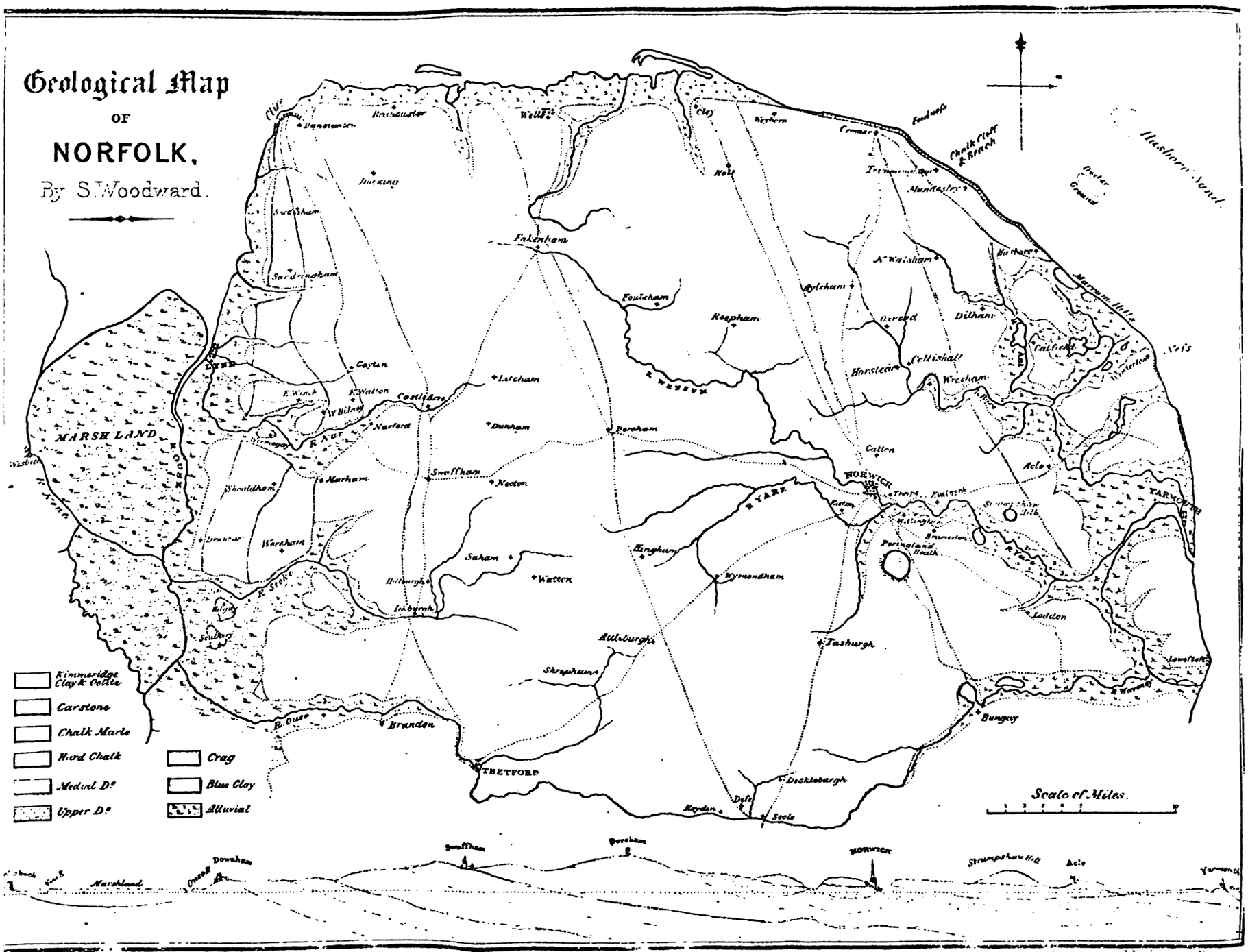
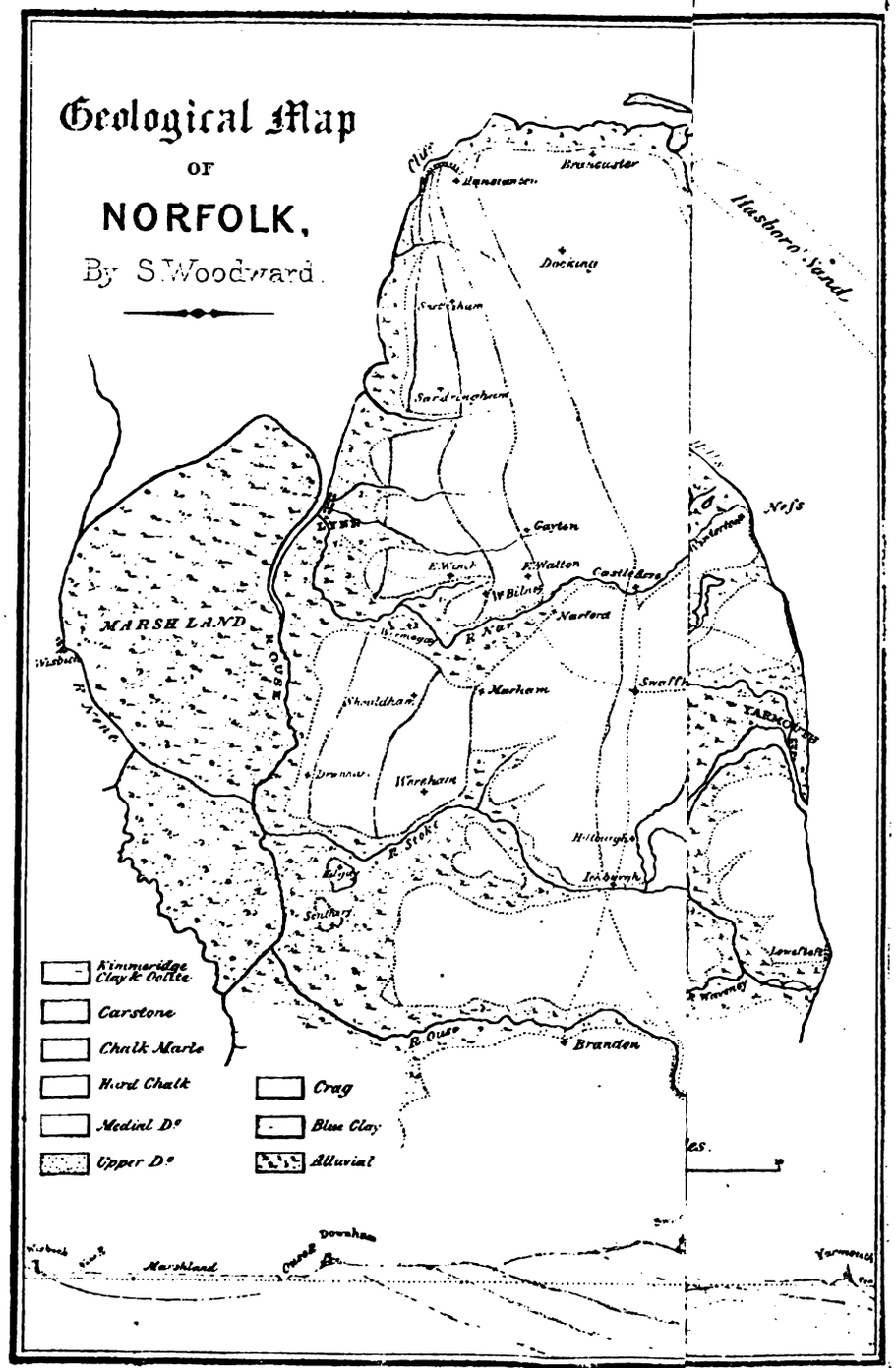
Woodward ... Geology of Norfolk

Woodward, S.

An outline of the geology of Norfolk. 1833. (Photocopy)


Geological Map
OF
NORFOLK,
By S. Woodward.
MARSH LAND
NORWICH
YARMOUTH
THETFORD
Kimmeridge Clay & Coltes
Carstone
Chalk Marle
Hard Chalk
Medial Do
Upper Do
Crag
Blue Clay
Alluvial
Scale of Miles.



AN

OUTLINE

OF THE

GEOLOGY OF NORFOLK.

BY

SAMUEL WOODWARD,

HONORARY MEMBER OF THE YORKSHIRE PHILOSOPHICAL SOCIETY,
AUTHOR OF A "SYNOPTICAL TABLE OF BRITISH
ORGANIC REMAINS."

NORWICH:

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Sm MDCCCXXXIII.

TO

DAWSON TURNER, ESQUIRE,

F. R. S., A. S., L. S., &c. &c. &c.

PRESIDENT OF THE NORFOLK AND NORWICH MUSEUM.

DEAR SIR,

A Natural History of our native County has, I am aware, been long considered by you, an object of primary importance; I therefore beg permission to dedicate to you, this attempt to supply one section of such a history.

Should this Sketch coincide with your views, it may not perhaps be too much to hope, that you will procure the publication of the Botany and Zoology of the County; thus completing an "Outline of the Natural History of Norfolk."

I am,

Dear Sir,

Yours very respectfully,

SAMUEL WOODWARD.

Norwich, 1st May, 1833.

PREFACE.

THE science of Geology in this country has of late made such advances, that a description of the various strata of every district or county in the kingdom, with their organic remains, now becomes a desideratum. On these grounds, this "Outline of the Geology of the County of Norfolk," is submitted to the lovers of natural science; and the Author trusts that it will be found an useful manual, to guide the geological inquirer in his researches; and that it may, at some future period, serve as the basis of a more extended work.

Hitherto the notices on the Norfolk strata have been few and partial. Mr. William Arderon, of Norwich, F. R. S., appears to have been the first writer whose observations have been made public; having contributed several papers on the Strata, Cliffs, and Fossils of Norfolk, which are printed in the *Philosophical Transactions*. A MS. Journal by the same writer, in the Author's possession, also contains numerous sections and remarks on

the strata.* Mr. Wm. Smith, (most appropriately designated "the father of geological science in England,") who resided in Norfolk some time, has given the subject a passing notice in his "*Strata Identified.*" Mr. R. C. Taylor's observations on the Norfolk Cliffs, published in the *Philosophical Magazine* for 1822, 23 and 24, come next in order. His paper in the *Geological Transactions*† (1823), on the Alluvial Strata and the Chalk of Norfolk and Suffolk, is the only one on the general subject hitherto published, with the exception of a short sketch by the Author, in the Introduction to *A General History of the County* recently published.‡ Mr. T. has two other papers in the same *Transactions*; one on the Crag Strata of Bramerton;§ the other on the Fossil Timber of the Norfolk Coast.‖ In 1826, Mr. Robberds published his "*Observations on the Eastern Vallies of Norfolk*:"** to these observations Mr. Taylor replied, through the medium of the *Philosophical Magazine.* This was also published separately;†† and to each of these works there is an appendix.

With regard to the Illustrations; the principal object of the map is to throw light on the Crag

* This Journal is a record of his observations on nature, from 1742 to 1764, and is in three thick volumes 12mo. There are three other volumes, containing miscellaneous observations, extracts, &c. &c.

† Vol. i. second series, p. 374.

‡ Printed and published by Mr. John Stacy, 2 vols. 8vo.

§ Vol. i. second series, p. 371. ‖ Vol. ii. second series, p. 327.

** Printed and published by Messrs. Bacon and Kinnebrook, with a plan of the Valleys. †† By Cochran, London, 1827.

deposit, by pointing out its probable extent. For the division lines of the Chalk (which are to be considered only as approximating the truth), he is under obligations to Mr. C. B. Rose, of Swaffham.

The Sketch of the Natural Section of the Cliffs was taken some years ago; and is introduced more as a guide for the geologist, than as affording data for speculation; since, from the continual changes in their features from year to year, nothing short of a personal examination can furnish a just idea of their true character.*

The figures of the fossils were copied on stone by Mr. J. M. Johnson, from pencil drawings by the Author, who made his corrections during their progress.

In conclusion, it is thought desirable to direct the attention of the geological inquirer, to the importance of tracing the boundaries of the Crag deposit, *generally;* since, if the data assumed be correct, they tend most materially to elucidate the geography of the antediluvial period. The Norfolk and Suffolk beds are decidedly contem-

* The lengths in the section (with the exception of the last) are four miles each. The first part exhibits the "Mud Cliffs," which are of diluvial origin, and occupy an extent of thirteen miles from Hasboro' to Cromer. The remaining seven miles of the cliffs to Weybourne belong to the Tertiary formation. The strata in this part are extremely disrupted and contorted; but the alternating layers of clay, shingle, and sand are in many places well preserved. From Weybourne to Hunstanton, a distance of twenty-four miles, the shore is an alluvial flat, consisting of salt marshes. Hunstanton cliff is about one mile and a quarter in length, and belongs to the lower part of the Chalk formation.

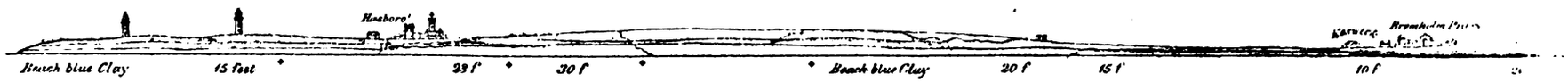
poraneous; and from the fact of a bed of shells,* analogous to those of the Calcaire Grossier of France, having been discovered below the Suffolk crag at Ramsholt, it is evident, that a connection once existed between the tertiary deposits of this country and those of the continent. This fact, it is hoped, will not escape the attention of the French geologists.

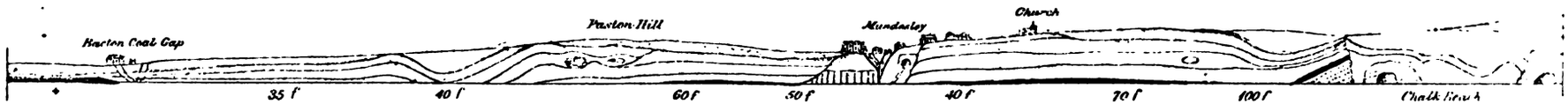
* Among these are Echinus granularis? Terebratula perforata. *Defrance* (Scilla, t. 14, f. 6) Milliolites, and other minute chambered shells, &c.

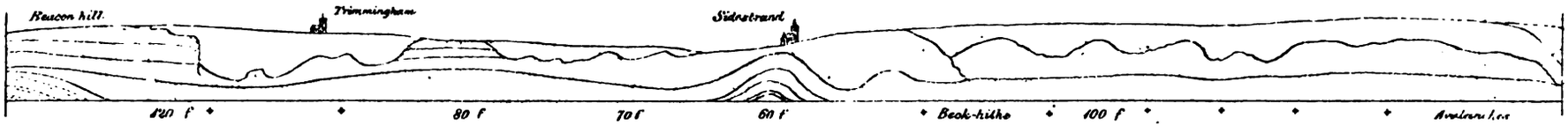
Natural Section
OF THE
NORFOLK CLIFFS.
By S. Woodward.

