BULLETIN No. 1

Contents

BULLETIN No. 1

GEOGRAPHIC AND GEOLOGICAL NOTES ON THE IPSWICH DISTRICT

By H. E. P. Spencer, F.G.S.

East Suffolk has beds of sand and clay deposited during the closing chapters of the series of geological epochs. In the region there are probably the greatest number of formations to be found in any such limited area.

Basically everything rests on the Cretaceous chalk laid down over 70 million years ago. Locally there are at least 250' missing of the upper chalk which is represented on the Norfolk shore at Trimingham by the Ostrea lunata zone. In the Gipping Valley the chalk outcrops between Claydon and Needham Market where it is singularly free from flint and about 98% calcium carbonate. Fossils are not abundant. Chalk gave rise to a number of industries most of which are discontinued – namely lime burning, whiting manufacture (the basis of distemper and whitewash). New industries are chalk for agricultural purposes and the manufacture of Portland Cement. The latter was only possible because of the adjacent masses of boulder clay – a product of the "Ice Ages".

Resting on the chalk are a series of Eocene deposits, which from the base upward are the Thanet Bed with its Basement Bed of curiously shaped flints, and the "Bull Head Bed". Next are the Reading sands and clays which like the Thanet are exposed only in temporary sections. Small remnants of Oldhaven Sands with pebbles etc. occur at Hoghighland and Bobbitshole. The uppermost part of the Eocene series is the London Clay which in some places has been completely destroyed. One of these is the Belstead Brook Valley near Gusford Hall where the early Pleistocene Red Crag rests on Reading Beds; another is Bramford Chalk Pit.

The Pliocene Coralline Crag is next in the series and exists only as remnants of which the smallest (seldom seen) is at Tattingstone; another, and perhaps the best documented, is in the Ramsholt-Sutton area. The largest extends northward from the Butley River to Thorpeness and is exposed in the Aldeburgh Brickyard and on the Aldeburgh-Leiston Road. At the base of the Coralline Crag is a stony basement from which teeth and antler fragments of Pliocene terrestrial mammals have been obtained. The most interesting of these are of Mastodons considered as ancestors of the elephants) and an axis type of deer, Axis pardenensis (C.& J.). The presence of these animals remains represents earlier Pliocene formation of a continental phase of the epoch which was destroyed by the inundation of the Pliocene sea in which the oldest of the Suffolk Crags was deposited. Traces of this vanished era have been found at Dove Holes in the Pennine region.

In addition to evidence of a former Pliocene stage the Basement Bed contains also rolled pebbles and cobbles of brown sandstone. Of these about 20% contain fossil mollusc and, rarely, teeth of the extinct giant shark Carcharodon megalodon. If teeth are an indication of size proportionate to modern sharks this monster may have been about 70' long. These remains prove the former existence in eastern Britain of vanished Miocene strata which, like the early Pliocene continent, was destroyed by the Coralline Crag sea – and perhaps partly by ice. Teeth of the Mastodon angustidens etc. imply an earlier terrestrial stage.

Following the Coralline Crag epoch the established cycle of events seems to have been repeated as is shown by the curious mixture of erratic rocks and fossils assembled in the Basement Bed of the Early Pleistocene Red Crag. This Basement Bed is much better known than that of the earlier Crag because it was exploited for the phosphatic nodules ("coprolites") during the last century. This gave rise to the artificial fertiliser industry, now represented by Fisons Ltd.

In the Red Crag Basement Bed fossils from most of the earlier formations have been found as far back in time as the Jurassic (140-170 million years) and the Cretaceous (70-140 million years). There are

also teeth of Hyracotherium (the ancestor of the horse in the eastern hemisphere), with Coryphodon and Lophiodon, Eocene representatives of the early Age of Mammals. Boxstones occur which were derived from the Coralline Crag Basement Bed together with Miocene Carcharodon teeth, Mastodon and other Pliocene fossils and, most important, Pleistocene mammals of the elephant and horse family, the presence of which proves that the bed really belongs not to the Pliocene (as was generally believed) but to the Pleistocene. This evidence was consistently overlooked, ignored or explained away until the Plio-Pleistocene boundary revision during the International Geological Congress in London, 1948. Cretaceous and Jurassic rocks in this mixture cannot have been transported to Suffolk except by ice and these together with striated stones suggest a pre-Red Crag Glaciation which may perhaps represent the Gunz of the Alpine sequence, or the earlier Donau. The latter is the last of some half dozen earlier glacial phases identified in southern Europe.

It is evident from observation that the incursion of the Red Crag Sea completed the destruction of an earlier Pleistocene landscape and such earlier deposits as had survived the pre-Red Crag ice. The quantity of derived Coralline Crag debris of polyzoan fragments proves the destruction of a large part of that formation in the Ipswich area and implies the Pliocene Crag was one widespread deposit.

The earliest Red Crag recognised is at Walton on Naze where the presence of large numbers of the “Left-handed Whelk”, Neptunia contraria, which at present lives mainly in a Mediterranean climate, implies a warmer climate than we have now. This crag has been divided into arbitrary zones based on percentages of living and extinct species of marine molluscan fossils which are so abundant in this formation, but at no time did the vertebrate fossils receive any serious attention until recent years. At Walton the Neptunea shells are average size but in the Newbournian zone some giants of the species existed suggesting an even more favourable climate. In the Butleyan zone not only do the shells deteriorate so far as size in concerned, but species occur which prove the climate was cooler.

A widely held theory is that during a glaciations (“Ice Age”) large quantities of water are locked in the ice and consequently the lea level is lowered. Under these conditions the oldest part of the Red Crag is undetected since the lowest Crag is unknown. The base of the crag on London Clay is between 40-50' O.D. at Walton; at Wix it is at 100' at Battisford there is a pebbly Crag beach at about 150', the highest level known in Suffolk. This unpublished data suggests the Red Crag is an interglacial deposit. It also reflects the geographical changes of the area more clearly than do the earlier formations with their fragmentary data.

The Red Crag is the southernmost of the Pleistocene Crag Series which includes the Red, Norwich and Weybourne Crags. It has been proved that the Norwich Crag at Southwold extends downward to -170' (below present sea level) and has a total thickness of about 300'. There is a possibility that the lower strata may perhaps be the missing lower portions of the Red Crag. Published maps show the outcrop of the Crag extending from Sudbury to Bramford and northward to Norwich and Weybourne. This is far from representing the limits of the Crag Sea as to the west and north of this line at least 100' of Crag sands have been revealed by numerous well bores.

The terrestrial indigenous mammals of the Pleistocene Crag period include the earliest British elephant Archdiskodon meridionalis, Equus robustus, sundry deer, Megaceros verticornis, M. savini, Euctenoceros sedgwicki, E. falconeri, E. Tetraceros and Dama nesti nesti. The early elk, Libralces gallicus is first recorded from Norwich Crag and the fauna is now known to be ancestral to the better known fauna of the Cromer Forest Bed series.

The Chillesford sands and clays rest on the Red Crag in the Butley and Orford area, but the laminated clays at Aldeburgh and Easton Bavents have been proved to belong to the Norwich Crag series of sands and clays by means of the fossil pollens.

Following the Crag and Cromerian series are the series of glacial and interglacial beds with the latter generally regarded as the first interglacial; most of the mammals of that epoch are extinct. The earliest TILL (deposit laid down in situ by ice) is the Cromer Till. (Till is equivalent to the term Boulder Clay; all tills do not contain boulders, but many do.) This till does not extend south into Suffolk, but the Norwich Brickearth, which is considered to be equivalent, occurs as far south as Covehithe cliff and at Easton Bavents and Holton overlies the Norwich Crag. The brown colour and included derived shells of the Norwich Brickearth seem due to the inclusion of much material from the Norwich Crag over which the ice progressed. (It must be stated that the Norwich Crag, with its beds of sand, gravel and clay, bears little resemblance to the Red Crag which is generally redder – due to hydroxide compounds of iron – and where not decalcified, its abundance of shells.)

Overlying the Cromer and Norwich Tills is the Corton sands, a very controversial deposit, which in all probability represents an interval (interstadial) between the first and second advances of "Mindel" ice. The second advance is responsible for depositing the Lowestoft (Kimmeridgian) Till which blankets northern Suffolk and occurs patchily in this area. This ice brought rocks from West of the Pennines and the Midland plain, and fossils of Jurassic marine reptiles, Ichthyosaurs, Plesiosaurs and Pliosaurs, occur in it. It extended southward to the Thames valley.

This glaciation was followed by a temperate period when the 'straight' tusked elephant, Hesperoloxodon antiquus, was the sole pachyderm in Britain. Prehistoric man hunted in the Hoxne and Ipswich areas and his Acheulian "Hand Axes" have been found sporadically over much of the region. The interval is known as the Great Interglacial when the Thames flowed N.E. over Essex past Clacton and Walton and our east coast rivers were tributaries. At the end of this interval there was a great deal of denudation which, as had happened so frequently in earlier ages, resulted in the destruction of most of the deposits of the era. Geographic change is marked at Hoxne where ancient lakebeds (or what remains thereof) lie on the plateau and new valleys have been excavated by streams on each side. Similarly at Foxhall Road, Ipswich, remains of a lake, or perhaps an old riverbed, occur on the plateau, high above the Orwell Valley. High level gravels and brickearth in N.E. Essex imply similar geographic changes.

Again ice spread from the north bringing rocks from lowland Scotland, the Cheviots, Yorkshire and Lincolnshire into Suffolk; this also extended into Essex. This is now known as the Gipping glaciations which produced the upper Chalky Till (Riss).

