea*, as having been found by the late Mr. James Sowerby, at White Conduit House, Islington, &c., and is thus spoken of:

"These columns much resemble in size and shape those of *Pentacrinites basaltiformis*, but have the angles more rounded. From their exhibiting no marks of muscular corrugation at their exterior surface, and the points being of uniform thickness, I apprehend the fragments before me to have been full-grown columnar portions. I wave distinguishing it as a species, not having the means of furnishing a specific character; yet, should it prove such, I should propose for it the name *Pentacrinites subbasaltiformis*." p. 140.

I have a specimen of spatangus which is strongly marked, but very fragile, and was found at the depth of 250 feet. The same species was also found at the Highgate Archway; and the late H. H. Goodhall, Esq., informed me he had in his collection one from the London clay at Barton.

It is worthy of notice, that on comparing *Terebratula striatula* obtained from the well with specimens found in the chalk, there was no apparent difference†.

\* Geological Transactions, 1st series, vol. i.

† Though this fossil is abundant in the London clay at Sheppy, and in the excavations for the Birmingham Railway, near Chalk Farm, yet it has been rarely found in the English chalk. Aug. 1837.

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In the list appended to this notice are ten new species belonging to the class Conchifera\*, and several species of *Microscopic foraminifera*†. In Plate VIII. fig. 2. 2 a., are represented two curious fossils. One of them is cylindrical, externally smooth, and shining, and is composed of dark brown spar; radiating internally like the Belemnite. The other is quadrangular, but with the angles rounded, and possesses internally the same structure as the first. Both effervesce strongly with muriatic acid. They are considered by Mr. J. De C. Sowerby to be remains of *Pennatulæ*.

The shells procured from "the rock" between the London and Plastic clays, are as follows: *Rostellaria lucida*, *Natica glaucinoides*, a *Nucula*, *Panopæa intermedia*, *Cardium nitens*, *Venus incrassata*, and a few casts apparently of the genus *Pleurotoma*. Lignite and scales of fishes also occurred. In some parts of the rock, were layers of calcareous spar, the surface of which was beautifully studded with crystals of pyrites. The bed contained a great many rounded flint pebbles, some of which were in a decomposing state; and a few of the same pebbles were imbedded in the lower part of the London clay at the depth of 230 feet. I believe it is not very usual to find a bed of sandstone between the two clays, but from its contained fossils, as the *Panopæa intermedia*, &c., there appears some analogy between it and the Bognor rock‡.

The plastic clay presented several varieties of colour, as red, grey, white, and yellow, variously intermingled. I examined it very closely without finding the slightest trace of organic remains. At the depth of 330 feet, the workmen arrived at a bed of sand, of a green colour, containing small flint pebbles, and at this part soft water was obtained, which gradually rose to within 200 feet of the surface. A steam engine is about to be erected on the spot, but whether an adequate supply of water will be obtained without the necessity of boring into the chalk, remains doubtful.

\* Plate VIII.

† Plate IX.

‡ In a paper by Mr. Richardson, (Geological Proceedings, vol. ii. p. 79,) much sand and green earth are stated to occur in the London clay near Herne Bay; and in Mr. Rofe's paper on the plastic clay of Reading, a rock is described at the top of the plastic clay. See p. 128 et seq. of this volume. I have also a specimen from Egham.

*Organic Remains found in the London Clay in sinking a Well at Lower Heath, Hampstead.  
(London Clay.)*