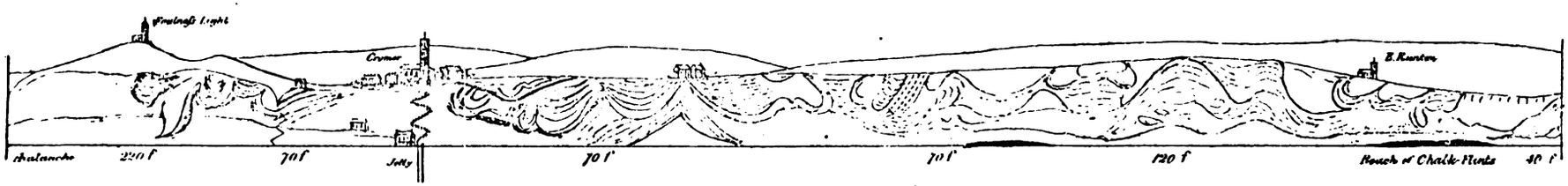
Loam · Clay · Gravel · Blue Clay · Sand · Springs

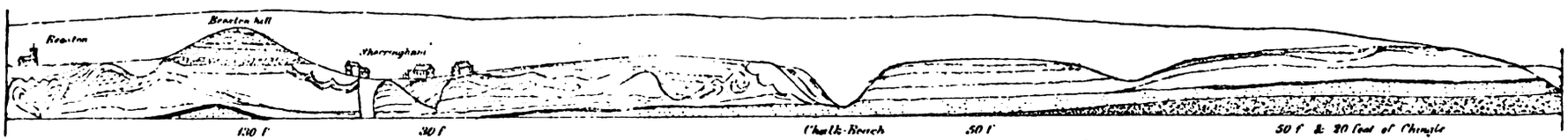
Ferruginous Sand · Chalk · Hard Chalk

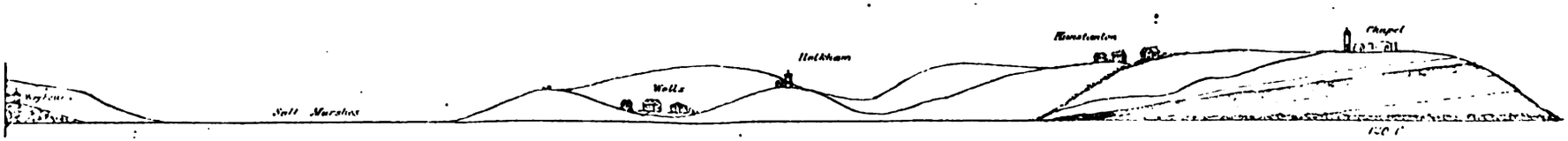




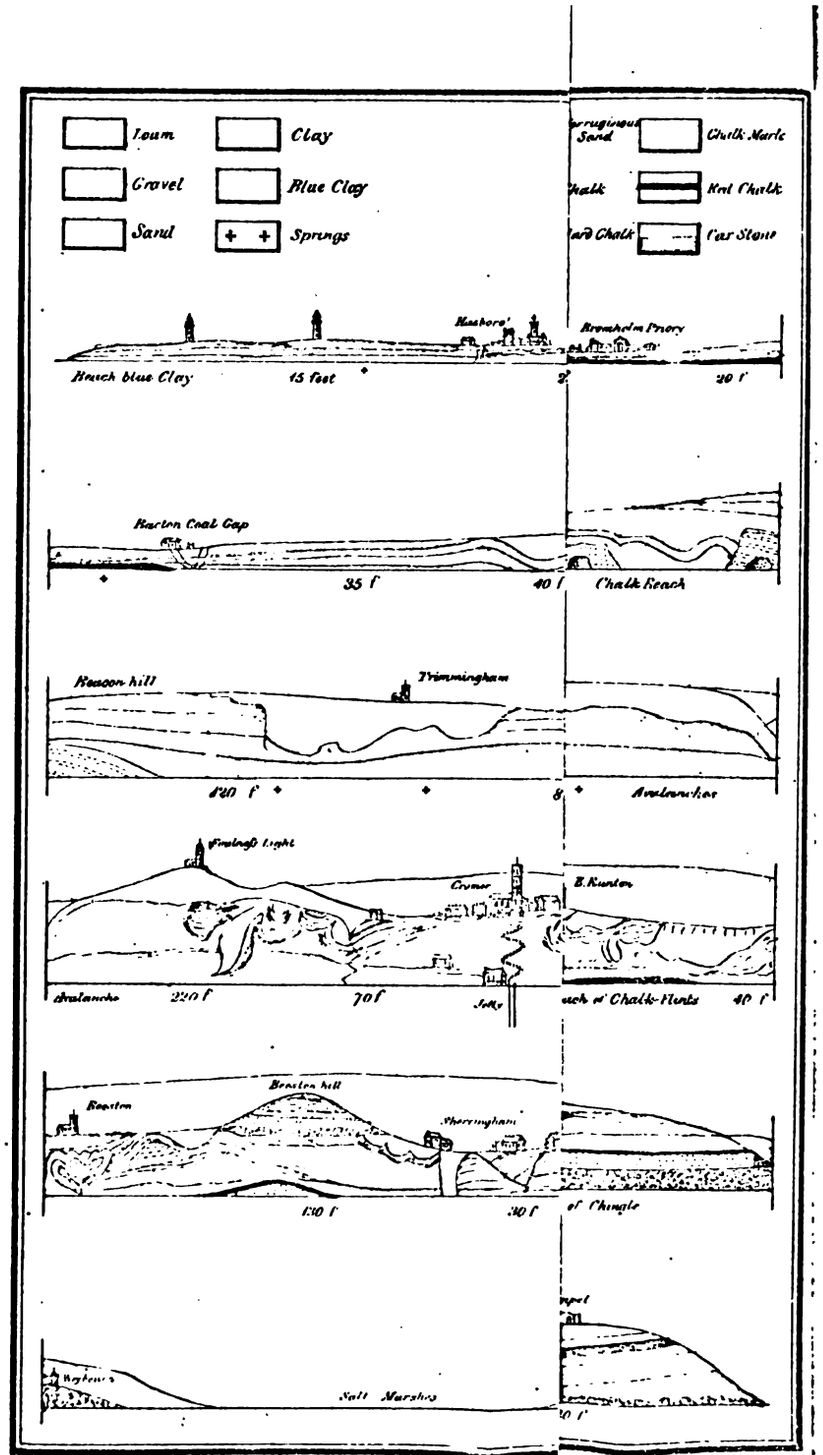








On Stone



OUTLINE

OF

THE GEOLOGY OF NORFOLK.

THE County of Norfolk is of an oval form, having the sea on the north and east, and the rivers Waveney and Ouse on the south and west. These rivers have their rise within a few feet of each other, at a place called Lopham Ford, making the county nearly insular. From this spot, the high ground of the county passes in almost a direct line to Brancaster; and from this high ground most of its rivers have their source. Those flowing towards the east are, the Wensum, Yare, and Waveney; those to the west, the Nar, Stoke, and Ouse: besides these, there is no other river worthy of notice, except the North river—which falls into the Yare by Yarmouth—and its branches the Bure and Ant.

The general feature of the county, is a gently undulating surface, with scarcely any eminence deserving the name of a hill. The elevations in

the neighbourhood of Cromer originate in the disruption of the chalk strata, and are most probably of the same age as the valleys. The natural section of the cliffs shows, in the disrupted chalk, the origin of the Beacon-hill at Trimmingham; and, to the westward of Cromer, is seen a large mass of chalk at the upper part of the cliff, in a perpendicular position. These are, beyond a doubt, effects of the same cause. On the Lighthouse hill at Cromer also, the chalk is forced up to the surface, two hundred feet above its natural level, and a limekiln is worked on the spot.

The valleys of Norfolk are such as are denominated "*valleys of elevation*;" that is, they were formed by the upheaving of the chalk, and its consequent fracture. This is demonstrated by the agreement of the "salient" with the "re-entering angles" of their borders; * and from the fact of the layers of flint in the chalk, on each side of the valley, being found to decline from its line of fracture.

The entire substratum of the county is chalk, with the exception of a small portion on the borders of Marshland. It has a considerable inclination from the south-east towards the north-west;† the north-western, or raised part, has been worn away, by diluvial action, and its debris, consisting

* Greenough's *Principles of Geology*, p. 115.

† This inclination is not confined to the chalk series; but, according to the best authorities, embraces the whole of the secondary strata.—See *Section of the Strata*, at the end of the *Geology of England and Wales*.

of flints and chalk boulders, constitutes the subsoil of a considerable portion of the county.

The tertiary beds occupy the principal part of eastern Norfolk. In them are found mammalian and ligneous remains. In the crag district these beds are about thirty feet in thickness, and abound with marine testacea.

The diluvial detritus varies considerably. In western Norfolk, it consists principally of beds of clay, containing organic remains of the oolitic series; in the medial part chalk flints abound, and in eastern Norfolk a blue clay prevails, which, from the organic remains found therein, is presumed to be the wreck of the lias.

The alluvium occupies Marshland, and the extensive valleys of eastern Norfolk, as shown in the map.

The following data, which we have drawn up for our guidance, convey, in a brief form, the history of the Norfolk strata.

1. That the county is situate on the western side of the great chalk formation, which is the substratum of nearly all Europe.*

2. It appears that this extensive marine deposit, emerging from the waters of the ocean, became inhabited by herds of elephants,† together

* *Outlines of the Geology of England and Wales*, p. 64.

† From the number of grinders of the elephant found on the oyster ground off Hasboro', we are warranted in concluding that upwards of five hundred animals were deposited in that limited space! When we contemplate the abundant distribution of the remains of animals, now

Having briefly noticed the constituent parts of the Norfolk strata, we next proceed to show their order of superposition, and describe them in detail.

TABLE OF THE NORFOLK STRATA.

ALLUVIAL DEPOSITS.

Modern.	Silt and Sand	Marshland & Valleys of East Norfolk	Marine and Freshwater Exuviæ.
	Brick-earth	Valley of the Nar	Marine Exuviæ.
	Lacustrine	Brancaster, Saham, Dilham, &c.	Mammalian and Ligneous Remains.

DILUVIAL BEDS.

	Gravel	Norwich, &c.	Marine Remains.
	Clay	Western Norfolk	.. ..
	Blue Clay	Eastern Coast	Marine and Mammalian Remains.

ANTEDILUVIAL DEPOSITS.

Tertiary.	Brick-earth	Norwich	No Organic Rem.
	Crag	.. &c.	Marine Testacea.
	Ferruginous Gravel	Eastern Coast	Mammalian Rem.

CHALK FORMATION.

Secondary.	Chalk Upper	Eastern Norfolk	Marine Rem. & Flints
	.. Medial	Swaffham, &c.	.. ..
	.. Hard	Marham, &c.	.. no Flints.
	.. Marle	Western Norfolk	.. ..
	.. Red	Hunstanton	.. ..
	Carstone	..	No Organic Remains.
	Kimmeridge Clay	Borders of Marshland	Organic Remains unknown.

ALLUVIAL DEPOSITS.

SILT.

The subsoil of Marshland, which is entirely alluvial, has in some places been found twenty feet in thickness, consisting of alternate layers of moor and silt, thus marking the changes to which this part of the county has been subjected. * Not only have large trunks of the oak, fir, &c. been found imbedded in this silt, but works of art also; as within this deposit, no less than eight canoes have been dug up at various times. These were in every case formed out of single trunks of trees, in the same way that the North American Indians used to form theirs.† The last canoe was found in 1818, about three miles from Lincoln, and eight feet below the surface. It measured thirty feet eight inches in length, three feet over, and the bottom was six inches thick.

The testaceous remains discovered in this deposit are both fluviatile and marine. They are not very abundant, and are but little altered in their appearance.

* Sir Wm. Dugdale's *History of Embanking*, and Wells on the *Bedford Level*.

† We have no hesitation in stating our conviction, that the large flint celts found so abundantly in this county, were employed in hollowing out these canoes; the process being simply kindling a fire on the upper surface of the trunk, and chipping out the charred wood with these instruments.

The silt of the valleys of eastern Norfolk is principally marine. A few testaceous remains have been found therein, consisting of mactræ and river shells. The alluvium of the narrow valleys contains a greater number of the latter, and some land shells.

SAND.

On the coast between Winterton and Hasboro' is a line of sand banks called the Marram hills; presenting a natural barrier to the encroachments of the ocean. This sand, accumulating by the action of wind and tide, is carried for a considerable distance in-land. Great care has been taken to keep up this barrier, notwithstanding which, in severe gales the sea sometimes breaks over, and inundates the adjacent country. The sand on which the town of Yarmouth stands, which extended as far south as Lowestoft in the time of Edward III. may be considered as a continuation of these hills. It is evident that the same operation of nature produced both.

On the beach at Weybourne, and for about two miles east of that village, is an extraordinary accumulation of flint boulders arranged in terraces. Their size is very uniform, being between three and four inches in diameter. At Weybourne they rise from the water's edge till they attain twenty feet above its level; and gradually decrease in thickness towards the east until they entirely disappear.

BRICK-EARTH.

The brick-earth of the valley of the Nar is of a kind peculiar to itself. It is of a blueish-gray color, and replete with shells by no means fossilized, agreeing with the recent marine testacea. The bricks made of this clay are of a gray color and are very durable. Its principal localities are Narford, East Walton, West Bilney and East Winch.

LACUSTRINE FORMATIONS.*

The ligneous deposit on Brancaster beach comes under this head, and deserves our particular notice. In this locality trunks of trees are found abundantly imbedded in the mud; and at low water, the proprietors of the land thereabouts remove them by means of a team of horses, and convert them into posts and fences, or use them for similar purposes; the wood being quite sound and not in the least impregnated by the soil in which they have been imbedded. With these are found the horns and bones of the deer and ox in excellent preservation.

There are traces of another of these formations in the meres about Saham and Hingham, in which the horns of the deer are found in abundance.

* Two excellent papers on this subject, by the Rev. Dr. Fleming, are published in the *Transactions of the Royal Society, Edin.* vol. ix. p. 419, and in the *Quarterly Journal of Sciences* for January, 1830, p. 21. Some interesting matter on the same subject will also be found in the second volume, chap. 13, of Lyell's *Principles of Geology*.

Another appears to have existed in the upper part of the valley of the Ant, between North Walsham and Stalham. Trunks and branches of several kinds of trees were found therein, during the formation of the Dilham canal. The seed vessels of the oak, beech, hazel, and fir, together with the remains of the deer and ox, were likewise very abundant. From the quantity of fossil wood, and the numerous roots of trees in their natural position observable in the beach at Palling, we think it probable that a similar deposit exists near this place. Fine specimens of highly ferruginous wood, principally fir, are to be found scattered upon the sands.

DILUVIAL BEDS.

The effects of the Deluge on the earth's surface, are now known to have been less violent than described by the early theorists. The wreck, consisting of transported gravel, immense boulders of many tons weight, and disintegrated portions of all the superstrata of the antediluvial period, constitutes the substratum of the table-lands of this country.

GRAVEL.

The beds which come under this denomination vary in thickness from ten to twenty feet. They consist principally of small water-worn pebbles, which in some places are so cemented by the

oxyde of iron, as to resemble pudding-stone. The large flints in these beds appear, from their organic remains, to have belonged to the medial chalk. From a disengagement of the iron originally contained in these flints, they are become very shattery and of a light-gray color. With the iron the spathose substance of the shells has also escaped; so that instead of finding the shells, as in the black flints of the chalk; their casts or impressions only remain. The iron thus disengaged and oxydising by the action of the atmosphere, has we believe given the orange tint to the beds of gravel with which they have lain in contact. This oxyde is also formed into arborizations in the fissures of the flints; occasionally assuming an appearance so regular, that they have been mistaken by some writers for the remains of plants and sea-weeds.

THE CLAY *

Of western Norfolk appears to be formed by an admixture of portions of those beds of the oolitic

* In the Norfolk part of "*Magna Britannia, &c.*" which has been designated by our county historian, Blomefield, as the *Norfolk Atlas*, at p. 362, it is stated, that—"A gentleman of this county, digging by chance in his ground, turned up a fine clay, which some skilful persons observing, discovered the value of it to him; whereupon sending it to Holland, where they made a choice sort of earthenware of it, he made £10,000. sterling of a piece of ground not forty yards square. Dr. Fuller tells this story, but suspects the sum as having a cipher too much." The locality of this valuable clay is probably described in Arderon's MS. Journal (noticed in the preface) under date of July 28th, 1751:—"This day I walked to Yelverton to see the clay-pit, from whence the clay is carried to London and Holland, to make Delf-ware of. It is situate in a close bordering upon Yelverton common, about one mile south-east of the church, and is about four or five yards deep from the surface."

series, which were more readily dissolved; such as the alum shale, the Oxford and Kimmeridge clays, &c., the fossils peculiar to these strata abounding therein. Fragments of the oolites, cornbrash, calcareous grit, and green sand, are found imbedded in this clay. In these fragments fine specimens of organic remains have been discovered, some of which have not at present been found in the undisturbed strata; as Pholadomya ambigua, a Unio, Cirrus, and others figured in our first table. Mr. Rose, of Swaffham, has a fine collection of the organic remains of this deposit; and to that gentleman we are indebted for the loan of his catalogue, which has enabled us to complete our lists of the fossils of western Norfolk.

BLUE CLAY

Is the principal constituent of the cliffs from Hasboro' to Cromer;* and is evidently the wreck of the blue lias, brought from the interior of the kingdom by the diluvial waters. It contains small chalky concretions, pyritical balls, and indurated nodules, enclosing ammonites† and gryphææ, the characteristic fossils of that stratum. These cliffs vary from ten to three hundred feet in height, and from their loose nature being acted upon by the

* There is a blueish clay in the cliffs westward of Cromer, which we are disposed to believe is of a different kind to that under consideration: we notice this, in order to direct the attention of geologists to the subject.

† Ammonites Taylori was found by the author in Bacton cliff, and was forwarded by Mr. R. C. Taylor to Mr. Sowerby, who has figured it in Table 514 of the *Mineral Conchology*.

sea, are subject to frequent shoots or falls. In the winter season this work of degradation is carried on to an alarming extent, particularly towards Cromer, where it is greatly promoted by the land-springs.*

One of our greatest geologists is of opinion that the existing town of Cromer will, in the space of forty years, be destroyed by these combined causes. Upon the same principle we infer that in about twice that period, the church and village of Hasboro' will meet the same fate (unless steps be taken to prevent it); when the waters of the German ocean will again occupy the valleys of eastern Norfolk, as they did one thousand years ago.

Since the Conquest the villages of Shipden, Keswick, Clare, Wimpwell, Eccles, and Ness, or the greater part of them, have been washed

* During the winter of 1799, the cliffs near the light-house "made several remarkably large shoots."—Bartell's *Cromer*, 2nd ed. p. 25.