Another interglacial followed and temperate terrestrial formations and their fossils testify to climatic change from cool to warm and back to cool. Mammaliferous beds occur at Brundon, and the Stutton Brickearth, Bobbitshole Lake Beds and Stoke Hill loams have all yielded fossils proving abundant animal life. Notable among these was the S. European Pond Tortoise, Emys orbicularis, which can only breed in a climate as warm as Southern France. This with Corbicula fluminalis, a mollusc not now found nearer than the River Nile, show the climate was warm during the middle of the interglacial. During the middle period the Mammoth, Rhinoceros, Horse, Red Deer, Bos and Bison, Bear, Lion, Wolf and Fox all lived here. Toward the end of this warm interval the Red Deer was replaced by the Reindeer and the Woolly Rhino appeared. Hyaenas seemed to have favoured a diet of Woolly Rhino as more gnawed bones of the animal have been found than any other beast.

Lastly another cold period, when no actual ice sheet reached the area, finally modified the landscape leaving the flat plateau and clogging the valleys with a gravelly till.

In post glacial times only marsh and fen deposits have been formed and limited areas of sand dune which have been largely destroyed by man.

Coast Erosion - the following quote is from the British Association Report of 1895 (Ipswich meeting), they in turn having quoted it from 'An Historical Account of Dunwich, anciently a City, now a borough; Blithburgh, formerly a Town of note, now a Village; Southwold, once a village, now a Town-corporate; with Remarks on some Places contiguous thereto.' By Thomas Gardner: London, 1754. – It is hoped that it will be of interest. - R. M.

An Account of Dunwich in 1589 by Radulph Agas

'The Toune of Dunwich, a Coaste Toune, neare the Midle of the Sheire, is scituate upon a Cliffe fortie Foot hie, or there about; bounded on the Easte with the Otian Sea; on the Weaste with the Toune of Westleton, and is girt on the Weaste and South, neare to the bodie of the Toune, with an Auntient Bancke, whereof Parte is now builte with the Wall of the Graieffriers; the North ans South ends are environed with diverse Marishes, Shredds, and divided with Fleetes, Crickes, and Diches; the Auntient Haven there was sometime at the North Ende of the Toune, where standeth now their Keie, which Haven was utterlie choaked upp, with a North-Easte Winde, the foretene Daie of Januarie, Anno 1 Edward III. notwithstanding if it were recovered woulde not onlie preserve the Toune from Danger of the Sea; but bie Helpe of a Sluce weasteward, woulde be soe mainetained the same as might likelie bringe the same Toune neare to her former estate and condition. At the Losse of this Haven, another was opened verie neare the Place, where Dunwich Men have, now in a shorte time, bie Helpe of Nature, prepared a Passage as by ancient Inquisit, and other evidence maie plainelie appeare, videlez, fere duas leucas ab antique Portu: That this Haven hath been oftentimes chaunged; for the whole Raunge of Shingle assureth it in noe Place certaine, causing it to runne Southward bie trussing, and choakinge the same with Beach, appeareth bie sondrie evidence, videlez. that the Men of Bliborough, Walberswick, and Southwold, shall paie duelye to Dunwich men their Toules and customes, ubicunq portus ille mutari contigerit. That as novi portus ac filum aquae ejusdem shall be the Boundes betwene the Toune of Dunwich, and the Lordship of Bliborough, ubicunq dictum novum portum in futurum diverti vel mutari per jactum sabuli vel aliunde contigerit; as also bie the view of the Place itselfe. Notwithstandinge were it now runneth these have bie good happe lighted on an owse Banke at the South Side of the Haven, which causeth the back Water to turne of the Beache, and to lie straight againe the Mouthe, as hath happened divers times since the same was opened first. And although the North Easte Windes have been, since the same was opened, most violent and extreme, as also the 10, 11, 12, and 13 of this present Moneth, yet the verie nexte Daie affter, being the fourteenth Daie, divers loaden crayers went readilie out of the same. and whereas there are now to Flattes, on the North Side of the Haven, which the Walberswick and Southwold Men would willinglie turne Dunwich men unto; being notwithstandinge Owners, under her Majestie, of the same Haven there, and more than a Mile above, and the intended Cuttes of the said Walberswick and Southwold men there, very dangerous to all Passengers, bie Reason of certaine Flattes called Passelie Sands, yf a Cutt were made both on a Levell, and as appeareth Owessey Ground, from the Weaste Flatt toward their keies, they should remedie those Flattes, and perfect the Haven as bie this Platte may better appear.'

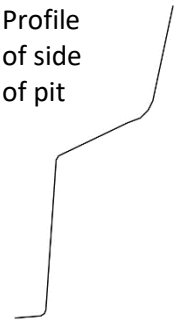
The Crag Exposure to the West of the water Tower
on Rushmere Heath - S. J. J. MacFarlane

The site lies on the side of a small stream valley which runs along the western edge of the water tower enclosure and the Foxhall stadium. The crag was exposed in a large square pit approximately 25'-30' square dug to accommodate a drainage appliance.

Three faces of crag were seen in this pit, the fourth side being blocked by a concrete bastion; unfortunately the faces of crag did not run the whole length of the side of the pit, at each corner a ramp of talus led down into the pit and the slope of the sides themselves was such that they were easily obscured by soil slipping from above.

The face to the north of the pit which I will all face (A) was partially obscured and divided into an upper and lower face (see diagram).

Profile of side of pit



Soil	2 ins	
Brownish sub soil	3 ins	On the left is the succession through which the pit was dug at FACE A
Fine gravel	18 ins	
Yellow sand	6 ins	
(Obscured)	18 ins	
Upper shell bed	2 ins	
Yellow shelly sand	8 ins	
Lower shell bed	7 ins	
Yellow sand	2 ins	

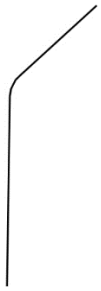
Species recorded from Face A - lower shell bed

Mya arenaria	Natica sp.
Spisula sp.	Nucella lapillus
Venus casina	Turritella sp.
Chlamys sp.	
Macoma obliqua	Ditrupa subulata
Gastrana laminosa	
Mytilus edulis	Barnacle sp.
Cardium angustatum	
Cardium parkinsoni	
Ostrea sp.	
Glycimeris glycimeris	
Pholas sp.	

It is to be noted that an extensive collection was not made and that most of the above species were fragmentary.

The face to the east of the pit, Face (B), was a clear face of crag; however it was obscured above the fine gravel. The remainder of the face where the crag was seen was quite clear however.

Profile of side of pit



(Obscured)	1 ft	Succession through Pit side which pit passed on profile face B
Fine gravel	15 ins	
Fine brown sand	13 ins	
Upper shell bed	10 ins	
Yellow shelly sand	7 ins	
Lower shell bed	7 ins	
Yellow sand	4 ins	
Hard brown clay	2 ins	

Species recorded from Face B - Upper shell bed

Glycimeris glycimeris	Turritella incrassata
Spisula sp.	Natica multipunctata
Tellina obliqua	Neptunia or Nucella sp. (juvenile)
Cardium edule	
Cardium parkinsoni	Barnacle sp.
Mya sp.	
Pholas sp.	
Mytilus	

Species recorded from Face B - Lower shell bed

Astarte sp.	Nucella lapillus
Spisula sp.	Natica sp.
Glycimeris glycimeris	Turritella sp.
Mya arenaria	Neptunea contraria
Cardium edule	Hinia reticosa
Cardium angustatum	Natica multipunctata
Cardium parkinsoni	Turbonilla sp.
Dosinia exoleta	
Corbulomya complanata	Echinocyamus pusillus
Mytilus sp.	
Macoma sp.	
Pholas sp.	
Chlamys opercularis	

Also from below the lower shell bed in the yellow sand were found

Astarte sp.	Natica sp
Macoma sp.	
Mya arenaria	

These species were also very fragmented.

The third face of crag on the south side was very poor indeed, no collection was made.

(Diagrams on next page)

MARSUPITES FROM THE GIPPING VALLEY CHALK

A few plates of the zonal crinoids (sea-lily), showing the characteristic patterning of the genus Marsupites, were found by C. Allen and R. Markham in the Chalk of the deepest part of 'Masons Quarry', Great Blakenham, about half a dozen years ago. The outcrop of this zone had been recorded in the Brett Valley, and may now be recorded from the Gipping Valley, due to the depth to which this quarry is excavated. Two or three additional plates have recently been found by J. Norman and R. M.

R. Markham

NOTE OF SOME CRAG FOSSILS IN THE MUSEUM OF THE GEOLOGY DEPARTMENT OF BIRMINGHAM UNIVERSITY

The more interesting of the specimens noted during a visit in 1961 are listed here:

No. 1994 - Hippochrenes ampla, "Red Crag, derived from Eocene". (the preservation, and the species, made me doubt its Crag origin; the specimen needs examination).

- Galeodea bicatenata with infilling of calcite crystals. (An interesting specimen of this rare gastropod).
- 'Elephas' meridionalis?, L.S. and T.S. of molar. Red Crag, Trimley. (Elephant teeth are rare in the Red Crag).