Class.	Genus.	Species.	References and Synonyms.	Elsewhere.
Zoophyta	Flustra	r <sup>*</sup> .	Pl. IX. f. 22 .....	Highgate.
	Cellepora	r.	— f. 21.	
	Desmophyllum	r.	(Ehrenberg.) Pl. VIII. f. 1.	
	Pennatula	r.	Pl. VIII. f. 2.	
Radiaria	Asterias			
	Spatangus	v.r.		
	Pentacrinites	subbasaltiformis	(Miller's Crinoidea, page 140.) Pl. VIII. f. 3 .....	{ Near White Conduit House, Islington, Richmond, and Kensington.
Crustacea	Cancer	Sowerbii	Pl. VIII. f. 4.	Sheppy.
	Astacus	2 species	.....	
	Cytherina	barbata	Pl. IX. f. 1.	
Cirripedia	Pollicipes?		Pl. VIII. f. 5. Pl. IX. f. 2 .....	Highgate.
Annelides	Serpula	v.r.	Min. Con. vol. 1. tab. 30 .....	Ibid.
Conchifera	Teredo	c.	— vol. 1. tab. 102 .....	Minster, Southend, Highgate, &c.
	Panopæa	r.	— vol. 5. tab. 419 .....	Bognor.
	Corbula	r.	— vol. 3. tab. 209. f. 8 to 13 .....	Barton Cliff.
	Tellina	c.	Sowerby, Pl. VIII. f. 6. ....	Highgate and Sheppy.
	Lucina	r.	— f. 7. ....	Ibid.
	Astarte	r.	Min. Con. vol. 4. tab. 316. ....	Ibid.
	Axinus	r.	— vol. 4. tab. 315 .....	{ Near White Conduit House, Islington, and be- tween Vauxhall and Wandsworth.
	Venus	r.	— vol. 2. tab. 155. f. 1, 2 .....	Brackenhurst, Hampshire.
	Cardium	r.	Sowerby, Pl. VIII. f. 8. ....	Highgate and Sheppy.
	Arca	r.	Min. Con. vol. 1. tab. 14 .....	Ibid.
		r.	Sowerby, Pl. VIII. f. 9.	
		r.	— f. 10.	
	Pectunculus	r.	Min. Con. vol. 1. tab. 27. f. 1 .....	Ibid.
	Nucula	c.	— vol. 6. tab. 554. f. 4 .....	Ibid. and Bognor.
		r.	— vol. 6. tab. 554. f. 2 .....	Ibid. and Southend.
		r.	— vol. 2. tab. 192. f. 8, 9 .....	Ibid.
		r.	— vol. 2. tab. 192. f. 3, 4, 10 .....	Ibid.
		r.	Sowerby, Pl. VIII. f. 11.	and Barton.
		r.	— f. 12.	
		r.	Wetherellii	

Conchifera	Nucula	striata, var.	(Deshayes), Pl. VIII. f. 13.		
—	—	compressa	Sowerby, Pl. VIII. f. 14.		Bognor, Richmond Park Well, &c.
—	Modiola	elegans	Min. Con. vol. 1. tab. 9	.....	Highgate.
—	—	depressa	— vol. 1. tab. 8	.....	Ibid. and Bognor.
—	Pinna	affinis	— vol. 4. tab. 313. f. 2.	.....	Ibid. and Sheppy.
—	Avicula	media	— vol. 1. tab. 2.	.....	
—	—	arcuata	Sowerby, Pl. VIII. f. 15.	.....	
—	—	papyracea	— f. 16.	.....	
—	Pecten	duplicatus	Min. Con. vol. 6. tab. 575. f. 1, 2, 3	.....	Richmond and Hyde Parks.
—	—	corneus	— vol. 3. tab. 204	.....	Stubbington.
—	Terebratula	striatula	— vol. 6. tab. 536. f. 3, 4, 5	.....	Southeast, Sheppy, &c.
—	Anomia	lineata	— vol. 5. tab. 425	.....	Highgate, Barton, and France.
—	Lingula	tenuis	— vol. 1. tab. 19. f. 3	.....	Bognor.
—	Natica	glaucoides v.c.	— vol. 1. tab. 5	.....	Highgate and Sheppy.
—	Dentalium	incrassatum	— vol. 1. tab. 79. f. 3, 4	.....	Ibid. and Richmond.
—	—	nitens	— vol. 1. tab. 70. f. 1, 2	.....	Ibid.
—	—	anceps	— vol. 1. tab. 17	.....	
—	—	Three species analogous to the Hampshire. r.	Sowerby, Pl. VIII. f. 17	.....	
—	Vermetus	Bognoriensis v.c.	Min. Con. vol. 6. tab. 596. f. 1, 2, & 3	.....	Ibid. Sheppy, and Bognor Rocks.
—	Scalaria	reticulata	— vol. 6. tab. 577. f. 5	.....	Ibid.
—	—	undosa, var.	Sowerby, Pl. VIII. f. 18.	.....	
—	Solarium	patulum	Min. Con. vol. 1. tab. 11	.....	Ibid.
—	Pleurotoma	nexilis	— vol. 4. tab. 331	.....	Ibid. and Barton.
—	Pyruia	trilineatus	— vol. 1. tab. 35. f. 4, 5	.....	Ibid. and Brentford.
—	Murex	carinata	— vol. 1. tab. 6. Three upper figures	..	Ibid. and Sheppy.
—	Cassidaria	lucida	— vol. 1. tab. 91. f. 1, 2, 3	.....	Islington Tunnel.
—	Rostellaria	simulata	— vol. 2. tab. 163. f. 5, 8	.....	Barton.
—	Auricula	laeviuscula	— vol. 4. tab. 361. f. 1	.....	Highgate.
—	Cancellaria	retusum	Sowerby, Pl. VIII. f. 19	.....	Ibid.
—	Ovulum	—			
—	Nautilust	—			
—	Squalus, teeth	—			
Pisces	Raia, palate of	—			

\* r. signifies that the fossil was rare; c. common; v. r. very rare; v. c. very common. The new species and varieties are distinguished by a reference to the Pl. VIII. and IX.