On the 15th of January, 1825, a large mass was detached from the Light-house hills, which are about 250 feet in height: the avalanche extended about 300 yards along the cliff.—See a notice of this by Mr. R. C. Taylor, published in the *Geol. Trans.* vol. ii. 2nd ser. p. 327, and *Norwich Mercury*, 29th Jan. 1825.

In the night of the 18th of August last, another great fall took place, which extended to low-water mark, and covered several acres of ground.

Bartell thus remarks, at p. 27—"What in one year stands out as a bold point projecting into the sea, in the next year gives place, and is perhaps hollowed into a spacious bay. A remarkable instance of this kind happened a few years since at Trimmingham, when one of these bays was formed to a considerable extent, not indeed by the action of the sea, but by a subterraneous body of water supposed to be collected by the choking up of a spring. Two farm-houses and their yards fell a prey to this unsuspected enemy."

away.* The remains of Eccles church are still to be seen buried, as it were, within the Marram hills.

The blue clay of which the cliffs are composed, is for the most part confined to the high grounds along the coast. It is however visible on Strumpshaw hill and Poringland heath; and a subsided mass of it has lately been cut through, in forming the junction of the Yare and Waveney, by the Norwich and Lowestoft Navigation Company.

ANTEDILUVIAL DEPOSITS.

THE BRICK-EARTH

Appears to be the residuum of the æstuary which deposited the crag stratum. It is found near the surface reposing upon beds of sand, and is from twelve to twenty feet in thickness; its colors are brown and gray—the former burns to a bright red, and the latter to a yellowish-white. There are no organic remains in this deposit, except a few fragments of rolled belemnites.

Immediately below the brick-earth, near Mackie's nursery, in the parish of Lakenham, is a stratum of sandstone deserving of notice in this place. It occurs also on the opposite side of the

* The pipes of the old wells are frequently exposed in the cliff, and in 1825, we saw a large portion of one lying on the beach near Hasboro'; it was composed of large flints united by a coarse strong mortar.

valley, in the parish of Stoke Holy Cross. From the former locality it is probable that some of this sandstone has been quarried for the purpose of erecting Norwich castle. In appearance it is somewhat analogous to that denominated by geologists Bagshot sand. No organic remains have at present been discovered in it; but the sand immediately below it—an extension of the crag?—contains about thirty per cent of comminuted shells.

THE CRAG DISTRICT

Is a narrow tract running southward from the coast between Cromer and Weybourne, and passing Norwich in its progress towards the Suffolk coast, the great deposit of this formation.* This tract appears to us to have been an æstuary in the antediluvial period, and that the shells found therein are not of postdiluvial origin, nor the reliquiæ of a subsided German ocean.†

* The western boundary of the crag may be extended from Bungay to Halesworth, Woodbridge, and Ipswich; between which and the sea, lie all the localities of the Suffolk crag given in the "*Synoptical Table of British Organic Remains.*"

† We here insert an extract from an interesting paper, "On the Physical Structure of the Site of Rome," published in Professor Jameson's *Edinburgh New Philosophical Journal*, Jan. 1833, p. 28, which places the subject in a very clear light. It says—"Changes in the relative level of the sea and land have been alluded to. By what probable causes were these changes effected? The answer that most naturally occurs to such a question is, that it was the sea which changed its level; but further inquiry makes it much more probable, nay almost certain, that it was the 'fixed earth' which moved, and the unsettled sea remained unaltered.

The original bed of this æstuary may be identified in many places; but more particularly so in a chalk-pit near Postwick church, the plateau of which, in its whole extent, is perforated by an animal of the Tubicolæ family, as the rocks of our present coasts are. At Bramerton there are, on the upper surface of the chalk, numerous small holes four or five inches in depth, analogous to those formed on our chalk beach at Trimmingham by the action of the water on small pebbles. Wherever the crag shells occur, a layer of loose flints reposing on the chalk generally accompanies them. We witness precisely the same circumstance at the present day, where the bed of the sea is composed of chalk, as at Trimmingham and Foulness point, Cromer. With these facts before us, and viewing the thick beds of testaceous remains, we cannot hesitate to admit that the sea occupied, for a long period, the part of Norfolk now under consideration. In many places, as at Bramerton, Postwick, Thorpe, Wroxham, Belaugh, Horstead, Marsham, Cromer, Weybourne, and Bungay, the rejectamenta of this æstuary have been discovered

No permanent *partial* change in the sea can take place; if it rose at any time to the height of the Alban mount, it must have stood 3000 feet higher than it does at present over the whole globe; and if it fell from the height of the Alban mount to its present level, a mass of water equal to a stratum 3000 feet in thickness over the whole globe must have disappeared. But the phenomenon in question may be accounted for by partial elevations of the land, and proofs of such movements are to be found *in many parts of the earth*; no where in a more palpable manner than in this district of Italy."

lying intermingled with the sand, as we see the recent shells on the beach near Hunstanton.*

Another point worthy of attention, is the apparent agreement in the gregarious habits of the original occupiers of these shells, with the recent mollusca, confining them to particular spots or habitats: thus we find that the beds of crag shells are not continuous, but deposited in patches; and that the shells in the Suffolk beds are in numerous instances generically, and in almost all, specifically different to those found near Norwich. At Cromer they resemble the Suffolk, at Weybourne the Norwich shells.† They are generally not so well preserved as those of the Suffolk beds; excepting the murices and turbines, which being stronger shells are for the most part in good preservation;

* At Bramerton, the shells may be traced in the bank on the right hand, for a quarter of a mile as you approach the Wood's-end house. The cliff is situate about a quarter of a mile below the house, by the river-side; and, about two hundred yards lower down the river, a thick bed has been cut through, to enlarge a cottage garden. At Postwick, they are to be seen in a pit north-west of the church, and in the grove; at Thorpe, by the toll-gate and near the asylum; at Wroxham, by the river-side below the church; at Belaugh, in Mr. Allen's farm-yard; at Horstead, near the mill; at Marsham, in Mr. Warne's grounds; at Cromer, in the beach at low water; and they have recently been discovered by Mr. Daniel Stock, at the foot of the Bath hills, on the Norfolk side of the river Waveney, opposite Bungay common.

The recent rejectamenta at Hunstanton, will be found on the beach at the extremity of the cliff, (see Section). They are exceedingly numerous and of various species, both of univalves and bivalves; and, as a cause now in action, highly deserving the attention of the geologist.

† Some of the shells peculiar to the Suffolk crag, are found in the beds at Thorpe, in a bouldered and mutilated state; these are Pentunculus variabilis, Tellina obtusa, Buccinum elongatum, and Cassis bicatenata. Two specimens of Murex contrarius have been found at Bramerton, by the Rev. William Foulger, very much water-worn.

the latter even retain their color. Within the murices are found the minute shells noticed in the catalogue; and the turbines when in a state of decomposition, will readily separate at their lines of increase on being held in a warm hand. There are some crag shells, which appear to us to be the exuviæ of the mollusca, left on the retiring of the waters of the æstuary; these shells are easily distinguished, even by an unpractised observer, by their lying considerably above the rejectamenta; and by the hinges of the bivalves being always in contact.

Fragments of crag shells are to be found in the diluvium, of the whole line of cliffs of the eastern coast, particularly about Cromer.

The cliffs westward of Cromer, present an interesting section of this deposit; the contortions of some of the layers are extraordinary and inexplicable. This being the section of our presumed æstuary, we here trace in the thin alternate layers of chingle, sand, and clay, the remains of its bed. Some of these are placed in such extraordinary positions, that it is impossible to form any geological conclusions respecting them. Beeston hill, the highest point of this line, presents a section entirely composed of layers of chingle and sand in a horizontal position.

FERRUGINOUS GRAVEL.

This layer reposes upon the chalk and is immediately below the blue clay, on the eastern coast.

It is to be traced, at intervals, (generally at the base of the cliff) from Weybourne to Mundesley,* by a yellow efflorescence on its surface. It seldom exceeds two feet in thickness, consisting of ferruginous and ochraceous nodules, accompanied by sand, gravel, clay, peat, sulphur, and loam, containing the wreck of the antediluvial forest; such as trunks and branches of trees, compressed by the weight of the superincumbent strata, stools of trees, leaves and seed vessels; also the tusks, teeth, horns, and bones of the elephant, ox, deer,† horse, and other animals. These remains are also found in the lower part of the blue clay.

This stratum disappears below the beach a little south of Mundesley; but it has been traced out at sea off Hasboro', by the teeth, bones, &c. which have from time to time been dredged up, by the men fishing for oysters.‡ To the west of Cromer it has a similarity of character; but hitherto no mammalian remains have been discovered in it.

* Mr. Charles Peach, riding officer in the Preventive service, while stationed on the coast in 1826, discovered, at the base of the cliff at Sidestrand, several thick beds filled with shells, which appear to be the Unio Solandri of Sowerby's *Min. Con.* t. 517. The Mya pictorum of Hordwell cliff—*Fossilia Hantoniensia*, fig. 95. A bed of pipe-clay was visible at the spot in the section, at which the strata are upheaved; and it is very probable that the shells in question, may still be found near this place.

† From the abundance of *shed* horns of the deer, we presume that the original habitat of these animals was not far off.

‡ The oyster-bed off Hasboro' was discovered in the year 1820, and during the first twelve months many hundred specimens of the molar teeth of the elephant were destroyed by the fishermen; who amused themselves by breaking them, their wonder being excited by the grinders separating into laminæ.

CHALK FORMATION.*

This deposit may be traced in the upper parts of the valleys of eastern Norfolk, and in western Norfolk generally; where it lies in many parts within a few feet of the surface. The uppermost beds of this formation, are remarkable for their double rows of flints, which are now rarely met with, being removed by diluvial action. Their principal localities are Trimmingham, Whitlingham, Postwick, and Swaffham. The latter may be an out-lying mass, which has suffered little by diluvial abrasion. In the first-named place, the chalk appears in two isolated disrupted masses, and presents some species of fossils peculiar to it; as Ostrea canaliculata, a Gryphæa, specifically different to G. globosa, being much thicker and larger,† Magas pumila, Terebratula rigida, a depressed Galerites, &c. The Magas pumila is occasionally found at Swaffham and Norwich.

The total absence of the shells of univalves in

* M. de la Beche, in his *Geological Manual*, p. 260, has an interesting note on this subject.

† These gryphææ are subject to being changed into chalcedony, and many of them so changed have been collected on the beach; but, to our knowledge, only one specimen has been found in the chalk cliff, which was in the possession of Mr. R. C. Taylor. We collected numerous specimens in a state of decomposition, during a short search made in the gravel pit on the east of Wayford bridge, in the parish of Stalham. These were covered with chalcedonic patches; the progress of which is so accurately described by M. Von Buch, in a memoir on the "Silicification of Organic Bodies," published in Professor Jameson's *Edinburgh New Philosophical Journal*, January, 1833, p. 53.

this formation, does not arise from their non-existence at the time of its deposition; but a peculiarity in their crystalline structure has caused their absorption. In consequence of which, no trace of these exuviæ is to be found, except an occasional cast of their interior, or an impression upon an ostrea or gryphæa.* To the casts of nautilites and ammonites of the hard chalk are seen adhering small ostræa, &c. These were originally fixed on the shell, which, upon its absorption, were impressed into the cast.

UPPER CHALK.

The chalk around Norwich, in the neighbourhood of Holt,† and at Coltishall, Horstead, &c. in the valley of the Bure, comes under this division. It contains organic remains considerably different to those in the medial chalk of Swaffham; which has induced us to give separate catalogues of their fossils.

Its flints with the exception of those above noticed, are arranged in single horizontal layers about four feet asunder. This horizontal arrangement is not peculiar to the chalk, as a similar stratification of geodes or nodules of chert occurs

* This circumstance has been noticed by De France, in his "*Tableaux de Corps organisés fossiles*," p. 33.

† In the fissures of the chalk near Holt, have been discovered dendritical configurations, (tab. 4, fig. 1,) similar to those found in the Sussex chalk, which M. Ad. Brongniart has determined to be the remains of a species of confervites, and has named C. fasciculata.—*Prodrome d'une Histoire des Végétaux fossiles*, p. 13.

in the London clay, green sand, Kimmeridge clay, Bath oolite, lias, and mountain limestone. The fact of the regular parallelism and stratification of the flinty nodules is, we conceive, a sufficient refutation of their animal origin; added to which, there is not a greater number of organic remains to be found in the flinty stratum, than is seen distributed in the adjoining bed of chalk.* Besides these nodular flints, large hollow cylinders—described by Dr. Buckland, in the *Geol. Trans.* vol. iv. p. 413, under the name of Paramoudra—are of frequent occurrence at Thorpe, Whitlingham, and Coltishall.† These singular and interesting fossil bodies are about four feet in length, and eighteen inches in diameter. They are frequently seen traversing the chalk quarries from bottom to top, one upon another lengthwise, in a way not to be attributed to accident; but apparently resulting from an original connection in each chain or group. We here find them in all stages of growth, from the small pyriform specimen of about two feet in length, to those of near five feet, occupying the full space between each horizontal layer of flints. There are other specimens which appear to be nearly worn out, having

* The quartz crystals and chalcedonic appearances in the cavities of flints, result from the decomposition of alcyonia, &c. The remains of these bodies are easily traced in the light-colored diluvial flints, as they have assumed a reddish-purple tint.

† Within the hollow of these cylinders at Coltishall, have been found spherical and nodular masses of pyrites; but of so loose a nature, that they soon decompose on exposure to the influence of the atmosphere.

a very large hollow with comparatively thin sides, and measuring nearly three feet in diameter.*

In a pit about one mile east of Wells, thin seams of flint are seen traversing the chalk, both in a horizontal and oblique direction; and in many parts they do not exceed one-eighth of an inch in thickness. They are, we believe, of rare occurrence. Two localities have been noticed by Dr. Buckland; one at Hurly Bottom, near Henley, Oxfordshire; the other, at Rottingdean, near Brighton.—*Geol. Trans.* vol. iv. p. 418. The former is figured in tab. 24, fig. 8, of the same vol.; the latter, in tab. 5 of Mantell's *Geology of Sussex*.

The pipes, or "sand-galls" as they are locally termed, which occur in the chalk around Norwich, may be referred to the action of springs. Similar causes now in action are to be witnessed at low tides on the beach below Dover castle; and, on a small scale, by the side of the Wensum, near Bishop's bridge, Norwich.

MEDIAL CHALK.

The outcrop of this part of the chalk series, constitutes the high ground of the county; from which, as has been before noticed, the principal rivers take their rise. The places where this chalk is most exposed are, Brancaster, Docking, Lexham, Litcham, Swaffham, and Thetford. This

* Dr. Buckland, in the paper above referred to, considers the paramoudra to be a silicified sponge; and a comparison has more recently been instituted between it and the Neptune's cup of the Indian seas.

chalk is of a closer texture than the upper, and has fewer flints.

THE LOWER OR HARD CHALK

Is so compact, that in western Norfolk, where it abounds, it is in general use together with the carstone, for the construction of cottages and farming buildings. Its quality is also so uniform, that we find it employed for the architectural ornaments in the interior of churches and religious buildings, and for the monuments of the illustrious dead. The principal localities are, Feltwell, Gayton, Hunstanton, Hockwold-cum-Wilton, Marham, Narborough, Snettisham, and Stoke-ferry.

The jaws and teeth of a large Saurian animal, have been recently discovered in this bed in Hunstanton cliff, by the Rev. Edward Edwards. Mr. Mantell considers them identical with those found in the Sussex chalk, and figured in *Geol. Suss.* t. 9, f. 6.

In accounting for the different appearance of the chalk formation in its upper and lower beds, we venture to advance it as our opinion, that the whole being deposited in one homogeneous mass, in which about twelve per cent of silex * was equally distributed; the lower part, from the

* Phillips' *Mineralogy*, p. 159, and in the *Geology of England and Wales*, p. 70, it is stated, that "the chalk even yet often contains a mixture of silex; at the period of its formation, a considerable quantity appears to have been precipitated with it, in a state of such minute division as to allow the chemical attraction of its molecules to have effect; these, separating from the cretaceous pulp, and uniting together, constituted the layers of nodular silicious concretions in question."

pressure of the superincumbent beds, began to consolidate, ere any arrangement of the silicious particles could take place; whilst in the upper part these particles, by chemical attraction, congregated themselves into the nodular and tabular forms under which they appear. Their horizontal arrangement may be the result of magnetic attraction, as according to the analysis of Klaproth,* flint contains 98 parts of silex, 0.5 of lime, 0.25 of alumine, 1 of water, and 0.25 of the oxyde of iron.†

Had the chalk formation been a succession of slow deposits, we should find the testaceous remains, from their specific gravity, disposed in layers. Such, however, is not the fact. They are sometimes found in shoals, as in the instance of Ostrea canaliculata in Trimmingham cliff; but generally they are uniformly distributed throughout the chalk, warranting a conclusion that the whole deposit is of chemical origin.