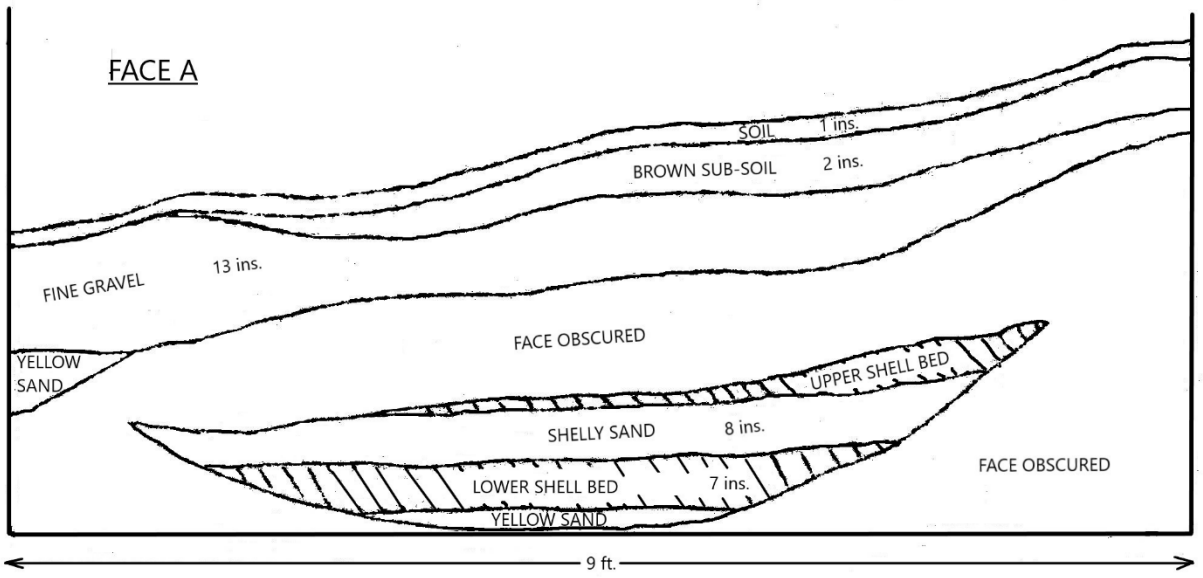
No. 1637 - Ceratorhinus schleiermacheri, part of upper molar, Red Crag, Woodbridge. (Upper molars, of more value for species determination than lowers, are also much rarer in the Crag).

- Mastodon arvernensis. Norwich Crag, Easton Bavents. Also labelled "Forest Bed". (!) (a tooth? – no note was made at the time).

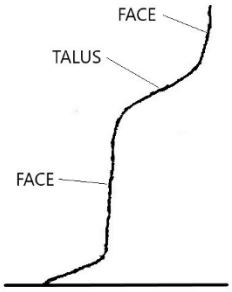
R. Markham

(The short articles in Newsletter 1 are more appropriate to the Bulletin, and are repeated). Table on page 8-10 not included here.

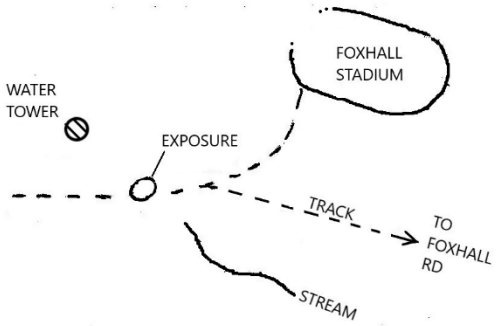
DIAGRAMS TO ILLUSTRATE THE CRAG EXPOSURE ON RUSHMERE HEATH
20TH JULY 1966



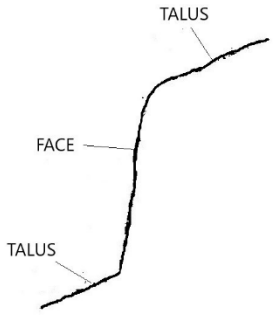
PROFILE OF FACE A

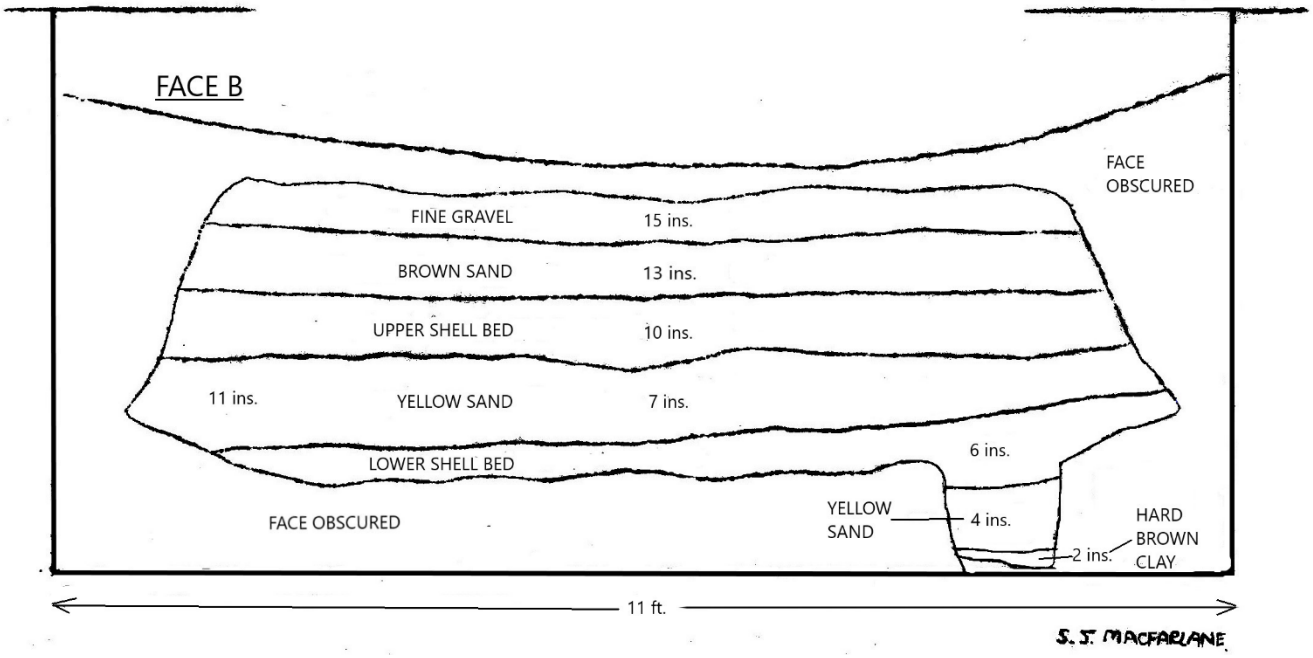


LOCATION OF EXPOSURE



PROFILE OF FACE B





S. J. MACFARLANE

ILLUSTRATIONS OF COMMON CRAG MOLLUSCS

Two very useful books for local geologists are -

'British Regional Geology: East Anglia and Adjoining Areas'(Fourth Edition' by C.P.Chatwin. London, Her Majesty's Stationery Office, 1961. 6s-00d.

'British Caenozoic Fossils (Tertiary and Quaternary)' (Second Edition). London, British Museum (Natural History), 1963. 6s-00d.

They illustrate many common genera of Crag molluscs, which are listed below (a few species are omitted, a few added). Compare your specimens with the figures (compare size, shape, sculpture, ornamentation, hinge - line, etc.), also with museum specimens; remember that there are many species not illustrated in the above books!

Notes on use of list —

- the standard form here used is for example;-

'TELLINA (i)
Macoma calcarea (ii) (Tellina lata) (iii) I (iv) B38;G24 (v)'

Key (as used in the example above)

(i) the generic name used in the Palaeontographical Society Monographs-
'A Monograph of the Crag Mollusca', by S.V.Wood, 1848-82 (here used for Pelecypods).
'The Pliocene Mollusca of Great Britain', by F.W.Harmer, 1914-24 (here used for gastropods).
The common name (in brackets) may follow the generic name.

(ii) Generic and specific names used in 'East Anglia and Adjacent Areas' and ' British Caenozoic Fossils '. Authors not given here.

(iii) commonly used synonyms.

(iv) deposit(s) in which commonly found
C - Coralline Crag
R - Red Crag
R(S) - more common in south than in north of Red Crag. area
R(N) - more common in north than in south of Red Crag area
I - Icenian (Norwich, Chillesford and Weybourne Crags).
I(N) - north of Southwold.
I(W) - Weybourne Crag.

(v) Plate No. in 'British Caenozoic Fossils ' (e.g. B38) and Fig. No. in 'East Anglia and Adjoining Areas' (e.g. G24).

This check list to illustrations is primarily for beginners, it is not intended for taxonomists or species - distribution students'.

R.M..

PELECYPODS (BIVALVES; LAMELLIBRANCHS)

OSTREA (Oyster)		
Ostrea edulis	C; R	B34
PECTEN		
Pecten maximus	C; R	
Chlamys opercularis (Aequipecten opercularis)	C; R; I	B33; G17
Chlamys tigerina (Palliolum tigerinum)	C; R	B33; G17
Chlamys harmeri (Pecten pusio)	R	
Pseudamussium gerardi (Chlamys gerardi)	C	B34
MYTILUS (Mussel)		
Mytilus edulis	R; I	B34
PECTUNCULUS		
Glycimeris glycimeris	C; R(S)	B33; G22
NUCULA		
Nucula laevigata	R	B33
Nucula spp. CJRJI		
Acila cobboldiae	R(N); I	B33; G24
LEDA		
Yoldia oblongoides (Leda myalis)	R(N); I	B32; G25