† The Foraminifera belong to the genera *Nodosaria*, Pl. IX. t. 3 to 7; *Articulina*, f. 8 and 9 and 10; *Fronculina*? f. 11; *Marginulina*, f. 12; *Rotalia*, f. 13 to 18; *Cristellaria*, f. 19; *Miliola*, f. 20.

*Description of the New Species and Varieties figured in Plates VIII. and IX.*

By Mr. J. DE CARLE SOWERBY.

*Desmophyllum*. This genus has been established by Ehrenberg, for a portion of those corals hitherto placed among the Turbinoliæ. The type of the genus given by Ehrenberg is the *Madrepora dianthus* of Esper, the *Caryophyllia dianthus* of De Blainville. It is distinguished from Turbinolia by having been attached at the base; and from the *Cyathina* of Ehrenberg (*Caryophyllia cyathus*), by the lamellæ being fasciculated.

Pl. VIII. fig. 1. (a.) The termination of the plates magnified. (b.) Section of one segment.

*Pennatula*. This fossil resembles the bony axis of *P. phosphorea*, (Lam.), which occurs recent on the British coast, and has the same structure, and the form of the section also varies from square to round, in the same bone.

Pl. VIII. fig. 2. (a.) The natural size. (b.) Magnified.

*Pentacrinus subbasaltiformis*, (Miller).

Pl. VIII. fig. 3. (a.) The principal stem. (b.) The side arm, nearly cylindrical and extremely long.

*Pentacrinus Sowerbii*, (Wetherell, MSS.). Joints unequal in diameter, 5-lobed, with two obscure tubercles on each lobe of the larger joints. Pl. VIII. fig. 4.

*Polliceps*? Posterior and lateral valves. Pl. VIII. fig. 5. and Pl. IX. fig. 2.

*Tellina splendens*. Ovate, convex, highly polished; beaks central, small; posterior extremity pointed, bent to the right.

Gregarious, occurring in thousands in Septaria. Pl. VIII. fig. 6.

*Lucina Goodhalli*. Subglobose, nearly smooth; anterior slope concave; lunette broad, flat, sunk; posterior slope convex, with one narrow and one broad groove on each side of it, meeting near the edge.

The young shell is sometimes very globose, at other times rather flattened. Pl. VIII. fig. 7.

*Venus tenuistriata*. Oval, gibbose, marked with nearly close, concentric striæ; beaks prominent, nearest the anterior extremity; lunette rather broad, pointed. Pl. VIII. fig. 8.

*Arca nitens*. Transversely oblong, convex, smooth; anterior portion small, rounded; posterior subcuneiform; front oblique; shell thin.

Some specimens have a few punctures, in which character they approach the next species. Pl. VIII. fig. 9.

*Arca impolita*. Transversely oblong, very convex, marked with longitudinal rows of punctures; anterior portion small, rounded; posterior rounded; front parallel to the hinge line; shell thin.

It approaches *A. cucullaris* of Deshayes, vol. i. p. 206, pl. xxxiii. figs. 1, 2, 3; but differs slightly in form, as well as in the teeth being all transverse. Pl. VIII. fig. 10.

*Nucula Bowerbankii*. Elliptical, convex, smooth externally, striated within; anterior extremity obliquely truncated, the slope filled by a large, pointed, nearly flat lunette; edge toothed; impression of the abductor muscles shallow. Pl. VIII. fig. 11.

*Nucula Wetherellii*. Suborbicular, transverse, gibbose, smooth; extremities pointed; beaks nearly central; margin obtuse, edge toothed.

The radiating structure of this *Nucula*, common to other species of the genus, is very conspicuous; but the inner surface is not striated as in *N. Bowerbankii*. Pl. VIII. fig. 12.

*Nucula striata*, var. (Lam., Ann. Mus., tom. vi. p. 126., tom. ix. pl. xviii. fig. 4 a., b.—Deshayes, vol. i. p. 236, pl. xlii. figs. 4, 5, 6.) This variety is less equilateral than in Lamark's and Deshayes' figures. Pl. VIII. fig. 13.

*Nucula compressa*. Ovate, compressed, smooth; anterior portion very small; lunette wanting. Pl. VIII. fig. 14.

*Avicula arcuata*. Transversely ovate, arched, compressed, smooth, thin; nearly twice as wide as long; posterior ear large. Pl. VIII. fig. 15.

*Avicula papyracea*. Nearly orbicular, much compressed; concentrically waved; ears small, unequal.

An extremely thin pearly shell, sometimes assembled in considerable masses. Pl. VIII. fig. 16.