CHALK MARLE.

This bed reposes upon the red chalk, and is seen to great advantage in that interesting section, Hunstanton cliff. It is of a grayish color, and at that place about four feet in thickness. The Spongia paradoxica, as we have named it *pro*

* *Geology of England and Wales*, p. 70.

† The chalk flints from the pits in the hamlet of Thorpe contain blue phosphate of iron. These flints are used, for their neat appearance, in constructing the fences by the road side; and the fractured parts, on exposure, frequently become coated with a beautiful azure blue, which, on analysation, proved to be phosphate of iron.

tempore, abounds in it; there are also two large ammonites, which are found in the corresponding beds of the Sussex chalk, and are named by Mr. Mantell, A. Lewesiensis and rusticus.

THE RED CHALK

Is found in Norfolk only in the cliff at Hunstanton; it occurs also on the Yorkshire coast in the Speeton cliffs. It is about two feet in thickness, and, like its superincumbent bed, abounds with Spongia paradoxica, and Belemnites Listeri or minimus. It is interspersed with numerous small quartz pebbles, of a dark-green color, identifying it with the "chalk with quartz grains," noticed by M. de la Beche as occuring near Lyme Regis.*

CARSTONE OR IRON SANDSTONE.

This stratum, corresponding with the green sand, is found in Hunstanton cliff, at Bilney, Middleton, &c.; and its debris is seen in the pits of western Norfolk. As before noticed, it is used as a building material, and our ancestors formed it into querns or corn-mills. The disintegrated particles of this sandstone, which are found between the large blocks on the beach at Hunstanton, are known to mineralogists as the Titaniferous oxydulated iron ore.†

OOLITIC SERIES.

The outcrop of this series is to be traced in the slope of the high grounds bordering on Marshland.

* *Geological Transactions*, second series, vol. ii. p. 110.

† *Geology of England and Wales*, p. 15, and Phillips' *Mineralogy*, p. 223.

It had attracted the notice of that able geologist, Mr. Wm. Smith, who has laid it down upon his maps as Oaktree clay, the Kimmeridge clay of our present geologists. Mr. Rose, of Swaffham, has Gryphæa bullata and Ammonites excavatus, from a well sunk at Lynn through this bed.

Presuming that an account of the private collections of the organic remains of the county would be acceptable, we have inserted it; and have no doubt but that they will be accessible to the scientific visitant in furtherance of his researches.

CATFIELD. The Rev. James Layton has a very magnificent collection of the mammalian remains, found on the oyster ground off Hasboro', and in the cliffs of our eastern coast. He has also a considerable collection of the fossils found on the beach of the same line of coast.*

CROMER. Miss Anna Gurney, (Northrepps cottage) has a collection of mammalian remains from the same localities as above.

——— Mr. Earl; a collection of mammalian remains, with chalk fossils from Trimmingham cliff and the vicinity of Cromer.

——— Mr. Fox (lapidary) has usually a collection of the coast fossils for sale.

LYNN. The Rev. Edward Edwards; a large

* It is with regret we announce, that since the above was written, the Rev. J. Layton has removed to Sandwich; and this splendid collection is in consequence lost to the scientific residents of this part of the kingdom.

collection of chalk fossils from the cliff at Hunstanton. In this collection are the remains of a new species of Sauria, analogous to that found in the Sussex chalk by Gideon Mantell, Esq. a description of which will be found in that gentleman's forthcoming work "On the *Geology of the South-East of England.*"

LYNN. Henry Hoste Henley, Esq. (Sandringham hall) has a collection of the fossils of western Norfolk; and a splendid suite of lias fossils from the vicinity of Lyme Regis, Dorset.

NORWICH. The Rev. W. Foulger (King Street); crag and chalk fossils, some of them unique.

——— Mr. John King, (St. Andrew's); a large collection of chalk fossils, many of them rare; besides which, he has some very interesting specimens of British fossils.

——— The Author; flint casts, crag shells, and upper chalk fossils agreeing with the annexed lists; mammalian remains from the coast, and a large collection of British fossils.

SHROPHAM. The Rev. G. R. Leathes; a splendid collection of crag and chalk fossils; with a general collection of British fossils.

SWAFFHAM. C. B. Rose, Esq. Shells from the brick-earth of the Nar, fossils from the clay of western Norfolk, and from the medial and hard chalk, as expressed in the lists of the fossils of those deposits; with a few exceptions in those of the clay.

TABLES

OF

THE ORGANIC REMAINS.

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The letters following the localities indicate their numbers; as, *u.* unique, *r.* rare, *c.* common, and *a.* abundant.

SYSTEMATIC TABLES

OF THE

Organic Remains of the County of Norfolk.

ALLUVIAL DEPOSITS.

1. *Silt, &c.* — *Valleys of East and West Norfolk.*

Genus.—Species.	Reference, &c.	Observations, Localities, &c.
PLANTÆ.		
Quercus robur	Oak	Found unchanged on the Beach at Brancaster—in a state of decomposition, accompanied by their seed vessels, in the Valley of the Ant—and impregnated by the oxyde of iron on Palling Beach.
Fagus sylvatica	Beech	
Castana vesca	Chesnut	
Corylus avellana	Hazel	
Pinus sylvatica	Scotch Fir	
Salix ———	Willow	
Ulex Europæus	Furze	Marshland
CONCHIFERA.		
Mactra Listeri	Wood's Ind. t. 6, f. 25	Eastern and Western Norfolk
Tellina solidula	.. 4, f. 84	Western Norfolk
Cyclas cornea	Turton's Man. f. 2	Ibid.
Cardium edule	Wood's Ind. t. 5; f. 26	Ibid.
Mytilus edulis	.. 12, f. 21	Ibid.
Ostrea edulis	.. 11, f. 74	Ibid.
MOLLUSCA.		
Helix nemoralis	Turton's Man. f. 23	Valley of the Waveney
hortensis	.. 24	Ibid.
Carocolla lapicida	.. 51	Ibid. and Western Norfolk
Clausilia laminata	.. 53	Valley of the Waveney
Succinea amphibia	.. 73	Western Norfolk
Planorbis corneus	.. 95	Ibid.
Lymnea pereger	.. 101	Ibid.
palustris	.. 107	Ibid.
Paludina impura	.. 120	Ibid.
Turbo Ulvæ	Wood's Ind. t. 31, f. 58	Ibid.

Genus.—Species.	Reference.	Observations, Localities, &c.
CONCHIFERA.		
Erycina complanata	Tab. 1, fig. 8	Common
Modiola elegans ?	.. 9	Unique specimen
Pinna sulcata	Tab. 5, fig. 23	Fragmt. of Cast—Bungay Comn.
Inoceramus Cuvieri	Min. Con. t. 441, f. 1	Very abundant
Websteri	Geol. Suss. t. 27, f. 2	
striatus	Min. Con. t. 582, f. 2	
mytiloides	.. 442	
undulatus	Geol. Suss. t. 27, f. 6	
latus	Min. Con. t. 582, f. 1	
Dianchora lata	.. 80	Rare
Lima ? ———	Tab. 1, fig. 10	Finely striated, *u*.
Plagiostoma asperum	Geol. Suss. t. 26. f. 18	Impression
Brightoniensi	.. 26, f. 15	Cast
Hoperi	Min. Con. t. 381	Casts of single valves
spinosum	.. 78	Casts of interior of the valves in contact
Pecten nitidus	.. 394, f. 1	Impressions and Casts
muricatus	Smith, Chalk, f. 3	
concentricus	Tab. 5, figs. 27 & 28	
sexcostatus	.. fig. 29	
Plicatula inflata	Min. Con. t. 409, f. 2	Casts
Gryphæa minuta ?	Tab. 1, fig. 11	
Crania striata	Tab. 6, fig. 15	Group of three upper valves on one flint
Terebratula pectita	Min. Con. t. 138, f. 1	Casts of these bivalves are known under the general appellation of Hysterolites—in some instances the cavities they once occupied in the flint, are lined with quartz crystals.
semiglobosa	.. 15, f. 9	
subplicata	Geol. Suss. t. 26, f. 5	
elongata	Min. Con. t. 435, f. 1	
plicatilis	.. 118, f. 1	
octoplicata	.. .. f. 2	
Gallina	Tab. 6, fig. 12	
Pisum	Min. Con. t. 536, f. 6	
obliqua	.. 277, f. 2	
Mantelliana	.. 537, f. 5	
MOLLUSCA.		
Cirrus ———	Tab. 1, fig. 13	Sections of Casts, *r*.
Trochus ———	———	Cast of exterior
Belemnites electrinus	Geol. Trans. 2 ser. ii. t. 8, f. 18	Impression
(Callirhoe)	Org. Rem. iii. t. 8, f. 15	Casts of the alveolar cavity
Baculites Faujasii	Min. Con. t. 592, f. 1	Impression covered with quartz crystals
VERMES.—Casts of cells	Geol. Trans. ii. t 14	In Inocerami and Belemnitæ
.. ..	———	Small spherical cells in the apex of Ananchytes hemisphericus
Casts of tubes	Geol. Tr. ii. t. 14, f. 9	In Belemnitæ

Genus.—Species.	Reference.	Observations, Localities, &c.
PISCES.		
Salmo Lewesiensis	Geol. Suss. t. 37	Single scales, having a corneous appearance
Squalus mustelus	.. t. 32, f. 2, 3	A single tooth of a yellowish-white color

2. *Clay, of Western Norfolk, &c.*

Genus.—Species	Reference, &c.	Probable Bed.	Localities, &c.
PLANTÆ.			
Wood calcareous	———	Sandst. of Oolite	Common
..	———	Portland Oolite	
ferruginous	———	Carstone	
spathose	Org. Rem. i. t. 9	London Clay	
pyritous	———	..	
POLYPI.			
Madrepora galaxea?	Ellis, t. 47	Mt. Limestone	Roydon, near Diss
ramea ?	.. 38	———	Ibid.
Siderea ?	.. 49	———	Scole
annularis ?	.. 53	Oolite	Dickleburgh
compound porpital	Org. Rem. ii. t. 7	Coral Rag	Roydon
Caryophyllia centralis	Geol. Suss. t. 16	Chalk	Dunham
RADIARIA.			
Pentacrinites basaltiformis	Miller, p. 62	..	Ibid. Swaffham, Diss, &c.
Poteriocrinites crassus	.. p. 68	Mt. Limestone	Near Diss
ANNULATA.			
Dentalium incrassatum	Min. Con. t. 79	London Clay	Ickborough, *r*.
Serpula tetragona, *α*.	.. 599	Cornbrash	Thetford, Wereham, *c*.
tricarinata	.. 608	..	———
squamosa	Phillips, t. 4	Coral Rag	Great Dunham, *r*.
CONCHIFERA.			
Fistulana personata	Min. Con. t. 102	London Clay	In fossil wood
Pholas crispata	Tab. 1, fig. 19	Clay	Hasboro' Cliff
Pholadomya Murchisoni	Min. Con. t. 545	Inferior Oolite	Hasboro'
ambigua	.. 227	..	Narford, *r*.
Mya literata, *β*	Tab. 1, fig. 14	..	G. Dunham, Roydon, *r*.
depressa ?	Min. Con. t. 418	Oolite	Ibid. *r*.
Astarte elegans	.. 137	Inferior Oolite	Wereham, *r*.
lineata	.. 179	Upper Oolite	Fincham, Saham, Roydon, *c*.
planata	.. 257	Clunch Clay ?	Gunton, Roydon
Venus ———	Tab. 1, fig. 15	———	Casts of, common
——— ?	.. 16		

Genus.—Species.	Reference, &c.	Probable Bed.	Localities, &c.
Cardium multicostatum	Phillips, t. 13	Lias	Sporle, *r.*
striatulum	Min. Con. t. 553	Coal of Oolite	Wereham, Roydon, *c.*
Hillanum	.. 14	Green Sand	Swaffham, Hasboro'
Isocardia tener	.. 295	Kelloway's Rock	Hasboro'
Arca æmula?	Phillips, t. 3	Coral Rag	Wereham, *r.*
———	Tab. 1, fig. 17	———	Roydon, *r.*
Cucullea subacuta	Min. Con. t. 44	Green Sand	G. Dunham, Scarning, &c. *c.*
Nucula claviformis	.. 476	Limestone	Caston, *r.*
ovum	.. ..	Lias	Eastern Coast
trigona	.. 192	London Clay	Wereham, G. Dunham, *c*
Trigonia costata	.. 85	Inferior Oolite	Swaffham, Roydon, *c.*
clavellata	.. 87	Cornbrash	Common
alæformis	.. 215	Low. Gn. Sand	Marham, *r.*
Unio hybridus	.. 154	Mag. Limestone	Roydon, *r.*
crassissimus	.. 153	Inferior Oolite	North Pickenham
Listeri	.. 154	..	Roydon, Sporle, &c.
concinnus	.. 223	..	Roydon, *r.*
Modiola parellela	.. 9	Limestone	Holmhale, *r.*
Hillana	.. 212	Lias	Great Dunham, *r.*
cuneata	.. 211	Inferior Oolite	Swaffham, Wereham, *r.*
aspera	.. 212	Oolite	Wereham, *r.*
elegans	.. 9	London Clay	Holmhale, *r.*
Pinna tetragona, *a.*	.. 313	Green Sand	Westacre, *r.*
affinis?	.. ..	London Clay	Great Dunham, *r.*
Gervillia aviculoides	.. 511	Inferior Oolite	Narford, *r.*
Avicula inæquivalvis, β	.. 214	..	G. Dunham, Hasboro', *c*
costata, γ	.. ..	Cornbrash	Ibid. *r.*
echinata, α	.. 243	..	Fincham, Sporle, &c.
——— β	.. ..	Kimmeridge Cl.	———
ovalis	Phillips, t. 3	Coral Rag	Hasboro'
costata, δ	Min. Con. t. 214	Upper Oolite	———
media	.. 2	London Clay	Hasboro'
Inoceramus concentricus	.. 305	Chalk Marle	Ibid.
Cuvieri	.. 441	Chalk	Swaffham, *c.*
Brongniarti	.. ..	..	Necton, *r.*
cordiformis	.. 440	..	Little Dunham, *c.*
mytiloides	.. 442	..	Great Dunham, *r.*
digitatus	.. 604	..	Caston, *r.*
latus	Geol. Suss. t. 27	..	Ashill, *r.*
undulatus	.. ..	..	Sporle, *u.*
Lima elegans	Tab. 1, fig. 18	Cornbrash	Swaffham, *r.*
Plagiostoma punctatum	Min. Con. t. 113	Lias	Hasboro'
giganteum	.. 77	Lias & Cornbr.	Near Diss, Sporle, *c.*
pectenoides	.. 114	Inferior Oolite	Great Dunham, *r.*
rigidum	.. ..	Coral Rag	Stradsett, near Downham, *r.*
spinosum	.. 78	Chalk	Common

Genus.—Species.	Reference, &c.	Probable Bed.	Localities, &c.
Pecten æquivalvis	Min. Con. t. 136	Inferior Oolite	N. Pickenham, Sporle
cinctus	.. 371	..	Little Dunham, ibid.
viminеus	.. 543	..	Wereham
vagans	.. ..	..	Roydon
Lens	.. 205	Forest Marble	Stradsett, &c.
fibrosus	.. 136	Cornbrash	Narford
barbatus	.. 231	Coral Rag	Great Dunham
lamellosus	.. 239	Upper Oolite	Roydon
arcuatus, *a*	.. 205	Green Sand	Common
orbicularis	.. 186	Up. Gn. Sand	Ditto
nitidus	.. 394	Chalk	Ditto
corneus	.. 204	London Clay	Ditto
Gryphæa obliquata	.. 112	Lias	Diss, Scole, *c.*
Maccullochii	.. 547	..	Eastern Coast
incurva	.. 112	Lias & Cornbr.	Dunham, Sporle, Roydon, *c.*
dilatata	.. 149	Inferior Oolite	Dunham, Roydon, *c.*
bullata	.. 368	Oxford Clay	Stradsett, ibid. *c.*
Ostrea Marshii	.. 48	Inferior Oolite	Little Dunham
duriuscula	Phillips, t. 4	Coral Rag	Eastern Coast
gregaria	Min. Con. t. 111	..	Roydon
deltoidea	.. 148	Kimmeridge Cl.	Stradsett, Roydon, *c.*
carinata	.. 365	Up. Gn. Sand	Bressingham, Great Dunham, *c.*
Terebratula crumena	.. 83	Mt. Limestone	Hasboro', Diss, *c.*
resupinata	.. 325	Inferior Oolite	———
tetraedra	.. 83	..	Swaffham, Roydon, *c.*
spinosa	Phillips, t. 9	..	Scole
ovoides	Min. Con. t. 100	Low. Gn. Sand	Common
lata	.. 502	..	Ditto
Lingula ovalis	.. 19	———	Ditto
MOLLUSCA.			
Patella latissima	Min. Con. t. 139	Coal of Oolite	Narford, Wereham, &c.
Melania vittata	Phillips, t. 7	Cornbrash	Swaffham
Scalaria ———	Species undetermined	Green Sand	Scarning
Cirrus ellipticus	Rose, MS.	———	Great Dunham, *u.*
perspectivus	Min. Con. t. 428	Chalk	Near Swaffham
Euomphalus costatus	Tab. 1, fig. 20	Green Sand	Caston
Trochus punctatus	Min. Con. t. 193	Inferior Oolite	Swaffham
———	Casts of	Calc. Sandstone	Common
Turbo ornatus	Min. Con. t. 240	Inferior Oolite	Swaffham
muricatus	.. ..	Cornbrash	Ibid.
Turritella muricata	.. 499	..	Ibid.
Rostellaria bispinosa	Phillips, t. 4	Calcareous Grit	Caston, *c.*
Terebra vetusta	.. 9	Inferior Oolite	Sporle, Scarning, *c.*
Belemnites acutus	Min. Con. t. 590	Lias	Dunham, Roydon, *c.*