LUCINA		
Phacoides borealis (Lucinoma borealis)	C; R; I	B36
CARDIUM (Cockle)		
Cardium edule (Cerastoderma edule)	R; I	B36; G24
Cardium parkinsoni	R(S)	B36; G22
Cardium angustatum	R(N)	B36; G24
Cardium decorticatum	C	
Serripes groenlandicus	R(N); I	G24
CARDITA		
Cardita senilis	C; R	B35; G17
Cyclocardia scalaris	C: R	B35
Pteromeris corbis	C; R	B35
ASTARTE		
Astarte incerta	C	G17
Astarte montagui (Astarte compressa)	R(N); I	
Astarte omalii	C; R	B35
Astarte semisulcata (Astarte borealis)	I(N)	B34; G24
Astarte obliquata	R	B34; G22
Digitaria digitaria (Woodia digitaria)	C;R	B35
CYPRINA		
Arctica islandica	C; R(N); I	B35; G17
VENUS		
Venus casina	C; R(S)	B36
Verus ovata	C	
DOSINIA		
Dosinia exoleta (Artemis exoleta)	R(S)	B37; G22
TELLINA		
Macoma praetenuis	R(N); I	B38
Macoma calcarea (Tellina lata)	I	B38; G24
Macoma obiiqua	R; I	B38; G24
Macoma balthica	I(W)	B38; G24
Tellina crassa (Arcopagia crassa)	R	
Tellina donacina	C	
SCROBICULARIA		
Scrobicularia plana (S. piperata)	I	B37; G25
MACTRA		
Spisula arcuata	R(S)	B37
Spisula ovalis	R; I	G24
Spisula subtruncata	I	B38
MYA		
Mya truncata	C; R(N); I	B38; G24
Mya arenaria	R; I	
PHOLAS		
Pholas cylindrical (Barnea cylindrical)	R(S)	G22
GASTROPODS		
TRIVIA		
Trivia coccinelloides (Cypraea europaea)	C; R	B39
NASSA		
Hinia reticosa (Nassarius reticosus)	R	B40; G22
Hinia granulata	R(S)	B39; G22
Amycla labiosa	C; R	
BUCCINUM (Whelk)		
Buccinum undatum	R	B40; G24
LIOMESUS		
Leiomesus dalei	C; R	B40
PURPURA		
Nucella lapillus	R; I	G22
Nucella tetragona	R	B40; G22
TROPHON		
Trophonopsis clathratus (Trophon scalariforma; Boreotrophon clathratus)	R	B40
SEARLSIA		
Searlisia costifera	R(S)	B40

NEPTUNEA		
Neptunea contraria	R(S)	B40; G22
Neptunea despecta	R(N); I	B40; G22
SIPHO		
Sipho curtus	R	B40
ADMETE		
Admete viridula	R(N)	B41
POTAMIDES		
Potamides tricinctus (Cerithium tricinctum)	R; I	B39
TURRITELLA		
Turritella incrassata	C; R	B39
Turritella communis	I	B39; G24
VOLUTA		
Scaphella lamberti	R	B41; G22
SCALA		
Scalaria foliacea	C	G17
Scalaria groenlandica (Epitonium greenlandicum)	R; I	B39; G24
LITTORINA (Winkle)		
Littorina littorea	I	B39; G24
NATICA		
Natica multipunctata	R(S)	B39
Lunatia catenoides (Euspira catenoides)	R	B39
Polinices hemiclausus	R	B39
TROCHUS		
Calliostoma subexcavatum	R	B39
Gibbula tricariniferus	C	G17
CAPULUS (Cap Shell)		
Capulus ungaricus	R	B39
CALYPTREA (Cup-and-Saucer Limpet)		
Calyptraea chinensis	C; R; I	B39
EMARGINULA (Slit Limpet)		
Emarginula reticulata (E. fissura)	C; R	B39
RINGICULA		
Ringicula ventricaea	C; R; I	B41

SECTION THROUGH JUNCTION OF RED AND CORALLINE CRAGS, "THE ROCKS" RAMSHOLT

Section as seen 29th August – 4th September 1963.

A section about a yard wide was cleared.

The exposure showed some 7 feet of Red Crag resting on Coralline Crag seen to 3 feet.

The Red Crag was represented by shelly sands with ferruginous bands, together with coprolites and small black flint pebbles, many of which had been broken and imperfectly rounded. False bedding was not noticed and the ferruginous bands were approximately horizontal.

The basal layer, (A), showed yellowish sands with large, almost unworn flints unevenly distributed throughout. These flints often measured nearly a foot in diameter, and one was encrusted with barnacles. The layer was bounded above by a band of almost unworn to rounded flints, generally about six inches in diameter; and ¼ inch thick iron pan band at the base.

The Coralline Crag below the iron pan was represented by 2 ½ inches of hard, marly sandstone with comminuted shells. The under surface of the iron pan contained lamellibranch casts. The remainder of the Coralline Crag consisted of pale yellow sands, with a zone of whitish sand (B) at the base.

Bryozoans were collected, but other fossils were not observed during a cursory search.

The base of the deposit was not seen, but London Clay outcrops on the beach.

Colin Holcomb

(Red Crag species list follows on page 11; Diagram on page 12).

List of fossils from Red Crag, Ramsholt 'Rocks'

Phacoides borealis
Chlamys opercularis
Chlamys harmeri (Pecten pusio)
Pecten maximus
Mytilus edulis
Spisula spp.
Tellina praetenuis
Macoma obliqua
Glycimeris glycimeris
Cardium parkinsoni
Cardium edule
Cardium ?interruptum
Ostrea sp.
Dosinia exoleta
Venus ovata
Venus ?imbricata
Ensis ?siliqua
Corbula sp.
Cyprina ?spp.
Cardita senilis
Cardita scalaris
Astarte omalii
Astarte basteroti
Astarte obliquata
Astarte sp.
Pholad
Tapes

Searlsia costifera
Neptunea contraria
Nucella lapillus
Turritella communis
Nasa reticosa
Nassa ?granulata
Scaphella lamberti
Liomesus dalei
?Lunatia sp.
?Polinices sp.
?Trochus sp.
Buccinum ?undatum
Trophon clathratus
Trivia coccinelloides
Melampus pyramidalis ?

Cellepora
Cheilostome bryozoans

Cliona (borings)

Barnacles

Echinoid spines

Terebratula sp.

Crustacean (fragment)

Sphenotrochus sp.

(All of the above were found in situ. Help with identifications was given by R. M.; the determinations were made nearly three years ago, and have not been checked for this bulletin.
- R. M.)

BIBLIOGRAPHY; PARAMOUDRA CLUB BULLETIN.

No. 1 (Sept.1953)

'Easton Bavents Cliff Sections - Southwold, Suffolk'. Larwood, G. P. and Martin, A. J. (1 page).
'Cliff Sections between Caister and Scratby'. Martin, A. J. 1 page.
'Recent Work on the Constitution of the Chalk.' summary by Larwood, G. P., from article by M. Black in Proc. Geol. Soc. of London. (1 page).

No. 2 (April 1954)

'An Abstract of Information obtained from Borings in Norwich, 1951' & 'The Yare Valley Buried Channel'. Funnell, B. M. (2 pages).
'Notes on some exposures in Glacial Beds west of Norwich (1954)'. Funnell, B. M. (2 pages(.

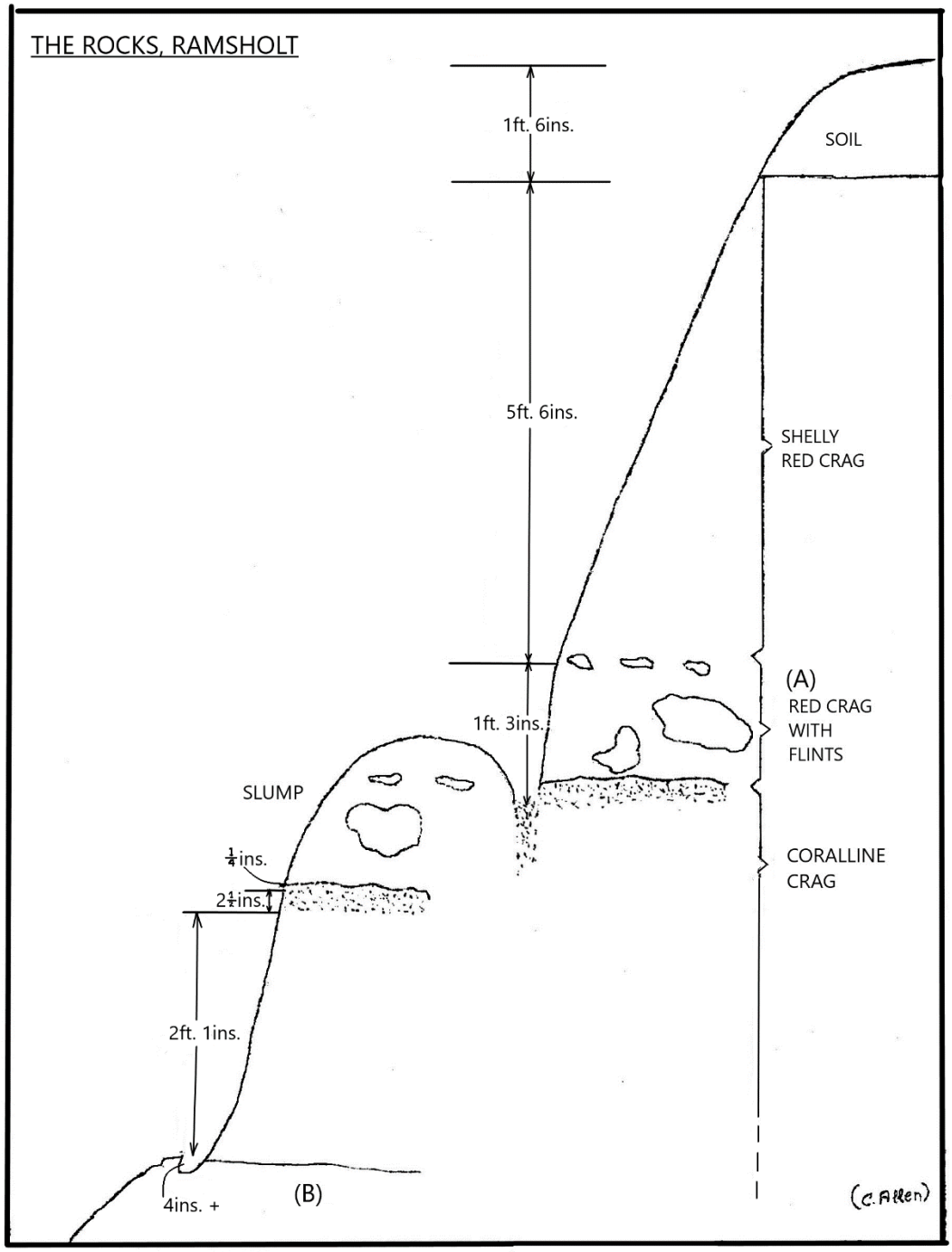
No. 3 (August 1955)

