XVIII.—*On the Crag-strata at Bramerton, near Norwich.*

By RICHARD TAYLOR, Esq. of Norwich.

[Read June 20th, 1823.]

IT is well known that an extensive district, commencing near Harwich and occupying nearly all the eastern coast of Suffolk, contains a substratum, several feet in thickness, of the crag-pit shells, which are used in many parts of that district for agricultural purposes. Many of them approach in their specific characters to those shells which are discovered upon our shores; while they are associated with others whose species have ceased to exist. Together with the shells are buried the remains of unknown animals. The Suffolk crag, particularly that in the vicinity of Ipswich, has furnished an extraordinary abundance of fossils to collectors, far exceeding in number those which we are able to present from Bramerton.

From Lowestoft to Bramerton, the crag shells are concealed beneath deposits of alluvial gravel, sand, and clay, of considerable but irregular thickness. To the east of Bramerton they have not, I believe, been recognised; to the west they may be observed at Whitlingham, immediately in contact with the chalk; they may also be traced forming thin beds above the chalk on the opposite side of the Yare at Thorpe, and are not unfrequently met with, several feet below the surface, on sinking wells in the city of Norwich. To the west of Norwich I have not hitherto discovered them, but to the north they may occasionally be observed at a few intermediate points between that city and Cromer. The valley of Wroxham, like that of Norwich, is sufficiently deep to intersect the crag, and to expose the chalk-strata, which here have attained a considerable elevation, and rise through the alluvial beds to a level with the surrounding country. At Cromer the crag passes into the sea immediately to the west of the jetty, and huge agglomerated beds of it may be observed scattered upon the beach at low-water mark. From these masses the best specimens of shells may be collected. They consist chiefly of a small *Mactra*, probably *Mactra arcuata*, and of *Turbo littoreus*, mixed with fragments of *Mya lata*, of *Cardia*, and of *Balani*. The crag shells are continued along the cliff about a quarter of a mile. Their position may readily be distinguished by the continual tendency of the sand, in which they are imbedded, to slip down, and to form heaps at the base of the cliff. The shells, in this as in

most other cases, bear but a small proportion to the sand ; they appear chiefly in small fragments, few, if any, perfect specimens being obtainable.

No place along the course of the stratum that we have here traced, is so favourable to its examination as Bramerton, nor is there any, where its organic remains are so abundant or so well preserved ; and accordingly its outcrop at this place has supplied several naturalists, and in particular Mr. William Smith and the late Mr. Sowerby, with excellent specimens of its fossils. There are some species however, particularly those belonging to the genus *Mytilus*, which, however perfect in form and colour, are too brittle to be taken out entire.

The accompanying sketch represents a section of the crag-strata, as they actually appear at Bramerton, on the southern bank of the river Yare, resting on the upper chalk. This is the deepest section in the county of the more elevated strata. The annexed table contains the thickness of each stratum, and a catalogue of the fossils is subjoined, both of such as I have observed myself and as have been obtained by Mr. W. Smith and Mr. Sowerby. Numerous as are the species, it is probable that many have escaped my observation ; and others have been purposely omitted, from my imperfect acquaintance with their names and specific characters.

TABLE.

Stratum. Thickness.

	Feet.	
1	5	Sand without organic remains.
2	1	Gravel.
3	4	Loamy earth.
4	1½	{ Red, ferruginous sand, containing, occasionally, hollow ochreous nodules.
5	1½	Coarse white sand, with a vast number of <i>Crag-shells</i> .
6	1½	Gravel, with fragments of shells.
7	15	{ Brown sand, in which is a seam of minute fragments of shells, 6 inches thick.
8	3½	{ Coarse white sand with <i>Crag-shells</i> , similar to stratum 5. The <i>Tellinæ</i> and <i>Murices</i> are the most abundant.
9	15	Red sand, without organic remains.
10	1	Loamy earth, with large stones and <i>Crag-shells</i> .
11	1	{ Large irregular black flints, crowded together <i>in situ</i> , in the chalk. Adhering to these flints are echini, terebratulæ, inocerami, and belemnites.
12	15	Chalk, excavated to the level of the river adjacent.

the Crag-strata at Bramerton, near Norwich.

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Genus.	Species.	Variety.	Number of Plate in Sowerby's Mi- neral Conchol?.	Number of the Stratum in which the shell is found.	Observations.
<i>Emarginula</i>	<i>reticulata</i>		33	8	
<i>Turbo</i>	<i>littoreus</i>	4 varieties	71	8	Abundant in stratum 8.
<i>Scalaria</i>	<i>similis</i>		16	5,8	
<i>Trochus</i>	<i>similis</i> ?		181	8	
	<i>concavus</i> ?		181	8	
<i>Turritella</i>	<i>conoidea</i>		51	8	
	<i>trilineata</i> (Smith)			8	
<i>Murex</i>	<i>striatus</i>		22	5,8	Abundant in stratum 5.
		<i>carinatus</i>	109	5,8	Sometimes with <i>Balani</i> attached.
	<i>latus</i>		35	8	
<i>Cerythium</i>	?			8	
<i>Mya</i>	<i>lata</i>		81	5,8,10	{ Mutilated specimens abundant in stratum 5.
<i>Tellina</i>	<i>ovata</i>		161	5,8,10	
	<i>obtusa</i>		179	5,8,10	
	<i>obliqua</i>		161	5,8,10	
	<i>bimaculata</i> (Smith)			8	
<i>Mactra</i>	<i>arcuata</i>		160	8	
	<i>cuneata</i>		160	8	
	<i>dubia</i>		160	8	
	<i>ovalis</i>		160	8	
<i>Cardium</i>	<i>Parkinsoni</i>		49	5,8,10	{ very fragile in stratum 5.
	<i>angustatum</i>		283	5,8,10	
	<i>Edulina</i>			5,8,10	
<i>Mytilus</i>	<i>edulis</i>			8,10	
	<i>antiquorum</i>		275	8,10	
<i>Modiola</i>	<i>pallida</i>		8	8	
<i>Pectens</i>	?			8,10	{ nearly an inch wide, with 20—25 rays.
<i>Cyclas</i>	<i>cuneiformis</i>		192	8	
<i>Astarte</i>	<i>plana</i>	3 varieties (Smith)	179	8	
<i>Venus</i>	<i>lentiformis</i>		203	8	
	<i>equalis</i>		21	8,10	
<i>Nucula</i>	<i>Cobboldiæ</i>		180	8	{ more common in stratum 5 than in stratum 8, both single and grouped.
<i>Balanus</i>	<i>tessellatus</i>			5,8	
.....	<i>crassus</i>		84	5,8	
Fragments of lobsters and crabs				8	
Palates and vertebræ of fishes				5,8	
Fragments of bone				5	
Horns, vertebræ and teeth of large her- } bivorous animals }				8	
Fragments of wood				5,8	
Fragments of coal				5,8

Level of the River Yare

SECTION of the CRAG STRATA at BRAMERTON near NORWICH.

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