Genus.—Species.	Reference, &c.	Probable Bed.	Localities, &c.
Belemnites fusiformis	Geol. Trans. 2 ser. ii. t. 8, 9	Inferior Oolite	Sporle
abbreviatus	Min. Con. t. 590	..	Dunham, Roydon, *c.*
compressus	.. ..	Cornbrash	Sporle
minimus	.. 589	Chalk Marle	Dunham
mucronatus	.. 600	Chalk	Ibid. *c.*
Ammonites striatus	.. 53	Mt. Limestone	Hasboro'
biplex	.. 293	Lias	Common
communis	.. 107	..	Dunham, Sporle, *c.*
Birchii	.. 267	..	Great Dunham
Taylori	.. 514	..	Ibid. and Bacton Cliff
rotiformis	.. 453	..	Ibid.
maculatus	Tab. 1, fig. 21	..	Hasboro' Beach
heterophylla	Min. Con. t. 266	..	Ibid.
Walcottii	.. 106	..	Bramerton
Turneri	.. 452	..	Windham
annulata, *a*	.. 222	Inferior Oolite	Roydon, *c.*
——— *β*	.. ..	..	Great Fransham, Hale
Strangewaysi	.. 254	..	Shipdham
decipiens	.. 294	Oxford Clay	Roydon, Wereham, &c. *c*
sublævis	Phillips, t. 4	Coral Rag	Roydon
rotundus	Min. Con. t. 293	Kimmeridge Cl.	Great Dunham
mutabilis	.. 405	Portland Oolite	Ibid. Stradsett, Roydon
excavatus	.. 105	..	Ibid.
triplicatus	.. 92	..	Ibid.
dentatus	.. 308	Chalk Marle	Gayton
peramplus	.. 357	Chalk	Sporle
bina	.. 92	———	Bramerton
serratus	.. 24	———	Hasboro' Beach
Spondylolites*	Org. Rem. iii. t. 9	———	Roydon
Hamites Gigas	Min. Con. t. 593	Limestone	Hasboro' Beach
PISCES.			
Dapedium politum	Geol. Trans. 2 ser. i. t. 6	Lias	Great Dunham
Squalus ———	(Vertebræ)	———	Roydon
Balistes (radius) †	Tab. 2, fig. 1	Lias	Stradsett, Roydon
SAURIA.			
Ichthyosaurus communis ‡	Geol. Trans. v. t. 41	Lias and Kimmeridge Clay	Roydon, &c. *c.* Great Dunham, *u.*
Plesiosaurus ——— §	.. ..	Lias	Common
Crocodilus priscus **	Tilgate Foss. t. 10	Tilgate Beds	Roydon

* Casts of the chambers of the Ammonites; provincially called Cat-heads.

† Similar tuberculated specimens are noticed by Mr. de la Beche, as occurring in the lias.—*Geol. Trans.* second series, vol. i. p. 44.

‡ Vertebræ and tooth. § Vertebræ, &c. ** Vertebræ and teeth.

TERTIARY BEDS.

1. *Crag.* — *Norwich, &c.*

Genus.—Species.	Reference.	Observations, Localities, &c.
CIRRIPEDA.		
Balanus tesselatus	Min. Con. t. 84, f. 1	Bramerton, *c.* Cromer
balanoides*	Tab. 2, fig. 3	Ibid. and Postwick, *c.* Thorpe, *r.*
——— †	.. 4	Thorpe, *a.*
CONCHIFERA.		
Solen siliqua?	Donovan, t. 46	Ibid. *r.* Only two single valves
Mya lata	Min. Con. t. 81	Bramerton, *r.* Cromer
arenaria	.. 364	Ibid. *a.* Postwick, *c.* Thorpe, *r.*
subovata	Tab. 2, fig. 5	Ibid. *a.* ibid. and ibid. *r.*
subtruncata	.. 6	Ibid. *r.*
Mactra Listeri?	.. 7	Ibid. *r.*
magna	.. 8	Postwick Grove (upper layer) *a.*
ovalis	Min. Con. t. 160, f. 5	Ibid. *r.*
arcuata	.. .. f. 1	Ibid. *r.*
triangularis	Tab. 2, fig. 9	Ibid. *r.* Cromer, *r.*
cuneata	.. 10	Ibid. *r.*
dubia	Min. Con. tab. 160, f. 2	Ibid., Bramerton, and Thorpe, *r.*
Saxicava rugosa	.. 466	Thorpe, *c.* In fragments
Tellina obtusa	.. 179, f. 4	Ibid. *r.* Postwick, *r.* ditto
obliqua	.. 161, f. 1	Ibid, Bramerton, & Postwick, *a.*
ovata	.. .. f. 2	Ibid. ibid. ibid. *a.*
ovalis	Tab. 2. fig. 11	Thorpe, *r.*
prætenuis	.. 12	Bramerton, Postwick, & Thorpe, *a.*
solidula?	.. 13	Weybourne, *a.*
Lucina divaricata	Min. Con. t. 417	Ibid. and Thorpe, *r.*
mitis	.. 557, f. 1	Postwick and Thorpe, *r.*
antiquata	.. .. f. 2	Ibid. and ibid. *r.*
Astarte plana	Tab. 2, fig. 14	Bramerton and Thorpe, *r.*
ovalis	.. 15	Ibid. and ibid. *r.*
antiquata	.. 16	Ibid. Postwick, Thorpe, *r.*
angulatus	.. 17	Ibid. and Thorpe, *r.*
Venus æqualis	Min. Con. t. 21	Ibid. *c.* Thorpe, *r.*
Cardium Parkinsoni *β* ‡	Tab. 2, f. 18	Thorpe, *r.* in fragments
edulinum	Min. Con. t. 283, f. 3	Ibid., *r.* Bramerton and Postwick, *c.* Cromer *r.*
obliquum	Tab. 2, f. 19	Postwick, *c.*
Pectunculus variabilis	Min. Con. t. 471	Thorpe, *r.* in fragments

* On murices.

† These are abundant on pebbles, but are so decomposed as not to be preserved in that state.

‡ Found in an isolated patch above the regular beds, in the pit near the asylum at Thorpe.

Genus —Species.	Reference.	Observations, Localities, &c.
Nucula Cobboldiæ	Min. Con. t. 180, f. 2	Bramerton and Postwick, *r.*
oblonga	.. .. f. 1	Ibid. and ibid., *r.*
Mytilus alæformis	.. 275, f. 4	Ibid. *c.* Thorpe, *a.*
antiquorum	Tab. 2, fig. 20	Ibid. *r.* ibid. in a distinct layer, *a.*
Pecten Princeps	Min. Con. t. 542	Thorpe, *a.*
sulcatus*	.. 393, f. 1	Ibid. *a.* Bramerton, *c.*
reconditus*	.. 575, f. 5,6	Ibid. *r.*
Hinnites Dubuissoni	.. 601	Ibid. *r.* Fragments
Chiton octovalvis	Org. Rem. iii. t. 5, f. 5	Ibid. One valve only
MOLLUSCA.		
Patella parvula	Tab. 3, fig. 1	Bramerton, *c.* Minute
Infundibulum clypeum	.. 2	Postwick, *r.* ditto
Bulla minuta	.. 3	Ibid. and Bramerton, *r.* ditto
Auricula pyramidalis	Min. Con. t. 379	Bramerton, Postwick, & Thorpe, *a.*
ventricosa	.. 465, f. 1	Ibid. *r.*
Lymnea tenuis?	Tab. 3, fig. 30	Ibid. *u.*
Paludina obsoleta	.. 4	Ibid., Postwick, and Thorpe, *r.*
media	.. figs. 5, 6	
rotundata	.. fig. 7	
Natica glaucinoides β.	Min. Con. t. 479, f. 4	Ibid. *c.* ibid. *a.* ibid. *r.*
Sigaretus similis	Tab. 3, fig. 8	Ibid. *r.* Minute
Actæon Noæ	Min. Con. t. 374	Postwick Grove, *r.*
Scalaria similis	.. 16, f. 1	Bramerton and Thorpe, *r.*
minuta	.. 390, f. 2	Thorpe, *u.*
Delphinula? carinata †	Tab. 3, fig. 9	Ibid. and Bramerton, *r.*
Trochus similis	Min. Con. t. 181, f. 2	Thorpe, *r.*
nitens	Tab. 3, fig. 10	Ibid. *r.*
Turbo rudis	Min. Con. t. 71, f. 2	Bramerton, Postwick, & Thorpe, *a.*
littoreus	.. .. f. 1	Ibid. ibid. and ibid. *a.*
carinatus	Tab. 3, fig. 11	Ibid. and Thorpe, *r.*
ventricosus	.. 12	
bicarinatus	.. 13	
sulcatus	.. 14, 15	
elongatus	.. 16—18	
semicostatus?	.. 19	Found in the large murices, but exceedingly tender: the first rare, the second abundant
minuta	.. 20	
Turritella terebra	Min. Con. t. 565, f. 3	Bramerton and Postwick, *r.*
Cerithium punctatum	Tab. 3, fig. 29	Ibid. ibid. *c.*
Murex striatus α	Min. Con. t. 109	Thorpe, *r.* Bramerton, *r.*
—— β	.. 22	Bramerton, *r.*
contrarius	.. 23	Ibid. Two fragments only
crispatus	.. 413	Ibid., Postwick, and Thorpe, *c.*
bulbiformis	Tab. 3, fig. 21	Thorpe, *u.*

* Found among the flints lying on the chalk.

† One specimen we have seen has the anterior part reversed.

Genus.—Species.	Reference.	Observations, Localities, &c.
Murex elongatus	Tab 3, fig. 22	Bramerton and Postwick, *c.*
angulatus	.. 23	Thorpe and ibid. *r.*
—— var.	.. 24	Ibid. and ibid. *r.*
lapilliformis*	.. 25	Ibid. *a.* Postwick
compressus †	.. 26	Ibid. and Postwick, *r.*
pullus	.. 27	Ibid. ibid. and Bramerton, *r.*
punctatus	.. 28	Ibid. *r.*
Cassis bicatenatus	Min. Con. t. 151	Ibid. *r.* Fragments only
Buccinum tenerum	.. 486 f. 2 & 4	Postwick Grove, *a.* ibid. *r.*
elongatum	.. 110, f. 1	Thorpe, *u.*

EXTRANEOUS MATTERS FOUND IN THE CRAG PITS OF THORPE, POSTWICK, AND BRAMERTON.

Cancer pagurus—Pincers (tab. 3, fig. 40) and fragments of shells of the common crab, *r.*

Terebratula plicatilis—Empty shells from the chalk, very fragile, *r.*

Belemnites mucronatus—Bouldered and broken fragments from the chalk, *c.*

Ammonites communis—(tab. 3, fig. 41) Impressions and casts in highly ferruginous and indurated clay, *r.*

Raia clavata—(tab. 3, figs. 34 to 38) Vertebræ from all parts of the spine; and fragments of bones, *a.*

Ditto—(tab. 3, fig. 39) Tubercles of the thornback, *c.*

—— (Tab. 3, figs. 32, 33) Rolled bones, some flattish, others conical, *a.*

Bos Urus—Bones of the extremities of the wild ox.

Cervus —— Teeth and fragments of bone and horn of the deer, *r.*

Mastodon —— The grinder figured in Smith's Strat. Id. Whitlingham.

latidens?—Part of grinder (vide Geol. Tr. 2 ser. ii. t. 37, f. 4) Horstead.

2. *Ferruginous Gravel. Mundesley Cliffs and Hasboro' Oyster Bed.*

Genus.—Species.	Reference.	Observations, Localities, &c.
MAMMALIA.		
Equus caballus	Rel. Diluv. p. 18	Teeth and Phalangi, *r.*
Bos Urus	Fleming, p. 24	Teeth & bones of the extremities, *r*
Cervus giganteus	Org. Rem. iii. t. 20, f. 1	Os frontis, *r.* and horns, *a.*
dama	Fleming, p. 26	Horns in abundance, teeth, vertebræ & bones of the extremities
elaphus	.. ..	
Elephas primogenius	Edin. Phil. Jour. 1827	Tusk, the Knole sand (Mammoth)

* Found among the flints lying on the chalk.

† As several similar specimens have been found, we have considered this a distinct species.

Genus.—Species.	Reference.	Observations, Localities, &c.
Elephas Asiaticus	Org. Rem. iii. t. 20, f. 8	Jaws, teeth, *a*. tusks (fragments only), vertebræ, and bones of the extremities, *a*.
Africanus	.. . 6	
Rhinoceros leptorhinus	Rel. Diluv. t. 7, f. 3	Teeth, *r*.
Hippopotamus ———	.. 22, f. 5	Jaw, tusks, and teeth, *r*.
Castor fiber	Fleming, p. 23	Jaw with teeth, *u*.

CHALK FORMATION.

1. *Upper Chalk.* *Norwich and Eastern Norfolk.*

Genus.—Species.	Reference.	Observations, Localities, &c.
PLANTÆ.		
Confervites fasciculata*	Tab. 4, fig. 1	Near Holt, *c*.
POLYPI.		
Flustra utricularis	Tab. 4, fig. 7	Common on ananchytes
tesselata	.. 4	Ditto
quadrata	Tab. 1, fig. 3	Whitlingham, *r*.
tubulosa	Tab. 4, fig. 5	Common on ananchytes
reteformis	.. 6	Ditto
Discopora mamillata	.. 2	On ananchytes, *r*.
radiata	.. 3	Ditto
Alecto ———	.. 16.	Norwich
Millepora Fittoni	Geol. Suss. t. 15, f. 10	Bishop's Bridge, Norwich, *r*.
globularis	Tab. 4, figs. 10—12	Norwich and near Holt
polymorpha	.. fig. 13	Catton and St. Giles's, Norw. *c*.
truncata?	.. 14	Norwich
gracilis	.. 15	Ibid.
Lunulites radiatus	.. 8	Letheringsett, near Holt, *u*.
Spongia lobata	Org. Rem. ii. t. 7, f. 6	Catton, near Norwich, *r*.
cribrosa	Phillips, t. 1, f. 7	Ibid. *c*.
ramosa	Geol. Suss. t. 15, f. 11	Ibid. *r*.
floriceps?	Phillips, t. 3, f. 8	Ibid. *c*.
Cœlopticium agaricoides	Tab. 4, fig. 19	Harford Bridge, near Norwich, *c*.
Ventriculites radiatus	Geol. Suss. t. 10—13	Catton and Harford Bridge
infundibuliformis	Tab. 4, figs. 20 and 21	Ibid. *c*.
Madrepora ———	.. fig. 17	On ananchytes and belemnites, *c*.
Paramoudræ ———	Geol. Trans. iv. t. 24	Thorpe, Whitlingham, Coltishall, *c*.
Gorgonia ———	Tab. 4, fig. 18	Harford Bridge, *r*.
Caryophyllia centralis	Geol. Suss. t. 16, f. 2	Ibid. Trowse, and Coltishall, *c*.

* Mr. Mantell is not certain that this is the same species as that found in the Sussex chalk.