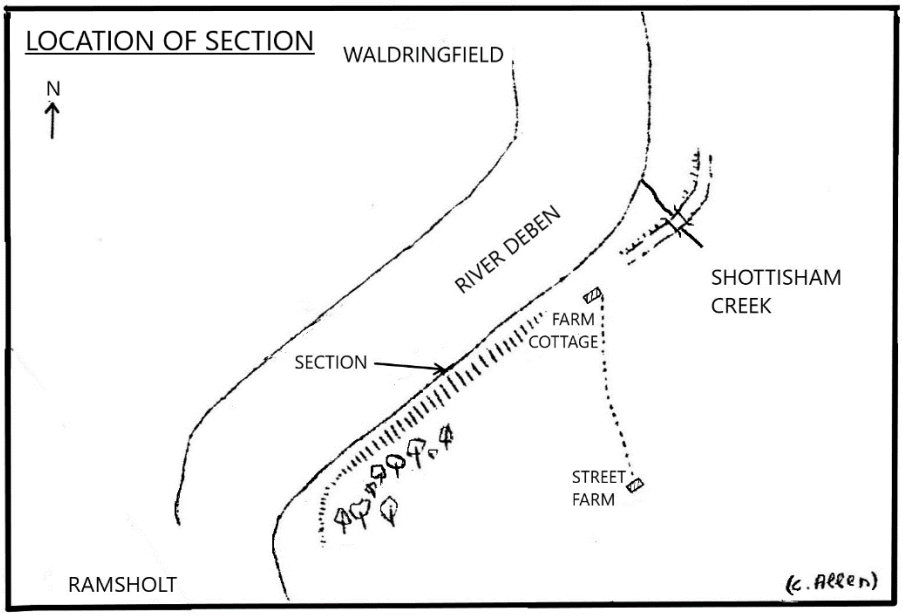
'A Survey of the River Tas Valley'. Brown, B. R. (4pp).
'The Age of the Ostrea lunata Chalk at Mundesley, Norfolk, exposed 1898 and 1954.' Howlett, D. R. and Larwood, G. P. (1 page).

No. 4 (Dec.1955)

'A Study of the Cliff Section at Easton Bavents, near Southwold, Suffolk.' Reeder, D. E. H. (3 pages).
'Report on the Excursion to Runton, September, 1955.' Brown, B. R. (2 pages).

(bibliography continued on page 13)


THE ROCKS, RAMSHOLT
1ft. 6ins.
SOIL
5ft. 6ins.
SHELLY
RED CRAG
(A)
RED CRAG
WITH
FLINTS
1ft. 3ins.
SLUMP
¼ins.
2¼ins.
CORALLINE
CRAG
2ft. 1ins.
4ins. +
(B)
(C. Allen)


LOCATION OF SECTION
WALDRINGFIELD
N
RIVER DEBEN
SHOTTISHAM
CREEK
FARM
COTTAGE
SECTION
STREET
FARM
RAMSHOLT
(C. Allen)

No. 5 (May 1956)

'The Evolution of the Southern North Sea Basin.' Funnell, B. M. pp. 1-5.

'The Glaciations and Interglacials of East Anglia; a Summary and Discussion of Recent Research' summary by Martin, A. J. from article by R. G. West in Quaternaria. pp. 6-7.

'Bibliography of East Anglian Geology' (Programme, Scope, Sources, System, Note). Funnell, B. M. pp.8-9.

'Section 15 (Decade 1950-59)'. pp.10-13.

'Section 14 (Decade I940-49)'. pp.14-17.

No. 6 (Feb, 1957)

'1956 Easter Field Meeting' (Caistor).' Funnell, B. M. pp.1.

'The Norwich Chalk Belemnitidae'. Funnell, B. M. pp.2-4.

'Bibliography of East Anglian Geology; Section 13 (Decade 1930-39).' pp.5-10.

'Bibliography of East Anglian Geology; Section 12 (Decade 1920-29).' pp.11-17.

No. 7 (Dec. 1957)

'The Differentiation and Correlation of East Anglian Pleistocene Deposits: A Review of Recent Research'. Funnell, B. M. pp.1-3.

'The Cretaceous Setting of East Anglia'. Hancock, J. M. pp.3-6.

No. 8 (March 1958)

'Button, Smith and Lyell in Norfolk'. Martin, A. J. pp1-2.

'Bibliography of East Anglian Geology: Section 11 (Decade 1910-19).' pp.3-11.

No. 9 (Sept. 1959)

'Cretaceous Flint.' Bell, S. V. pp1-5.

'Bibliography of East Anglian Geology: Supplement 1955 and Supplement 1956'. p.6.

'Bibliography of East Anglian Geology: Supplement 1957.' p.7.

'Bibliography of East Anglian Geology: Section 10. (Decade1900-09).' pp.8-16.

No. 10 (March 1961)

'Patterned Ground' (A Descriptive Review with emphasis on the importance of Permafrost Features in East Anglia). Banham, P. H. pp.1-15.

'Bibliography of East Anglian Geology; Supplement 1958.' p.16.

'Bibliography of East Anglian Geology: Supplement 1959.' p.17.

'Bibliography of East Anglian Geology: Supplement 1960.' p.18.

No. 11 (Dec. 1962)

'Glacial Tectonics' (A Review and Discussion of the Appliance of Tectonic Concepts to the Structures Observable in Glacial Deposits) Banham, P. H. pp .1-14 (plus 3pp. bibliography to article).

No. 12 (Feb. 1965; for 1963)

'Glaciofluvial Deposits at Burgh Castle, Suffolk'. Westgate, J. pp.1-4.

'A Bibliography of Literature describing Exposures of Beds disturbed by ice, particularly in Norfolk. Ranson, C. E. pp.4-7.

No. 13 (Oct. 1965; for 1964)

'The Cromer Forest Bed Series'. West, R. G. pp .1-4.

'Quaternary Field Study Group, Report on the First Field Meeting, Markhamm, R. A. D. pp.4-7. Birmingham, 1964.'

'The Surface of the Chalk in Norfolk.' Ranson, C. E. pp.7-9.

No. 14 (Jan. 1966; for 1965)

'Quaternary Field Study Group, Report on the Second Field Meeting, Durham, 1965.' Ranson, C. E. pp.1-7.

(The famous paper on the Hoxne Palaeoliths, by John Frere, is duplicated below. It first appeared in Archaeologia, vol. xiii. p.204, 1800. It was reprinted in 'On the Occurence of Flint Implements, associated with the Remains of Animals of Extinct Species in Beds of a Late Geological Period, in France at Amiens and Abbeville, and in England at Hoxne, by Joseph Prestwich, F.R.S., F.G.S., from the Philosophical Transactions, Part II, 1860). It is taken from the latter paper. - R. M.

Account of Flint-Weapons discovered at Hoxne in Suffolk, by John Frere, Esq., F.R.S., F.A.S. Read before the Society of Antiquaries, June 22, 1797.

Sir,- I take line liberty to request you to lay before the Society some flints found in the parish of Hoxne, in the county of Suffolk, which, if not particularly objects of curiosity in themselves, must, I think, be considered in that light, from the situation in which they were found. They are, I think, evidently weapons of war, fabricated and used by a people who had not the use of metals. They lay in great numbers at the depth of about 12 feet, in a stratified soil, which was dug into for the purpose of raising clay for bricks. The strata are as follows-

1 . Vegetable earth …….. 1½ft.
2. Argill …….. 7½ft.
3. Sand, mixed with shells and other marine substances ..... 1 ft.
4. A gravelly soil, in which the flints are found generally at the rate of five or six in a square yard …….. 2 ft.

In the same stratum are frequently found small fragments of wood, very perfect when first dug up, but which soon decompose on being exposed to the air; and in the stratum of sand (No.3) were found some extraordinary bones, particularly a jaw-bone of enormous size of some unknown animal, with the teeth remaining in it. I was very eager to obtain a sight of this; and finding it had been carried to a neighbouring gentleman, I inquired of him, but learned that he had presented it, together with a huge thigh-bone found in the same place, to Sir ASHTON LEVER, and i t therefore is probably now in PARKINSON'S Museum.

The situation in which these weapons were found may tempt us to refer them to a very remote period indeed, even beyond that of the present world; but whatever our conjectures on that head may be, it will be difficult to account for the stratum in which they lie being covered with another stratum, which, on that supposition, may be conjectured to have been once the bottom or at least the shore of the sea. The manner in which they lie would lead to the persuasion that it was a place of their manufacture, and not of the accidental deposit; and the numbers of them was so great, that the man who carried on the brick work told me that before he was aware of their being objects of curiosity, he had emptied baskets full of them into the ruts of the adjoining road. It may be conjectured that the different strata were formed by inundations happening at distant periods, and bringing down in succession the different materials of which they consists to which I can only say, that the ground in question does not lie at the foot of any higher ground, but does itself overhang a tract of boggy earth, which extends under the fourth stratum; so that it should rather seem that torrents had washed away the incumbent strata and left the bog earth bare, than that the bog earth was covered by them, especially as the strata appear to be disposed horizontally, and present their edges to the abrupt termination of the high ground.

If you think the above worthy of notice of the Society, you will please to lay it before them.
I am Sir, &c,

To the Rev. John Brand, Sec. S.A. JOHN FRERE.