*Dentalium anceps*. Slightly arched, longitudinally ribbed towards the apex; one rib on each side of the arch prominent and sharp; smooth towards the aperture, which is round. Pl. VIII. fig. 17.

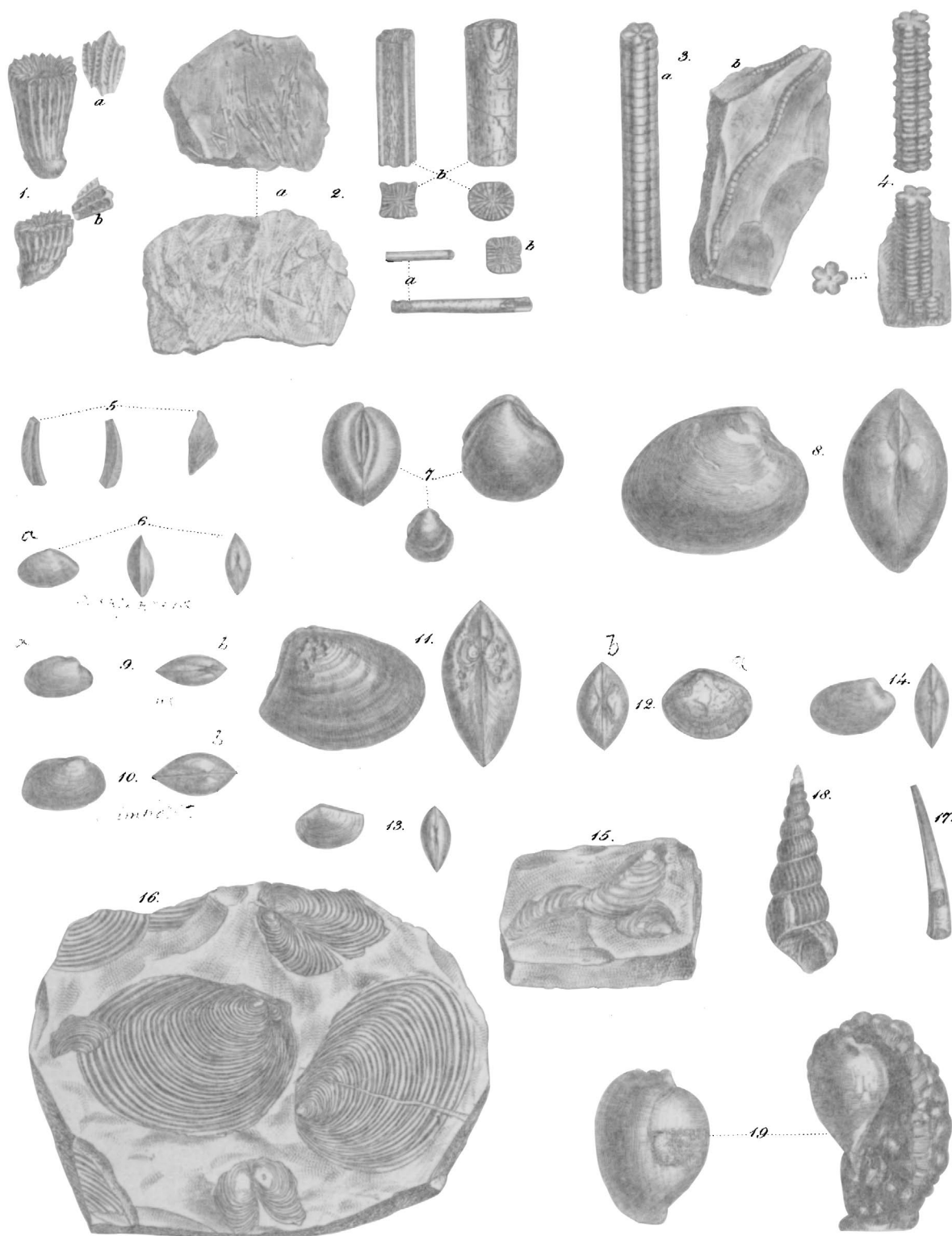
*Scalaria undosa*, var. (Min. Con. tab. dlxxvii. fig. 4.) This differs from the variety figured in Min. Con. only in having the costæ less waved. Pl. VIII. fig. 18.

*Ovulum retusum*. Egg-shaped, short, transversely striated.

This differs from *Ovulum ovum*, the young state of which it very nearly resembles, in being shorter. We have not seen it with an inflected or thickened edge to the lip. Pl. VIII. fig. 19.

*Cytherina barbata*. Transversely ovate, gibbose, smooth, with several spine-like processes at the extremities. Pl. IX. fig. 1.

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*Taradon paleatus?*