Genus.—Species.	Reference.	Observations, Localities, &c.
RADIARIA.		
Apiocrinites ellipticus	Org Rem. ii. t. 13, f. 75	Bishop's Br. & Trimmingham, *r*.
Pentacrinites ———	.. f. 48—51 & 60	Trimmingham, *r*. Single joints
Asterias semilunatus	.. iii. t. 1, f. 1	Harford Bridge. Fragments
areolatus	König. Icon. f. 100*	Ibid. and Norwich, *r*.
Echinus saxatilis	Org. Rem. iii. t. 3, f. 1	Harford Br. and St. Giles's, *r*.
Konigi	.. 1, f. 10	Sprowston and Trimmingham, *r*.
(spines)	.. 1, f. 5	Norwich, *r*.
Cidaris cretosa	.. 4, f. 3	Ibid. *r*.
(spines)	.. 4, f. 1—3	Clavate, cucumerine & muricated
Galerites vulgaris, *α*	Tab. 5, fig. 2	Harford Bridge and Trowse, *c*.
——— *β*	.. 3	Trimmingham, *c*.
Ananchytes ovata	Oss. Foss. ii. t. 5, f. 7	Harford Bridge, *r*.
hemispherica	Smith, Chalk, f. 10	Norwich, Holt, &c. *c*.
pustulosa	Park. Oryctol. p. 137	Ibid. *r*. Clay, *r*.
Spatangus cordiformis	Tab. 5, fig. 6	Harford Bridge, *r*.
rostratus	.. 7	Ibid. *r*. and near Holt
coranguinum	.. 8	Ibid. *c*.
ANNULATA.		
Serpula plana	.. 9	On spatangi, &c. *r*.
accumulata	.. 10	Ibid. *r*.
vortex	.. 11	On ananchytes
minuta	.. 12	On belemnites, *r*.—Norwich
spirulæa	Sowerby's Gen. No. 22	On spatangi, &c. *r*.
ampullacea	Min. Con. t. 597, f. 1—5	Harford Bridge and St. Giles's, *c*.
obtusa	.. 608, f. 8	Norwich
macropus	.. 597, f. 6	On ananchytes—Norwich
fluctuata	Tab. 5, figs. 15 & 16	On ananchytes, &c.
carinata	.. 13	
striata	.. 14	
pentangulata	.. 17	Trimmingham, *r*.
contracta	.. 19	Norwich
Plexus	Min. Con. t. 598, f. 1	Eaton nr. Norw. & St. Giles's, *c*.
CIRRIPEDA.		
Pollicipes maximus*	Min. Con. t. 606, f. 3	St. Giles's Gates, Norwich, *r*.
sulcatus	.. .. f. 1	Magdalen Chapel, nr. Norwich, *r*.
CONCHIFERA.		
Diceras inequirostratus	Tab. 5, f. 22	Harford Bridge and Trowse, *r*. St. Giles's Gates, *r*.
Modiola elegans?	Min. Con. t. 9, f. 1	Ibid. *u*.
Pinna sulcata	Tab. 5, fig. 23	Ibid. *r*.
Inoceramus Cuvieri	Min. Con. t. 441, f. 1	Trimmingham, *c*.
latus	.. 582, f. 1	Norwich, *r*.

* Detached valves of this genus are found in the chalk around Norwich; but to which species they belong it is impossible to determine.

Genus.—Species.	Reference.	Observations, Localities, &c.
Inoceramus striatus	Min. Con. t. 582, f. 2	Harford Bridge, *u.*
digitatus	.. 604, f. 2	Ibid. *r.*
giganteus *	———	Trowse and Bishop Bridge, *a.*
Dianchora lata	Min. Con. t. 80	Harford Br. & Trimmingham, *r.*
spinosa	Tab. 5, fig. 24	Norwich, *r.*
Plagiostoma Brighto-niense	Geol. Suss. t. 25, f. 15	Harford Bridge, *r.*
spinosum	Min. Con. t. 78	Ibid. *c.*
spinosum, jun.	Tab. 5, fig. 25	Ibid. *u.*
granulosum	.. 26	Ibid. *c.* Oxnead, *c.*
Hoperi	Min. Con. t. 380	Ibid. *c.*
Pecten Beaveri	.. 158	Norwich, *r.*
muricatus	Smith (Gn. Sand) f. 3	Harford Bridge, *r.*
nitidus	Min. Con. t. 394, f. 1	Ibid. *r.*
concentricus	Tab. 5, fig. 27 and 28	Ibid. *c.*
sexcostatus †	.. 29	Ibid. *c.* Bishop's Bridge, *r.*
Gryphæa globosa ‡	Min. Con. t. 392	Norwich, &c. *a.*
Ostrea alæformis §	Tab. 6, fig. 1—3	Norwich, &c. *c.*
inequicostata	.. 4	Harford Bridge, *c.*
concentrica	.. 5	Ibid. *r.*
semiplana	Min. Con. t. 489, f. 3	Ibid. *r.*
canaliculata	.. 135, f. 1	Trimmingham, *a.*
triangularis	Tab. 6, fig. 6 and 7	Harford Bridge, *c.*
Crania Parisiensis **	Min. Con. t. 408	On ananchytes and belemnites, *c.*
striata	Tab. 6, f. 15	Harford Bridge, *r.*
ovalis	.. 16	Ibid.
Terebratula Gervillii ††	.. 14	Norwich, *r.* On flints

* Fragments of a large species of Inoceramus are frequently seen lying in contact, extending for two feet or more, in the horizontal fissures of the chalk: but in consequence of its fibrous structure, and comparative thinness, no specimen has been found perfect. The Author possessed a fragment of a young shell which measured ten inches across. It was exceedingly thin, and from its general appearance, we are led to infer, that the fragments thus observed belonged to a single shell, and have named it I. giganteus

† The Norfolk specimens are identical with those of the green sand of Wiltshire.

‡ The external form of these shells is regulated by the form of the body to which it happens to be attached. If on a flattish surface, it is nearly flat; the base of the attached valve rising at right angles from the part attached. If it has a medial attachment, the shell has the appearance of the back of the last whorl of a Buccinum. And if the point of attachment is very slight, they then appear as the small specimen figured in Tab. 6, fig. 8.

§ These specimens are as varied in their character as Gryphæa globosa.

** The upper valves of this species have never been found; it is presumed that they have shared the same fate as the univalve shells—while that of C. striata has been found in the chalk, and even preserved in flint.

†† This appears to be allied to T. lyra, and may be the young of that species.

Genus.—Species.	Reference.	Observations, Localities, &c.
Terebratula rigida	Min. Con. t. 536, f. 2	Trimmingham, *r.*
striatula	.. 536, f. 4	Magdalen Chapel, nr. Norw. *r.*
Gallina	Tab. 6, fig. 12	Harford Bridge, *c.*
plicatilis	Min. Con. t. 118, f. 1	Norwich and Holt, *a.*
octoplicata	.. .. f. 2	Ibid. ibid. *a.*
pentangulata	Tab. 6, fig. 10	Harford Bridge
obliqua	Min. Con. t. 277, f. 2	Norwich, *r.*
lentiformis	Tab. 6, fig. 11	Ibid. *r.*
subplicata	Geol. Suss. t. 26, f. 5	Ibid. and Holt, *a.*
subundata	Min. Con. t. 15, f. 7	Harford Bridge, *c.*
subrotunda	.. .. 1, 2	Ibid. and Bishop's Bridge, *c*
carnea*	.. .. 5, 6	Trowse, *c.* Trimmingham, *r.*
elongata	.. 435, f. 1, 2	Harford Bridge, *c.*
obesa	.. 438, f. 1	Bishop's Bridge, *r.*
Magas pumila	.. 119	Trimmingham, *c.* Catton, *r.*
truncata	Tab. 6, fig. 9	Ibid. *r.* Norwich, *r.*
Mollusca.		
Patella ———	Tab. 6, fig. 17	Harford Bridge, *u.*
Vermicularia ?———	.. 18	Norwich
Trochus Basteroti ?	.. 19	Harford Bridge, *r.*
Cirrus depressus *a*	Min. Con. t. 428	Ibid. *r.*
striatus	Tab. 6, f. 20	Ibid. *r.*
Cerithium unicarinatum	Tab. 6, fig. 21	Ibid. *r.* Fragments
———	Species undetermined	Ibid. *r.* Impression on Gryphæa globosa
Cassis avellana	Tab. 6, fig. 22	Norwich, *r.*
Belemnites electrinus †	Geol. Trans. 2 ser. ii. t. 8, f. 18	Ibid., &c. *a.*
mucronatus	Min. Con. t. 600, f. 1	Ibid. *a.*
Ammonites catinus	Geol. Suss. t. 22, f. 10	St. Giles's Gates, Norwich, *u.*
Turrilites costatus	Min. Con. t. 36	Harford Bridge, *r.*
Hamites armatus	.. 168	St. Giles's, Norwich, and Harford Bridge, *r.*
ellipticus	Geol. Suss. t. 23, f. 9	Catton, *r.* A fragment
———	Species undetermined	St. Giles'
Baculites Faujasii	Min. Con. t. 592, f. 1	Bishop's Bridge and Catton, *r.*
magnum ‡	———	Trimmingham Beach, *u.*

* Its flesh color, from which the specific name is derived, is common to other species; and is, we believe, accidental.

† The distinction between this species and the following is, that the end of this is obtuse, with a mammillated point; whereas B. mucronatus gradually tapers off to a point.

‡ A section of this was seen by the Author in Trimmingham beach. It was above ten inches long, and exhibited the crenulated divisions, which were of an orange tint.

Genus.—Species.	Reference.	Observations, Localities, &c.
PISCES.		
Diodon ——— *	Geol. Suss. t. 32 f. 18, 20	Harford Bridge, *r.*
Salmo Lewesiensis †	.. 33, 40	Ibid. *c.*
Esox Lewesiensis? ‡	.. 41, f. 1	Ibid.
Squalus cornubicus ‡	.. 32, f. 1	Ibid.
Zygæna ‡	.. .. f. 4, 7, 8	Ibid.
Phillipsii ‡	.. .. f. 22	Ibid.
SAURIA.		
Crocodilus ——— ‡	———————	St. Giles's & Harford Bridge, *r.*

Cervus—Horns of a species of deer, have been found in abundance in the disturbed chalk at Whitlingham, also at Sprowston.

Elephas—The bones and grinders of an elephant were found in the year 1820, in the same chalk at Horstead; and in consequence of the ignorance of the labourers, they were put on board a barge and sent to Newcastle to be ground for manure. The Rev. James Layton had one of the grinders, and the head of one of the femoral bones.

2. *Medial Chalk.* *Swaffham, &c.*

Genus.—Species.	Reference.	Observations, Localities, &c.
POLYPI.		
Flustra utricularis	Konig. Icon. 61	Swaffham, *c.* On ananchytes
Lunulites urceolatus	Tab. 4, fig. 9	Ibid. *u.*
Ventriculites radiatus	Geol. Suss. t. 10—13	Ibid. *c.* Thetford, in flint
Caryophyllia centralis	.. 16, f. 2	Ibid. *c.* ibid. & Saham Toney, *c.*
RADIARIA.		
Asterias semilunatus	Org. Rem. iii. t. 1, f. 1	Ibid. *r.* Fragments
Echinus (spines)	.. .. f. 5	Acicular
Cidaris papillata, *var.*	.. .. f. 11	Ibid. *c.*
cretosa	.. t. 4, f. 3	Ibid. and Litcham, *r.*
(spines) §	———————	Swaffham and Saham, *c.*
Galerites albogalerus	Geol. Suss. t. 17, f. 8	Ibid. *r.*
Ananchytes scutatus	Org. Rem. iii. t. 2, f. 4	Ibid. *c.* Half the size of A. hemispherica
Spatangus cordiformis	Tab. 5, fig. 6	Ibid. and Thetford, *c.* Saham
rostratus	.. 7	Ibid. *r.*
ANNULATA.		
Serpula spirulæa	Sow. Gen. No. 22	Ibid. *r.*
granulata	Min Con. t. 597, f. 7, 8	Ibid. *c.*
ampullacea	.. .. f. 1—5	Ibid. *r.*

* Palates. † Scales. ‡ Teeth.

§ Two kinds, clavate and cucumerine.

Genus.—Species.	Reference.	Observations, Localities, &c.
Serpula obtusa	Min. Con. t. 608, f. 8	Saham, near Watton, *u.*
fluctuata	.. .. f. 5	Swaffham, *r.*
Plexus	.. 598, f. 1	Ibid. and Thetford, *r.*
CIRRIPEDA.		
Pollicipes maximus	.. 605, f. 5	Swaffham, *r.*
CONCHIFERA.		
Inoceramus Cuvieri	Min. Con. t. 441, f. 1	Ibid. and Thetford, *r.*
Bronguiarti	.. .. f. 2	Ibid. and Hilborough, *r.*
cordiformis	.. 440	Ibid. *c.*
involutus	.. 583	Ibid., Lexham, and Litcham, *r.* Saham, *c.*
latus	Geol. Suss. t. 27, f. 10	Ibid. *c.*
striatus	Min. Con. t. 582, f. 2	Ibid. *r.*
Dianchora lata	.. 80	Ibid. and Thetford, *c.* Saham
Plagiostoma spinosum	.. 78	Ibid. *r.* ibid. *c.*
granulosum	Tab. 5, fig. 26	Ibid. *r.*
Hoperi	Min. Con. t. 380	Ibid. *c.*
Pecten nitidus	.. 394, f. 1	Ibid. and Gooderstone, *c.* Saham
Gryphæa globosa	.. 392	Ibid. *r.*
Ostrea alæformis	Tab. 6, fig. 1	Ibid. *c.*
canaliculata	Min. Con. t. 135	Ibid. *r.*
Crania Parisiensis	.. 408	Ibid. *r.*
striata	Tab. 6, f. 15	Ibid. *r.*
Terebratula striatula	Min. Con. t. 536, f. 4	Ibid. *c.*
Mantelliana	.. 537, f. 5	Ibid. *c.*
plicatilis	.. 118, f. 1	Ibid. *r.*
obliqua	.. 277, f. 2	Ibid. *r.*
subplicata	Geol. Suss. t. 26, f. 5	Ibid. *c.* Castleacre
subrotunda	Min. Con. t. 15, f. 1, 2	Ibid. *r.*
semiglobosa	.. .. f. 9	Ibid. and Thetford, *r.*
Magas truncata	Tab. 6, fig. 9	Ibid. *u.*
MOLLUSCA.		
Cirrus perspectivus	Min. Con. t. 428, f. 1, 2	Ibid. *c.*
Turritella multicostata	Rose, MS.	Ibid. *u.*
Cerithium unicarinatum	Tab. 6, fig. 21	Ibid. *u.*
Nautilus elegans	Min. Con. t. 116	Ibid. *r.*
PISCES.		
Diodon (palates)	Sulcated and gibbous	Saham Toney, *r.*
———	Smooth	Swaffham, *u.*
Squalus Zygæna	Geol. Suss. t. 32, f. 4, 7, 8	Ibid. *c.* Thetford, Litcham, and Docking
galeus	.. f. 12 & 14	Ibid. and Saham Toney, *r.*
Phillipsii	.. 22	Ibid, *r.*
mustelus	.. f, 2, 3, 5, &c.	Ibid. and Thetford, *r.*
Zeus Lewesiensis	.. t. 35, 36	Ibid.

3. *Hard Chalk.* — *Marham, &c.*

Genus.—Species.	Reference.	Observations, Localities, &c.
RADIARIA.		
Asterias lunatus*	Tab. 5, fig. 1	Western Norfolk, *u.*
Galerites albogalerus	Geol. Suss. t. 17, f. 8	Narborough and Northwold, *r.*
subrotundus	.. .. f. 15	Ibid. *r.*
Scutella depressa	Tab. 5, fig. 4	Marham, *r.*
hemispherica	.. 5	Ibid. and Gayton, *r.*
Spatangus hemisphericus	Phillips, t. 1, f. 16	Ibid., Narborough, Shouldham, *c.*
planus	.. 15	Hunstanton, *r.*
CRUSTACEA.		
Astacus Norfolciensis †	Rose, MS.	Marham, *r.*
CONCHIFERA.		
Inoceramus Brongniarti	Min. Con. t. 441, f. 2	Narborough, *r.*
Cripsii	Geol. Suss. t. 17, f. 11	Marham, Shouldham, and Hunstanton, *c.*
intermedius	Mag. Nat. Hist. ii. f. 83	Narborough, *c.*
mytiloides	Min. Con. t. 442	Ibid. and Marham, *r.*
Pecten Beaveri	.. 158	Marham and Hunstanton, *r.*
asper	.. 370, f. 1	Hunstanton, *r.*
Gryphæa globosa, jun.	Tab. 6, fig. 8	Marham, *c.*
Terebratula plicatilis	Min. Con. t. 118, f. 1	Ibid. and Gayton, *r.*
rostrata	.. 537, f. 1, 2	Westacre, *r.*
subundata	.. 15, f. 7	Marham, *r.*
subrotunda	.. .. f. 1, 2	Ibid. and Westacre, *c.*
semiglobosa	.. .. f. 9	Ibid. and ibid. *r.*
MOLLUSCA.		
Vermicularia umbonata	.. t. 57, f. 6, 7	Hunstanton, *r.*
Cirrus depressus	.. 428, f. 3	Ibid. *r.*
Nautilus elegans	.. 116	Ibid. *c.*
Ammonites peramplus	.. 357	Marham and Hunstanton, *c.*
Lewesiensis	.. 358	Narborough and Stoke-ferry, *r.*
Mantelli	.. 55	Marham and Shouldham, *c.*
rusticus	.. 177	Hunstanton, *c.*
Turrilites tuberculatus	.. 74	Ibid. *r.*
PISCES.		
Diodon (palates)	Geol. Suss. t. 32, f. 18	Marham, Westacre, Narboro', *r.*
Squalus Zygæna	.. .. f. 4, 7, 8	Ibid. Shouldham, and Gayton, *c.*

* This species has about twenty-five lateral ossiculæ: on the anterior surface, about 120 in each angle—total number about 1450.