(It is hoped that repeats of the original and historical works by John Frere (last page) and William Smith (this page) will be of interest. - R. M.)

Extracts from 'Strata identified by Organised Fossils', by William Smith, June 1, 1816.

Introduction

……the Frontispiece, an annexed Engraving of a singular Fossil Tooth, of some extinct monstrous unknown animal, which is opalized; found in Norfolk.

Strata with organized fossils

…….The Crag being, in some parts of its course, composed of shells and sand, in some places of shells and clay, and in others of shells and coral, united in a soft stoney rock, which about Orford is used in building.

Crag

Crag is a local term for shells mixed with sand, overlaying the Chalk, in the counties of Norfolk and Suffolk.

It is best known and most in use for agricultural purposes in the latter county.

It extends from Tattingstone Park south of Ipswich, through the East Sands or Flock district, to Henham Park west of Southwold.

Re-appears South and North of the Yare, below Norwich, at Bramerton and Thorpe, and has been found at Marsham in the vale of Aylesham, in its course to the sea side west of Cromer. .....

Organized Fossils

Fig.		
1	Murex contrarius, Reversed Whelk	Thorpe Common; Harwich; Alderton, Suffolk. Holywell near Ipswich; Tattingstone Park
2	Murex striatus, Striated Whelk	Bramerton; Holywell; Alderton; Aldborough
3	Turbo littoreus, (Periwinkle)	Bramerton; Trimingsby; Thorpe Common; Leiston old Abbey; between Norwich & Yarmouth
4	Turbo. Turritella	Thorpe Common
5	Patella fissura. Emarginula	Bramerton; Harwich; Holywell
6	Balanus tesselatus	Bramerton
7	Area. Pectunculus	Tattingstone Park; Thorpe Common
8	Cardium	Bramerton; Happisburgh (or Hasbro'); Tattingstone; Trimingsby
9	Mya lata	Bramerton; Trimingsby
10	Short vertebra of a Fif	}
11	Elongated or Hourgafs vertebra	}
12	Another, worn (ditto)	} Thorpe Common
13	Do. showing the six costa forming a sort of	}
14	star.	}
15	Palate bone of a Fish	Tattingstone Park
16	Large Sharks tooth worn	Stoke Hill
17	{ Three others; such are found in the London	
18	{ Clay in a more perfect state but they are	
19	{ characteristic here from being worn very fmooth	
20	Quadruped's Bone	Tattingstone Park
21	An angular Stalactite	Burgh Castle

CRAG. Sowerby's Min. Conch.
Scalaria similis, Tab. 16. Bramerton; Holywell; also at Newhaven Castle.
Murex corneus, Tab. 35 . Aldborough; Holywell; Walton Nase.

Several Fossil shells of this ..... greatly resemble some which are recent…….. some in the Crag, as Turbo littoreus, often retain their natural colour.

(There are several other notes of interest. The frontispiece is a Mastodon).

BIBLIOGRAPHY

PROCEEDINGS OF THE PREHISTORIC SOCIETY OF EAST ANGLIA

VOLUME 1 (1908-1914)

Moir, J. Reid. "The Flint Implements of Sub-Crag Man", pp.17-43. (Includes reports by W. C. Underwood, W. Allen Sturge, W. G. Clarke, Nina F. Layard, F. Corner, W. Whitaker, J. E. Marr).

Sturge, W. A. "The Chronology of the Stone Age", pp .43-105.

Underwood, W. "Animistic Forms in Certain Flints, Showing Human Work', 106-108.

"Summary of Proceedings" (incl. 'Palaeoliths from the Cannon-Shot Gravels'- W. A. Dutt, 110; 'Dovercourt Implements and Mammalian Remains' - W. Underwood,112; 'Striated Neolithic Implements'- W. G. Clarke,115.).

Sturge, W. A. "The Patina of Flint Implements", 140-157.

Picton, H. "Observations on the Bone Bed at Clacton". 158-159.

Clarke, W. G. "Implements of Sub-Crag Man in Norfolk", 160-168.

Cockrill, H. W. "Implements in a Sand-stratum at Lyng", 169-170.

Moir, J. Reid. "The Natural Fracture of Flint and its bearing upon Rudimentary Flints Implements", 171-84.

Haward, F. N. "The Chipping of Flints by Natural Agencies", 185-193.

Moir, J. Reid. "The Occurrence of a Human Skeleton in a Glacial Deposit at Ipswich", 194-202.

Keith, A. "Description of the Ipswich Skeleton", 203-209.

Sturge, W. Allen. "Implements of the Later Palaeolithic 'Cave' Periods in East Anglia", 210-232.

Summ. of Proc. -(incl. 'Tho Wymouciiam Gravels'-H.Bixon-Hewitt, 237-238).

Sturge, W. A. "The Bearing of the Drayson Theory on the Problems presented by striated Neolithic Flints", 254-296.

Hewitt, H. D. "Prehistoric Human Remains at Little Cornard, Suffolk", 297- 300.

Clarke, W. G. "Some Barnham Palaeoliths", 300-303.

Moir, J. R. "Flint implements of Man from the Middle Glacial gravel and the Chalky Boulder Clay of Suffolk", 307-319.

Stopes, Marie C. "The Red Crag shell Portrait" (and report of special committee), 323-332. (Gycimeris glycimeris, claimed to show crude carving of a human face, first described in short note by Stopes, H. 'Traces of Man in the Crag', Rep. Brit. Asscc.,York, 1881, p.700.).

Clarke, W. G. "Norfolk implements of Palaeolithic 'Cave'' types", 338-345.

Haward, F. N. "The Problem of the Eoliths", 347-359.

Underwood, W. "A Discovery of Pleistocene Bones and Flint Implements in a gravel pit at Dovercourt", 360-368.

Moir, J. R. "A Defence of the 'Humanity' of the Pre-River Valley Implements of the Ipswich District", 368-374.

Summ. of Proc. - (incl. 'excursion June 8 - Bure Valley crag elephants', 378).

Moir, J. R. "The Fractured Flints of the Eocene 'Bull-Head' Bed at Coe's Pit, Bramford", 397-404.

Clarke, W. G. "Some Aspects of Striation", 434-438.

Moir, J. R. "Some Details of Flint fracture", 442-445.

Christy, M. "The Red Crag Shall Portraits A Comment on the Report of the Committee", 446-449.

Schwartz A. "Some suggestions for Organised Research on flint implements", 449-454.

Lowerison, B. "An Aurignacian Floor at Heacham, Norfolk", 475.

Summ. of Proc. - (incl. 'Subcrag implements on Norfolk Coast'- W. G. Clarke, 486-7.

VOLUME II (1914-1918)

Moir, J. R. "On the Further Discoveries of Flint Implements of Man beneath the base of the Red Crag of Suffolk", 12-31.

Kendall, H. G. O. "Middle Glacial and Pre-Crag Implements in South Suffolk", 31-35.

Hewitt, H. Dixon. "Some Experiments on Patination", 45-51'.

Smith, Reginald A. "High-Level Finds in the Upper Thames Valley", 99-107.

Dewey, Henry. "Surface Changes in North Kent in Palaeolithic and Later Times", 107-116.

Moir, J. B . "A Series of Mineralised Bone Implements of a Primitive Type from below the base of the Red and Coralline Crags of Suffolk 1.' 116-131.
Layard, Nina. "Coast Finds by Major Moore at Felixstowe Ferry", 132-134.
Kendall, H. G. O. "Some Palaeolithic Pits and Periods in Hertfordshire", 135-139.
Bell, Alfred. "A Description of the Sub-Crag Detritus Bed" 139-148.
Summ. of Proc. - (Cantley Well; R. Bure dam burst - W. G. Clarke, 155-156.).
Abbott, W. J. Lewis. "The Pliocene Deposits of the South-East of England", 175-194.
Moir. J. Reid. "A Series of Pre-Palaeolithic Implements from Darmsden", 210-213.
Clarke, W. G. "The Norfolk Sub-Crag Implements", 213-222.
Chandler, R. H. "The Implements and Cores of Crayford", 240-248.
Kennard, A. S. "The Pleistocene Succession in England", 249-267.
Summ. of Proc. - (Barnham Brick Pit palaeoliths, 321).
Kendall, H. G. O. ""Chipped Flints from below the Boulder Clay at Hertford", 352-359.
Bury, Henry. "Some 'Flat-Faced' Palaeoliths from Farnham, 365-374.
Moir, J. R. "The Position of Prehistoric Research in England", 381-391.
Smith, Reginald A. "Plateau Deposits and Implements", 392-408.
Summ. of Proc. - ('The human authorship of the Pre-Crag chipped flints '- 459; 'Perforated Teeth of Sharks from the Red Crag'-459; 'Fossil Shells from the Red and Coralline Crags- corrections to paper'- 462; 'Recent Finds in the peat at Norwich'-463).
Moir, J. R. "The Ancestry of the Mousterian Palaeolithic Flint Implements", 508-519.
Moir, J . R. "The Flaking and Flake Characteristics of a Pre-Red Crag Rostro-Carinate Flint Implement, 524-539.
Moir, J. R. "Fracturing of Flints by Natural Agencies in Geological Deposits", 575-578.