† Two hand-claws of this Astacus have been discovered; they differ from A. Sussexiensis, having only a few tubercles and no spines.

Genus.—Species.	Reference.	Observations, Localities, &c.
Squalus mustelus	Geol. Suss. t. 32, f. 2, 3	Marham, *r.* } Teeth and vertebræ
squatina?	Org. Rem. iii. t. 19, f. 9	Ibid. *r.* }
Balistes? ———	Geol. Suss. t. 33, f. 5	Ibid. *r.* The radius
Iulo-eido-coprus *	Geol. Tr. 2 ser. iii. t. 31	Ibid. *r.*
SAURIA ——— †	Geol. Suss. t. 9, f. 6	Hunstanton (jaw, &c.) and Marham (tooth)

4. *Chalk Marle.* — *Hunstanton Cliff, &c.*

POLYPI.		
Spongia paradoxica	Geol. Trans. ii. t. 27, f. 1	Hunstanton, *a.*
Ventriculites radiatus	Geol. Suss. t. 10—13	Ibid. *r.*
RADIARIA.		
Echinus ———	Species undetermined	Hunstanton, *r.* (R. C. Taylor)
Galerites albogalerus	Geol. Suss. t. 17, f. 8	Ibid. *r.*
Spatangus hemisphericus	Phillips, t. 1, f. 16	Ibid. *r.*
ANNULATA.		
Serpula antiquata	Min. Con. t. 598, f. 4	Hunstanton, *r.*
———	Species undetermined	Ibid. *r.* (R. C. Taylor)
CIRRIPEDA.		
Pollicipes maximus	Min. Con. t. 606, f. 3	Shouldham, *u.*
CONCHIFERA.		
Inoceramus Cuvieri	Min. Con. t. 441, f. 1	Hunstanton, *r.*
Cripsii	Geol. Suss. t. 27, f. 11	Ibid. and West Dereham, *a.*
Plicatula pectenoides	Min. Con. t. 409, f. 1	Shouldham, *r.*
inflata	.. .. f. 2	Ibid. *r.*
Terebratula plicatilis	.. 118, f. 1	Hunstanton, *r.*
subundata	.. 15, f. 7	Ibid. *r.*
subrotunda	.. .. f. 1, 2	Shouldham, *r.*
intermedia	.. .. f. 8	Hunstanton, *r.*
ovata	.. .. f. 3	Shouldham, *r.*
biplicata, jun.	.. t. 90	Ibid. *r.*
MOLLUSCA.		
Trochus ———	Species undetermined	Hunstanton, *r.* (R. C. Taylor)
Ammonites peramplus	Min. Con. t. 357	Ibid. *c.*
Mantelli	.. 55	Ibid. *r.*
varians	.. 176	Ibid. *r.*
Hamites raricostatus	Smith, Brick-earth, f. 2	Near Grimston.

* These were formerly considered to be the Iuli, or buds of the larch; they are now determined to be the fossil fæces of a species of Amia.

† The tooth of this Saurian animal differs from those of the crocodile, in being round and destitute of the two lateral ridges.

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ILLUSTRATIONS.

*** *The Fossils here represented are generally of their natural size; those which are reduced have a fraction subjoined, and those magnified have their natural size designated by a line.*

TABLE I.

BRICK-EARTH OF THE NAR.

FIG. 1. Natica pallidula? *Fleming*. Whorls, four; exterior polished.—FIG. 2. Cerithium reticulatum, *Sowerby*. Whorls, ten; longitudinal striæ, four.

DILUVIAL FLINTS.

FIG. 3. Flustra quadrata? *Desmarest*; also in Chalk.—FIG. 4. F. foliacea? *auctor*. There are two fronds, one behind the other, in this specimen.—FIG. 5. Spatangus excentricus. *Rose*. Cylindrical; groove in front deep.—FIG. 6, resembles a valve of Anatifera.—FIG. 7. Impression of a single valve, probably belonging to a species in the family Ostracea.—FIG. 8. Erycina complanata, *nobis*. A delicate and finely-striated shell.—FIG. 9. Modiola elegans? *Sowerby*.—FIG. 10, belongs apparently to the genus Lima; finely striated longitudinally.—FIG. 11, resembles Gryphæa minuta. *Sowerby*.—FIG. 12. Casts of a pair of bivalves similar to Cyclades.—FIG. 13. Cirrus. This specimen is the section of a silicified chalk cast, which has retained its color, notwithstanding its having been invested in flint; not the slightest trace of the original shell is perceptible.

DILUVIAL CLAY.

FIG. 14. Mya literata, β. *Rose*. Probably a young specimen only.—FIG. 15. Cast of Venus, in green sand.—FIG. 16. Doubtful; perhaps Venus.—FIG. 17. Arca ——— Hinge on the anterior side with five parallel teeth; the posterior with one lateral.—FIG. 18. Lima elegans. *Rose*. Ribs, sixteen; wings, with four or five teeth each.—FIG. 19. Pholas crispata; *auctor*. Imbedded in a pyritous cast of the cavity formed by the animal in the rock.—FIG. 20. Euomphalus costatus; *nobis*.—FIG. 21. Ammonites maculatus. *Williamson* (Scarborough). Whorls, five; keel rounded.

TABLE II.

FIG. 1. Fragment of the Radius of Balistes. *(Diluvial Clay.)*

CRAG.

FIG. 2. Specimen of the perforated chalk of Postwick.—FIG. 3. Balanus balanoides; *auctor.*; and FIG. 4, a variety of the same.—FIG. 5. Mya subovata; *nobis.* Anterior side very much reflected.—FIG. 6. M. subtruncata; *nobis.* Anterior side slightly gaping.—FIG. 7. Mactra Listeri? shell very thin.—FIG. 8. M. magna; *nobis.*—FIG. 9. M. triangularis; *nobis.*—FIG. 10. M. cuneata. *Sowerby.*—FIG. 11. Tellina ovalis; *nobis.*—FIG. 12. T. prætenuis. *Leathes.* Very thin.—FIG. 13. T. solidula. *Linnæus.*—FIG. 14. Astarte plana. *Sowerby.*—FIG. 15. A. ovalis; *nobis.*—FIG. 16. A. antiquata. *Leathes.*—FIG. 17. A. angulata; *nobis.*—FIG. 18. Cardium Parkinsoni, β. Found in fragments only, in the upper part of the pit at Thorpe.—FIG. 19. C. obliquum; *nobis.* Ribs, twenty-one.—FIG. 20. Mytilus antiquorum. *Sowerby.* Flattish, and expanded at the base.

TABLE III.

FIG. 1. Patella parvula; *nobis.* Extremely thin; striæ fine.—FIG. 2. Infundibulum Clypeum; *nobis.* Depressed; resembling a buckler.—FIG. 3. Bulla minuta; *nobis.*—FIG. 4. Paludina obsoleta; *nobis.* Volutions, four; nearly obsolete.—FIGS. 5 and 6. P. media; *nobis.* Smooth and glossy.—FIG. 7. P. rotundata; *nobis.* Volutions well defined.—FIG. 8. Sigaretus similis; *nobis.* An elegantly-formed minute shell.—FIG. 9. Delphinula carinata; *nobis.*—FIG. 10. Trochus nitens; *nobis.* Extremely glossy.—FIG. 11. Turbo carinatus; *nobis.* Middle of the whorl strongly carinated.—FIG. 12. T. ventricosus; *nobis.*—FIG. 13. T. bicarinatus; *nobis.*—FIGS. 14 and 15. T. sulcatus; *nobis.*—FIGS. 16 to 18. T. elongatus; *nobis.* Longitudinally striated.—FIG. 19. T. semicostatus; *auctor.* Transversely ribbed.—FIG. 20. T. minutus; *nobis.* Smooth and shining.—FIG. 21. Murex bulbiformis. *Leathes.*—FIG. 22. M. elongatus; *nobis.* Aperture about one-third the length of the shell.—FIG. 23. M. angulatus; *nobis.*—FIG. 24. Variety of the same.—FIG. 25. M. lapilliformis. *Leathes.* A very solid shell; the specimens are generally one-third less than the one figured.—FIG. 26. M. compressus; *nobis.*—FIG. 27. M. pullus. *Leathes.* So named from its curiously-formed apex.—FIG. 28. M. punctatus; *nobis.* With transverse punctured grooves.—FIG. 29. Cerithium punctatum; *nobis.* Turritella brevis. *Sowerby.*—FIG. 30. Lymnæa tenuis; *nobis.* Resembles the recent Limneus palustris of *Turton;* but is much thinner.—FIG. 31, resembles the bone connected with the pectoral fin in fish; two kinds are found, one belonging to the right, the other to the left side of the animal.—FIG. 32. A singularly-formed bone, which has been considered by an able geologist to belong to the ear of some large fish. The side pieces when detached are of frequent occurrence; as is also the centre piece, a larger specimen of which is shown at Fig. 33. They are of a dark-brown color, frequently with a highly-polished surface.—FIGS. 34 to 38. The vertebræ of a fish, probably the Thornback, Raia clavata.—FIG. 39. Bony tubercle of the Thornback.—FIG. 40. One of the pincers of the common Crab, Cancer pagurus.—FIG. 41. Impression of Ammonites communis; in highly indurated and ferruginous clay.

TABLE IV.

CHALK.

FIG. 1. Confervites fasciculata? *Brongniart.*—FIG. 2. Discopora mammillata; *nobis.*—FIG. 3. D. radiata; *nobis.*—FIG. 4. Flustra tessellata. *Desmarest.*—FIG. 5. F. tubulosa, with elevated tubes.—FIG. 6. F. reteformis; *nobis.* The lace coral of *Parkinson.*—FIG. 7. F. utricularis; *auctor.*—FIG. 8. Lunulites radiatus. *Lamarck.* In the concavity the cells are seen radiating from the centre; they terminate on the outside, giving it a porous appearance.—FIG. 9. L. urceolatus. *Lamarck.* Slightly concave, exhibiting lines of growth; the convex side porous.—FIGS. 10 to 12. Millepora globularis. *Phillips.*—FIG. 13. M. polymorpha? *nobis.* Surface covered with minute pores.—FIG. 14. M. truncata, with details. (*a*) View of the truncated extremity. (*b*) Lateral view of a cell. (*c*) Front view of three cells.—FIG. 15. M. gracilis. Cells disposed spirally, and as figured in detail.—FIG. 16. Alecto ———— FIG. 17. Madrepora?—FIG. 18. Gorgonia?—FIG. 19. Cocloptychium agaricoides. *Goldfus.*—FIG. 20. Probably a young specimen of Fig. 21, Ventriculites infundibuliformis; *nobis.*

TABLE V.

FIG. 1. Asterias lunatus; *nobis.* Lateral ossiculæ, about twenty-five on each side.—FIG. 2. Galerites vulgaris. α. *auctor.*—FIG. 3. G. vulgaris. β. *nobis.*—FIG. 4. Scutella depressa. *Rose.*—FIG. 5. S. hemispherica. *Rose.*—FIG. 6. Spatangus cordiformis; *auctor.*—FIG. 7. S. rostratus. *Mantell.*—FIG. 8. S. coranguinum; *auctor.*—FIG. 9. Serpula plana. *Sowerby.* Numerous on Spatangi.—FIG. 10. S. accumulata; *nobis.*—FIG. 11. S. vortex; *nobis.*—FIG. 12. S. minuta; *nobis.* Highly magnified.—FIG. 13. S. carinata; *nobis.*—FIG. 14. S. striata; *nobis.*—FIGS. 15 and 16. S. fluctuata. *Sowerby.*—FIG. 17. S. pentangulata; *nobis.* Detached, having five sides.—FIG. 18. The elongated base of S. macropus, exhibiting a hexagonal aperture.—FIG. 19. S. contracta; *nobis.* So named from its contracted aperture.—FIG. 20. This singular fossil belongs, or is closely allied, to the genus Radiolata; it is nearly flat; both sides are similar; and its interior is composed of concentric tubes.—FIG. 21. Interior of a nearly flat bivalve, composed of hexagonal pieces, (see enlarged figure); the sutures

ILLUSTRATIONS.

are of a fine orange tint.—Fig. 22. Diceras inequirostratus. *Leathes.* Cast only; shell extremely thin and striated.—Fig. 23. Pinna sulcata; *nobis.* —Fig. 24. Dianchora spinosa; *nobis.*—Fig. 25. Plagiostoma spinosum, junr. *nobis.*—Fig. 26. P. granulosum; *nobis.*, and section of the ribs.—Fig. 27. Pecten concentricus; *nobis.* Upper and under valves.—Fig. 28. Young specimen of the same.—Fig. 29. P. sexcostatus; *nobis.*

TABLE VI.

Figs. 1, 2, 3. Ostrea alæformis; *nobis.* Exhibiting this species under different appearances.—Fig. 4. O. inequicostata; *nobis.* Attached to the stem of Apiocrinites ellipticus.—Fig. 5. O. concentrica; *nobis.* A cast adhering to a Zoophyte.—Fig. 6. O. triangularis; *nobis.*—Fig. 7. Exterior of another specimen adhering to a Plagiostoma.—Fig. 8. Gryphæa globosa, junr. *Rose.*—Fig. 9. Magas truncata. *Rose.*—Fig. 10. Terebratula pentangulata. *Phillips.*—Fig. 11. T. lentiformis; *nobis.*—Fig. 12. T. gallina. *Brongniart.*—Fig. 13. T. triplicata; *nobis.* A fragment only, having three principal ribs on the under shell.—Fig. 14. T. Gervillii. *Stokes.*—Fig. 15. Crania striata. *Rose.* Principal striæ, about fifteen, with intermediate ones; interior strongly marked.—Fig. 16. C. ovalis; *nobis.*—Fig. 17. Patella? The shell is exceedingly thin; a considerable part of its posterior side is removed.—Fig. 18. Vermicularia; imbedded in flint.—Fig. 19. Trochus Basteroti? *Brongniart.* Impression.—Fig. 20. Cirrus striatus; *nobis.* Cast; the impression deeply striated.—Fig. 21. Cerithium unicarinatum; *nobis.*—Fig. 22. Cassis avellana. *Brongniart.* Cast.—Fig. 23. Ammonites alternatus; *nobis.*—Fig. 24. This minute fossil is in the hollow of one of the imperfectly formed flints of the Trimmingham chalk cliff. It most probably belongs to the genus Orthocera.

Several new species were forwarded by Mr. Rose for insertion; but the arrangement of the figures having been completed, they could not be introduced.

FINIS.