VOLUME III . (1918-1922)
Warren, S. Hazzledine "The Dating of Surface Flint Implements and the Evidences of the Submerged Peat Surface", 94-104.
Abbott, W. J. Lewis. "Implements from the Cromer Forest Bed and the Admiralty Section", 110-114.
Hayward, F. N. "The Origin of the 'Rostro-Carinate Implements' and other chipped flints from the basement beds of East Anglia", 118-146.
Clarke, W. G. "The Distribution of Flint and Bronze Implements in Norfolk", 147-149.
Moir, J. R. "A Few notes on the Sub-Crag Flint Implements", 158-161.
Marr, J. E. "Man and the Ice Age", 177-191.
Cox, J "Implements from the Glacial Deposits of North Norfolk", 200-205.
Layard, Nina F. "The Stoke Bone-Bed, Ipswich", 210-219.
Moir, J. R. "A Series of humanly-fashioned flints found in the cliffs and on the shore at Mundesley", 219-243.
Barnes, Alfred S. "Notes on the Paper by Mr. F. N. Haward on 'The Origin of the Rostro-Carinate Industry', 259-260.
Sollas, W. J. "A Flaked Flint from the Red Crag", 261-267.
Burkitt, Miles C. "Pleistocene Deposits in England, and the Continental Chronology", 311-314.
Summ. of Proc. - Palaeolithic Implements in Norfolk and the Little Ouse watershed - W. G. Clarke, 321.
Kendall, H. G. O. "Eoliths -Their Origin and Age" 333-352.
Marr, J. E., Moir, J. R., and Smith, Reginald A. "Excavations at High Lodge, Mildenhall, in 1920, A.D..", 353-379.
Moir, J. R. "Further Discoveries of humanly-fashioned flints in and beneath the Red Crag of Suffolk" (with note on Foxhall jaw-bone), 389-430.
Haward. F. N. "The Fracture of Flint. A Reply to the Criticism of Prof. A. S. Barnes", 448-452.
Barnes, A. S. "A Rejoines to Mr. F. N. Haward's Remarks on the Fracture of Flint", 458-160. 'In Memoriam. Benjamin Harrison', 468.
Moir, J. R. "On a Series of Ancient 'floors' in a small valley near Ipswich", 559-579.

Warren, S. Hazzeldine "The Mesvinian industry of Clacton-on-Sea", 597-602.
Moir, J. R.- 'Cromerian Flakes; - Summ. of Proc., Feb.8, 610-20.

VOLUME IV. (1922-24)

Bury, Henry. "Some Aspects of the Hampshire Plateau Gravels", 15-41.
Moir, J. R. “0n some further flint implements of Pliocene Age discovered in Suffolk", 46-56.
Arnstrong, A. Leslie "The Maglemose Remains of Holderness and their Baltic Counterparts", 57-70.
Moir, J. R. "A Series of Solutre Blades from Suffolk and Cambridgeshire", 71-81.
Summ. of Procs. -'Sidestrand Lower Glacial implement', - J. E.Sainty, 126-127.
Cook, W. H. & J. R. Killick "On the Discovery of a Flint-Working Site of Palaeolithic late Medway valley at Rochester, Kent, with Notes *on* the Drift Stages; of the Medway", 133-154.
Crawshay, de Barri, '"Eolith found 'In Situ' at South Ash, Kent", 155-162.
Sainty, J. E. "A Flaking Site on Selling Heath, Norfolk", 165-176.
Moir, J. R. "Some Archaeological Problems", 234-240.

VOLUME V (1925-1927).

Sainty, J. E. "Further Notes on the Flaking Site at Kelling Heath, Norfolk", 56-61. —p.87, - excavation at foot of Beacon Hill, W. Runton (elephant's tooth and part of reindeer antler).
Halls, H. H. & J E. Sainty "In Memoriam. W. G. Clarke" Moir, J. R. "The Silted-up Lake of Hoxne and its Contained Flint Implements", 137-165.
Tebbutt, C. F. "Palaeolithic Industries from the Great Ouse Gravels and near St. Neot's", 166-173.
Sainty, J. E. "An Acheulaan Palaeolithic Workshop Site at Whitlingham", 176- 213.
Moir, J. R. "Upper Palaeolithic Man in East Anglia", 232-252.
Summ. of Procs. -'the H. Picton collection of Clacton Bone-Bed animal remains to Charterhouse School Museum, Godalming', 255'.
Moir, J. R. "Further Researches i n the Forest Bed of Cromer", 273-281.
Kennard, A. S. & B. B. Woodward "Report on the non-marine mollusca from Hoxne", 282.
Sainty, J. E. "The Kelling Flaking Site", 283-287.

VOLUME VI . (1926-1931).

"John Frere" (photograph). Moir, J. R. "Palaeolithic implements from the Cannon-Shot Gravels of Norfolk", 1-11**.**
Moir, J. R. "Tertiary Man", 11**.**
Dines, H. G. "Flint industries of Bapchild", 12-26.
Layard, Miss N. F. "Solutrian Blades from South-East England" opposite p.55.
Sainty, J. E. "The Problems of the Crag", 57-75.
Moir, J. R. "A Double-Ended Rostro-Carinate Flint-Implement", 76-78.
Chandler, R. H. "On the Clactonian Industry at Swanscombe", 79-116.
Barnes, Alfred S. "The Dimensions of Flint Implements", 117-130.
Moir, J. R. "Obituary. Sir Edwin Ray Lankester", 140-142.
Dewey, Henry " Palaeolithic Thames Deposits ", 147-155.
Shotten, F. W. "Palaeolithic Implements found near Coventry", 174-181.
Moir, J. R. "Ancient Man in the Gipping-Orwell Valley, Suffolk", 182-221.
Moir, J. R. "A Hand-Axe from beneath the Norwich Crag", 222-225.
Burchell, J. P. T. "Upper and Lower Palaeolithic Man in East Yorkshire", 226-233.
Barnes, A. S. "The Industries of Le Moustier”, 234-242.
Summ. of Proc. - Swanscombe note, 250.
Burchell, J. P. T. "Early Neanthropic Man and his Relations to the Ice Age", 253-303.
Brotherton, Bertram. "A Remarkable Quartzite Implement", 304-305.
Moir, J. R. "Further Discoveries of Flint Implements in the Brown Boulder Clay of North-West Norfolk", 306-315.
Barnes, A. S. "The Flint Implements of the Type Station of La Madeleine", 316-329.
Armstrong, A. L. "Excavations in the Pin Hole Cave, Creswell Crags, Derbyshire", 330-334.

Armstrong, A. L. "A Late Upper Aurignacian Station in North Lincolnshire", 335-338.
Chandler, R. H. "Types of Clactonian Implements at Swanscombe", 377-378.

VOLUME VII (1932-1934)
Moir, J. R. "The Culture of Pliocene Man" 1-17.
Barnes, A. S. "Modes of Prehension of some forms of Upper Palaeolithic Implements", 43-56.
Notes - (Maglemose Harpoon, and Pollen Analysis of Moorlog'"X, 131-132).
Sainty, J. E. "Some Norfolk Palaeolithic Discoveries", 171-176 (incl. Appendix on 'Implementiferous Gravels in East Anglia', J. D. Soloman).
Moir, J. R. "Hand-axes from Glacial Beds at Ipswich", 178-184.
Notes on Excavations - Prepalaeolithic, 263.
Summ. of Procs. - (Orwell alluvial beds), 274.
Sainty, J. E. "Flint Implements from the 'Stone Bed' of the North Norfolk Coast", 323-326.
Moir, J. R. "A Giant Hand-Axe from Sheringham" 327-332.
Notes on Excavations - Pre-Palaeolithic, Palaeolithic, Mesolithic, 402-403,

---

The bibliography to Proc. Prehist. Soc. E. A. is chiefly Palaeolithic as later periods are more properly Archaeology; several non-local articles that may be of use to local workers are included. It also provides a useful historical survey to the Crag implement controversies.

It is hoped that these bibliographies (extracted by R. Markham) will be of use; several mere have been prepared for the next bulletin.

Other useful bibliographies are found in –

Memoirs of the Geological Survey.

Paramoudra Club Bibliographies.

The present work differs from these in quoting the articles in a run of any particular publication, rather than quoting articles from various publications for each year.

R.M.

FOSSILS COLLECTED FROM THE LONDON CLAY, 1963

Wood in the form of twigs enclosed in septaria has been collected from:
I. The Deben foreshore, nearly opposite Waldringfield at TM294492
II. The Orwell foreshore, near Bridge Wood at TM185415.
III. The Stour valley at Stutton, TM150330.

Also from site I. above, two small bone fragments, enclosed in septaria, presumed to represent fish remains.

In the cliffs near site III., at c. TM 139331, carbonaceous, lamina 'charcoal like' matter occurs in nodules and in cylindrical masses near the base of the cliffs (c. 4ft. above beach level). This carbonaceous material is associated with grey 'amorphous' powdery deposits and a brown 'humus like' substance. The whole association is often enclosed in, or associated with gypsum crystals. These features, along with groups of gypsum crystals occupy a zone about 18" in thickness running parallel to a layer of tabular septaria 2ft. above.

Pyritised wood is also relatively abundant on the shores of the Orwell around site II., although I have never observed any in situ there.

From another site in the Stour valley, a set of thirteen shark vertebrae were collected in Jan. 1962, from a platform of clay below high water mark at Harkstead cliffs, TM187338. The vertebrae were lying approximately in their natural position, eight being in contact and in line on a horizontal plane, the rest being slightly displaced. The bones had been cleared sufficiently by tidal scour to be visible above the relatively unweathered clay in which they were imbedded, although they were themselves very fragile. It was obvious that any similar bony remains higher in the clay appearing in the cliffs above high water mark would not survive to be weathered out of the dry surface.

From the beach at Stutton, B. Keeble has recently collected a

well preserved shark tooth (Lamna sp.) which has, from its appearance, presumably been weathered out of the London Clay in the area.

C. Allen

SIMPLIFIED TABLE OF LOCAL STRATA

Meant as a guide only. After various authors; Quaternary subdivisions after Dr. R. G. West.

R.M.