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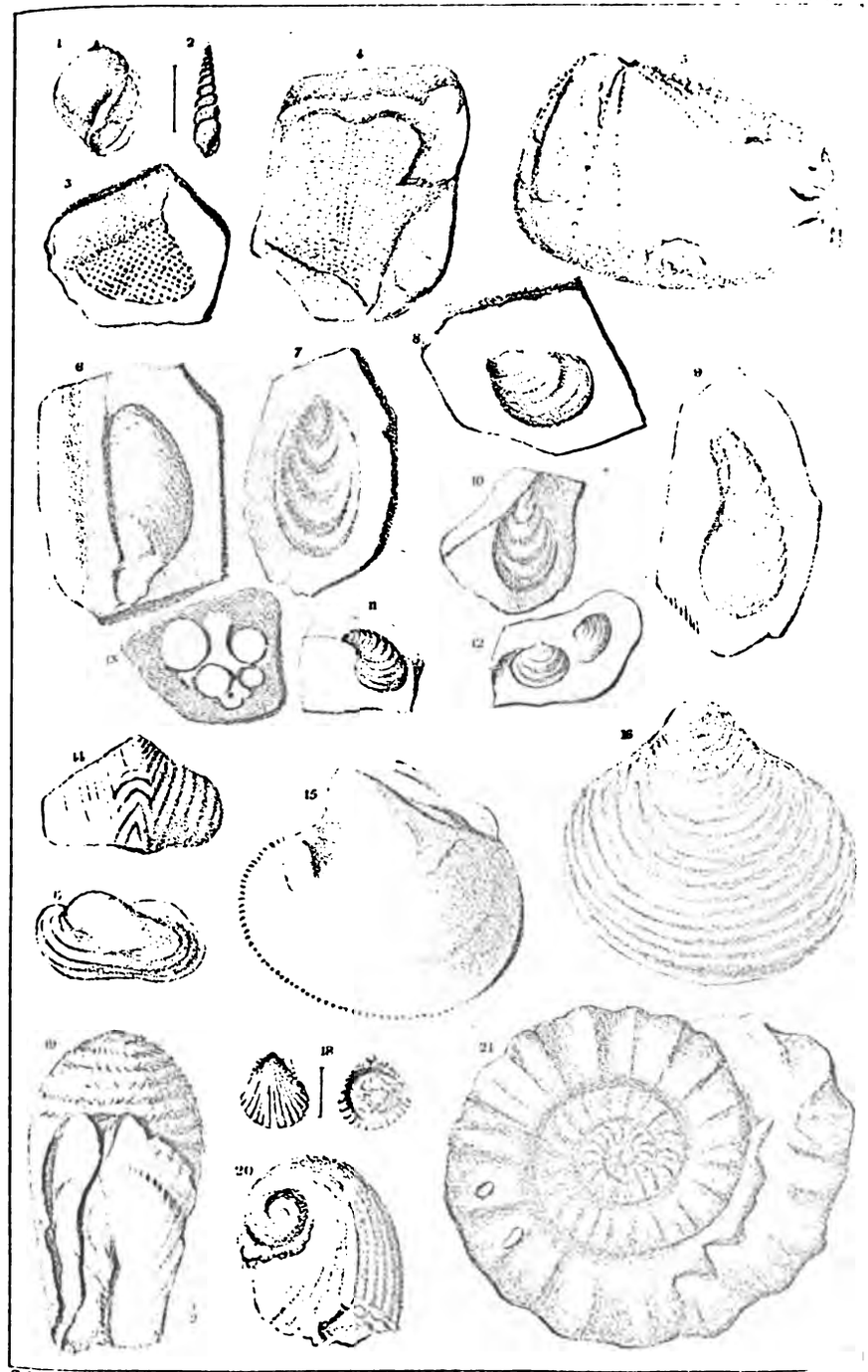

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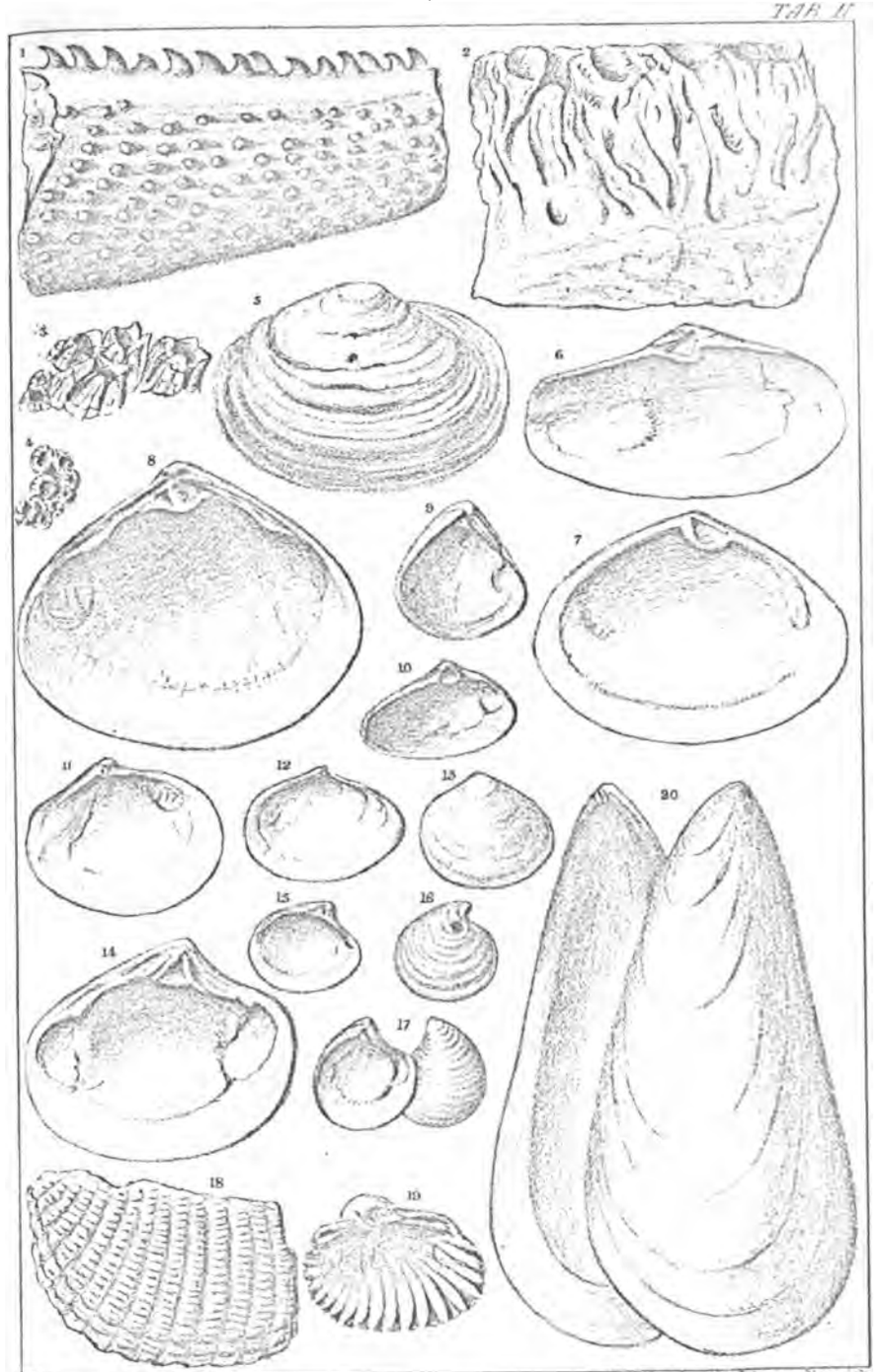

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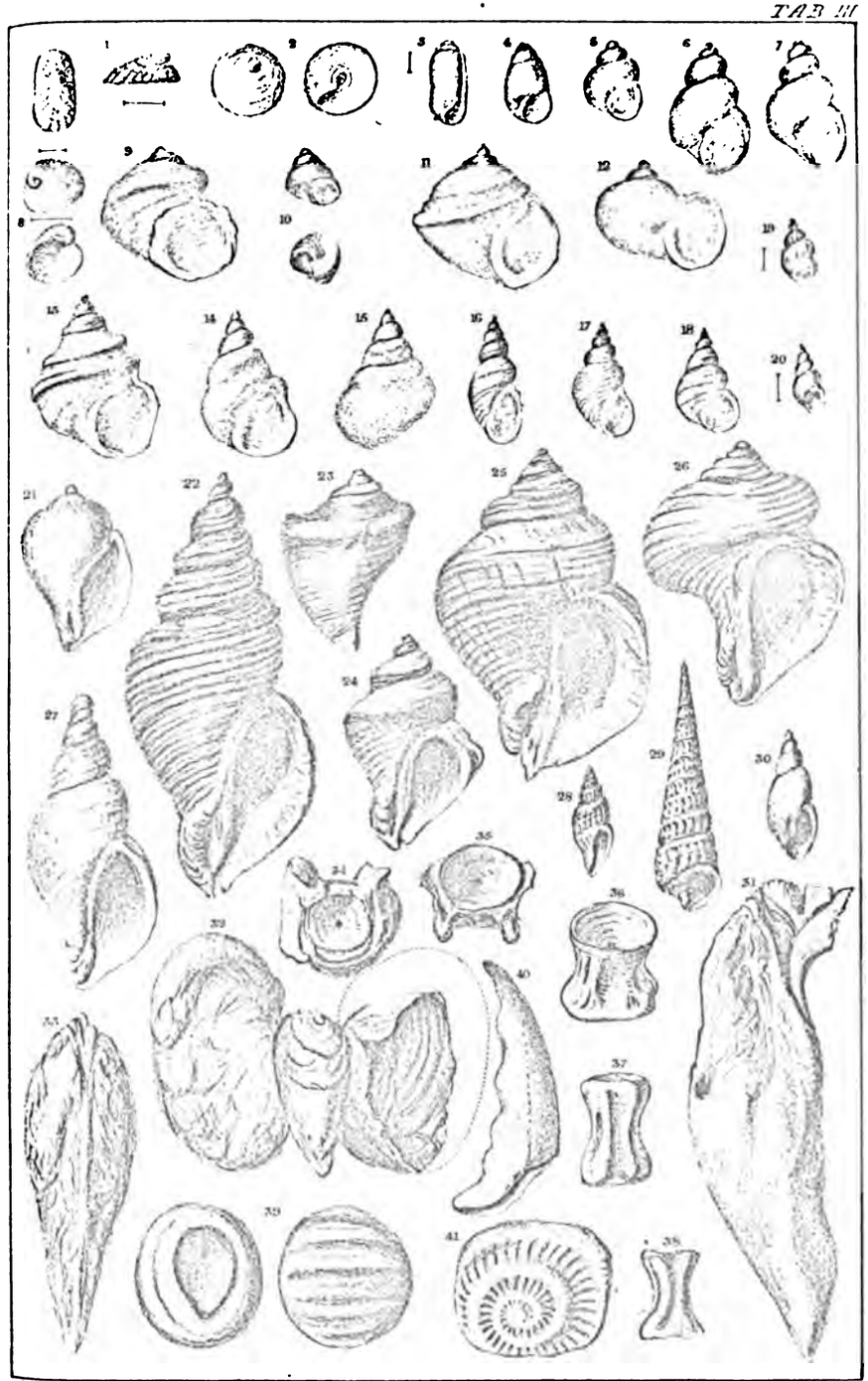
CRAG.

TAB III



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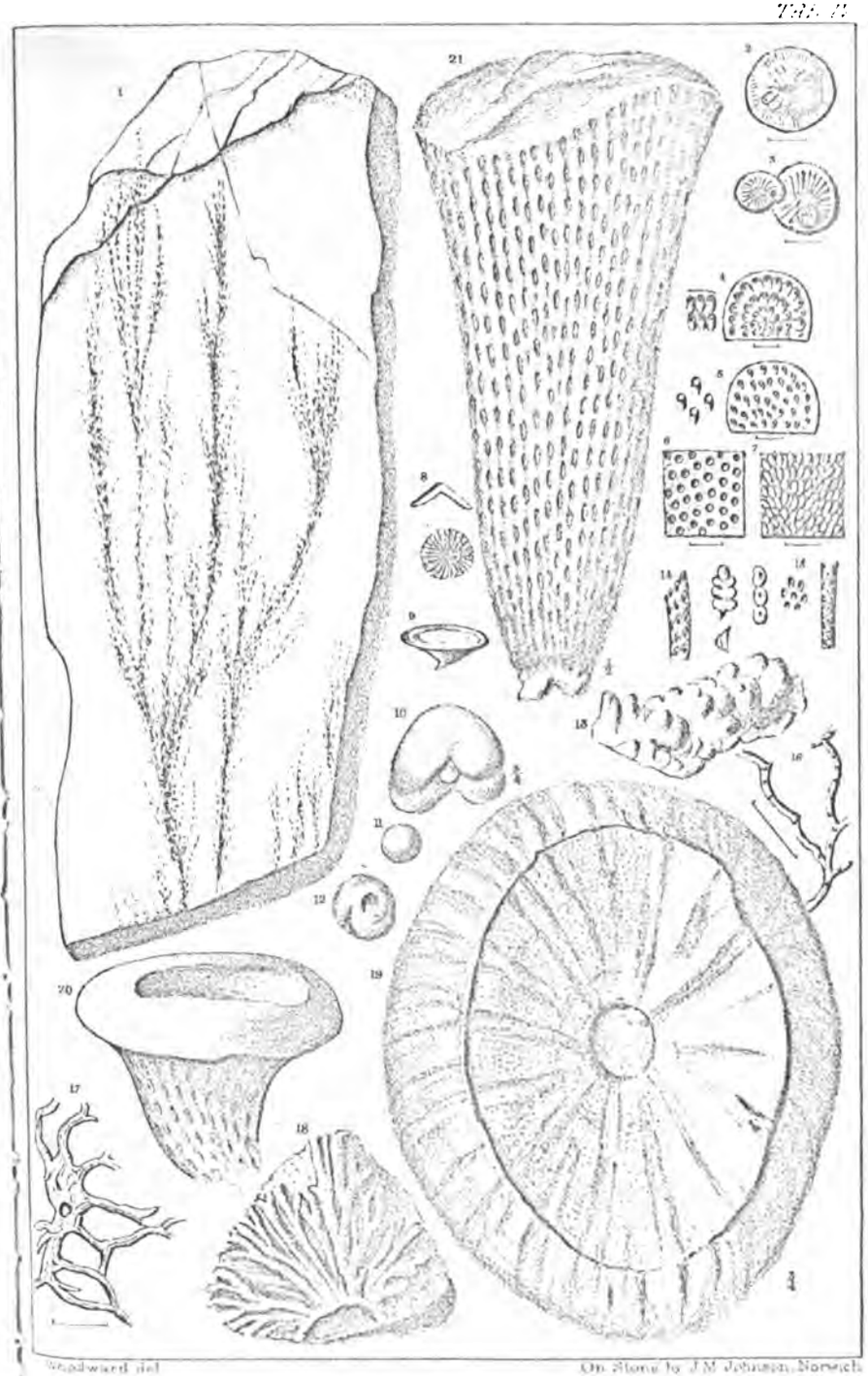

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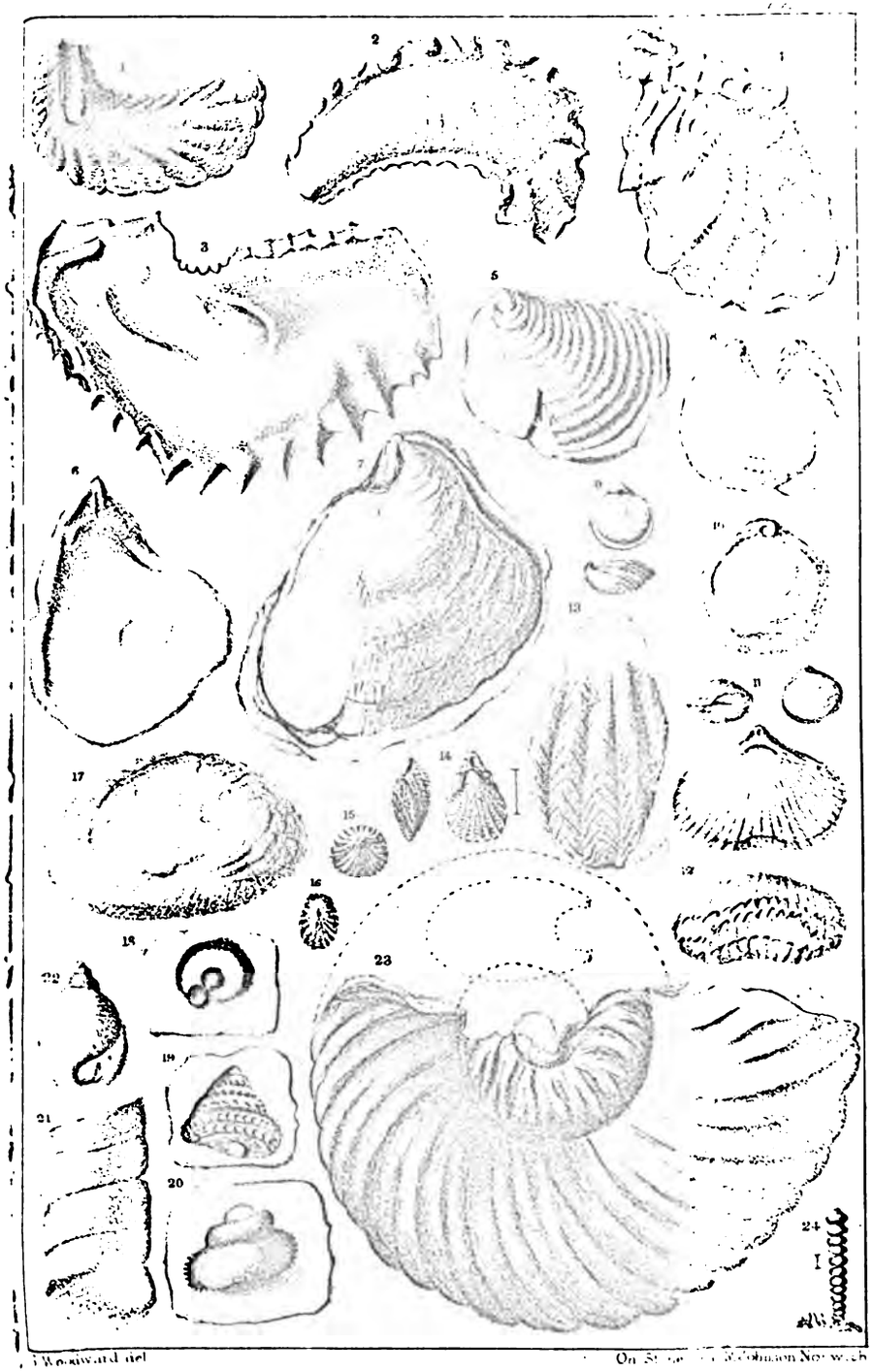

CRAGG.