QUATERNARY

		Sites and/or Deposit
FLANDRIAN	T	Recent Alluvium and Beaches; present day
WEICHSELIAN (Last Glaciation)	C	Periglacial phenomena; local tills
IPSWICHIAN	T	Bobbitshole; Stoke Tunnel; Harkstead; Stutton; Barham (in part)
GIPPINGIAN	C	Gipping Till and outwash gravel
HOXNIAN	T	Hoxne; Clacton; Nar Valley; Swanscombe
LOWESTOFTIAN	C	} Lowestoft Till (Chalky Jurassic Boulder Clay)
		} Corton Beds
		} Norwich Brickearth
CROMERIAN	T	} Cromer Forest Bed Series
BEESTONIAN	C	}
PASTONIAN	T	}
BAVENTIAN	C	} Icenian Crag Series (Norwich Crag; Chillesford Beds; Weybourne
ANTIAN	T	} Crag; Westleton Beds -) -in part)
THURNIAN	C	}
LUDHAMIAN	T	Red Crag deposits.

PLIOCENE

Coralline Crag.

(Miocene)

Box-Stones.

----------Major Break----------.

PALEOCENE AND EOCENE

London Clay.

Lower London Tertiaries. { Oldhaven Bed / { Reading Beds / { Thanet Beds

----------Major Break----------.

SENONIAN

(Part of) Upper Chalk { Belemnitella mucronata zone / { Gonioteuthis zone / { Marsupites zone

(Strata below this not seen at surface near Ipswich)

Notes

Flandrian = Holocene.
Ludhamian-Weichselian = Pleistocene.
Paleocene-Quaternary = Caenozoic.
Senonian = part of Upper Cretaceous.

T = Temperate ('Interglacial').
C = Cold ('Glacial' in part).

Approx. dates of certain deposits (based on radioactive dating of non-East Anglian samples).

Last (Ipswichian) Interglacial	c.100,000 years ago
Cromer Forest Bed Series	c.500,000 years ago
Coralline Crag	c.7,000,000 years ago
Lower London Tertiaries	c.57,000,000 years ago.

AN EXCAVATION IN THE CORALLINE CRAG AT TATTINGSTONE

An attempt (unsuccessful) to dig to the base of the Coralline Crag at Tattingstone (TM 143374) was made by C. Allen, B. Keeble and R. Markham on April 13, 1963, by kind permission of Mr. R. Caldwell.

At this locality (see diagram, page 23), Red Crag is seen to rest on Coralline Crag, exposed (13 April 1963) to a maximum depth of 4 ½ ft.. Excavation proved another 4ft. of Coralline Crag before the water table was reached; digging then became more difficult with the increasing inflow of water (necessitating baling) finally stopping operations after a further 2 ½ ft., making a total of 11ft. of Coralline Crag recorded (without reaching base).

The section (page 23) may be briefly noted –

J - Red Crag, shelly.

I - Red Crag-Coralline Crag junction – exact line of junction sometimes difficult to tell (disturbed – ?reworked- Coralline Crag in places; Coralline Crag material included in Red Crag). Apparent dip of junction in southern part of the section, c. 6° to South.

H - nodules at 8ins. and less from top of Coralline Crag

G - ferruginous band, 18ins. from top of Coralline Crag.

F - nodule band, 46ins. below G. (5ft. 4ins. from top of Coralline Crag).

E - nodule band, 11ins. below

F - (6ft. 3ins. from top).

D - nodule band, 6ins. below E - (6ft. 9ins. from top).

C - pink layer and nodule band (a Diplodonta found just above this layer); 12ins. below D (7ft. 9ins. from top).

B – 1ins. light-coloured crag. (bottom 3ins. in part black stained). (Base of B 10ft. 0ins. from top)

A -12ins. orange-coloured crag (base not seen). Some concretionary structures (not so Hard as nodules higher in section) at junction of A and B. Lowest level of water (1) 1 - 2ins. below top of orange crag; excavation stopped after another 10 - 11ft., as impossible to bale (needed continuously) and dig at same time in restricted space. Deepest part of hole 11ft. 0ins. below top of Coralline Crag).

2 - approximate level of water table (13 April 1963); 10ins. below C (8ft. 7ins. from top of Coralline Crag).

(N.B. –the 'nodules' of the nodule bands are indurated shelly limestone).

List of fossils collected from Coralline Crag, Tattingstone, 13 April 1963 (not checked since 1963)

Pelecypods
- Arca lacteal
- Limopsis pygmaea
- ?Limopsis aurita
- Glycimeris glycimeris
- Astarte sp.
- Woodia digitaria
- Ostrea sp.
- Anomia sp.
- ?Mya sp. (fragment)
- Corbula sp.
- Spisula sp. (large)
- Cardita corbis
- Diplodonta rotundata
- Chlamys ?opercularis
- Chlamys ?harmeri
- Ensis ?ensis
- ?Tellina or Donax? (fragment)
- Venus ovata
- Cardium decorticatum?

Gastropods
- Natica sp.
- Turritella sp.
- ?Emarginula sp.
- Scalaria sp.
- ?Gibbula sp.
- Calliostoma ?zizyphinum

Foraminifera

Echinoid spine

Bryozoans
- Trigonophora
- Celleria

Coral
- Sphenotrochus intermedius

Barnacles

Fish otoliths

R. Markham

(Notes on previous work on the Tattingstone coralline Crag have been abstracted, and start on next page).

"Report of an Excursion to Bentley, Suffolk" by P. G. H. Boswell, Proceedings of the Geologists' Association, Vol.XXIV, part 5, 1913. Pp.327-331.

".....Before reaching the (stackyard) pit, however, 'scratches' of the bed were pointed out near the house. The accompanying sketch-map (p.329 of article).....indicates the areal extent of the bank.....of Lower Crag. It is clear that the out-crop is not so large as.....indicated on the old oneinch map, the.....area being rather over double that on the more modern map. .....

.....one of the few whole fossils obtained from the Coralline Crag on the excursion was a perfect little Venus ovata Pen."

"The Pliocene Deposits of Britain", Mem.Geol.Surv.,1890, by Clement Reid, p.35.

".....Tattingstone Hall, 4 ½ miles S.S.W. from Ipswich and nearly 10 miles from the nearest of the other sections (of Coralline Crag); but the pits in it are now overgrown."

"The Geology of the Country around Ipswich, Hadleigh, and Felixstowe", Mem.Geol.Surv.,1885, by W. Whitaker, pp.26-7.

"At Tattingstone Hall, on the left side of the stream, there is a small outcrop of Coralline Crag, little more than a quarter of a mile along the bottom of the valley from south to north, and only an eighth of a mile wide at most. It is bounded westward by the narrow alluvium on the other side of which London Clay crops out, and elsewhere by Red Crag.....

The section given by the two pits here (almost touching each other) was as follows, in 1877, when the southern one was given up and its lower part filled in, so that the Coralline Crag could not be seen. I had, however, seen it there better and to a greater depth than in the other pit:-

(Glacial Drift – up to 8 feet.
Red Crag – up to about 20 feet thick, resting tolerably evenly, but irregularly on-)
Coralline Crag – Evenly bedded, firm, made up of finely broken shells, mostly buff, hardened into stony lumps in discontinuous layers; about 5 feet, but has been deeper.

At the back of the buildings between the pits brown shell-less Red Crag sand overlies the Coralline Crag."

Prof. Prestwich. Quart. Journ. Geol. Soc., vol.xxxvii, p.342 (1871). - section showing Red Crag resting on and abutting against Coralline Crag. (is also reproduced in 'The Geology of the Country around Ipswich'. Mem.Geol.Surv.,1927 by P. G. H. Boswell, p.35.).

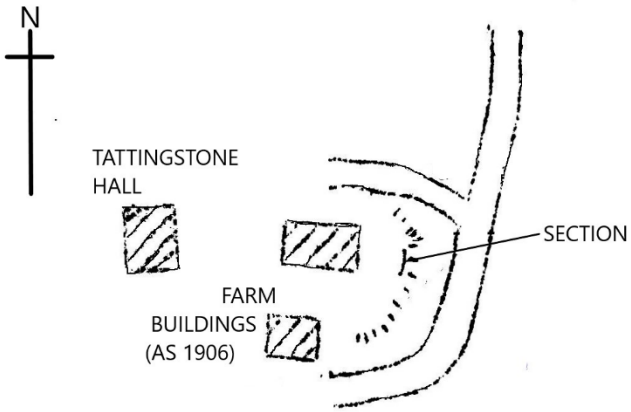
Sir C. Lyell. Mag.Nat.Hist.,ser.2, vol.iii, pp. 314-5. (1839). "On the Relative Ages of the Tertiary Deposits commonly called 'Crag' in the Counties of Norfolk and Suffolk"

- speaks of Coralline Crag as consisting "chiefly of greenish marl, with only a few stony beds" and again he says "I caused a pit about seven thick to be sunk in the yard at Tattingstone Hall farm, piercing the lowest part there exposed of the Coralline Crag, through green marls, with intervening layers of flaggy limestone, two or three inches thick. At the bottom of this pit I found marl of the same character, containing a large Nucula, Venus ovata, and some other shells; when the workmen were stopped by the large quantity of water which flowed in. One of the flaggy beds of limestone was almost of a brick red colour, and consisted chiefly of comminuted shells, like the green marl". (abstracted from Mem. Geol. Surv. 1885).

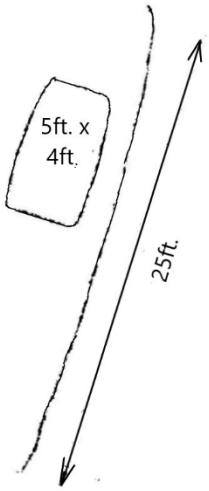
Mr. Charlesworth. Phil. Mag., ser.3, vol.vii., pp.83-4. (1835).

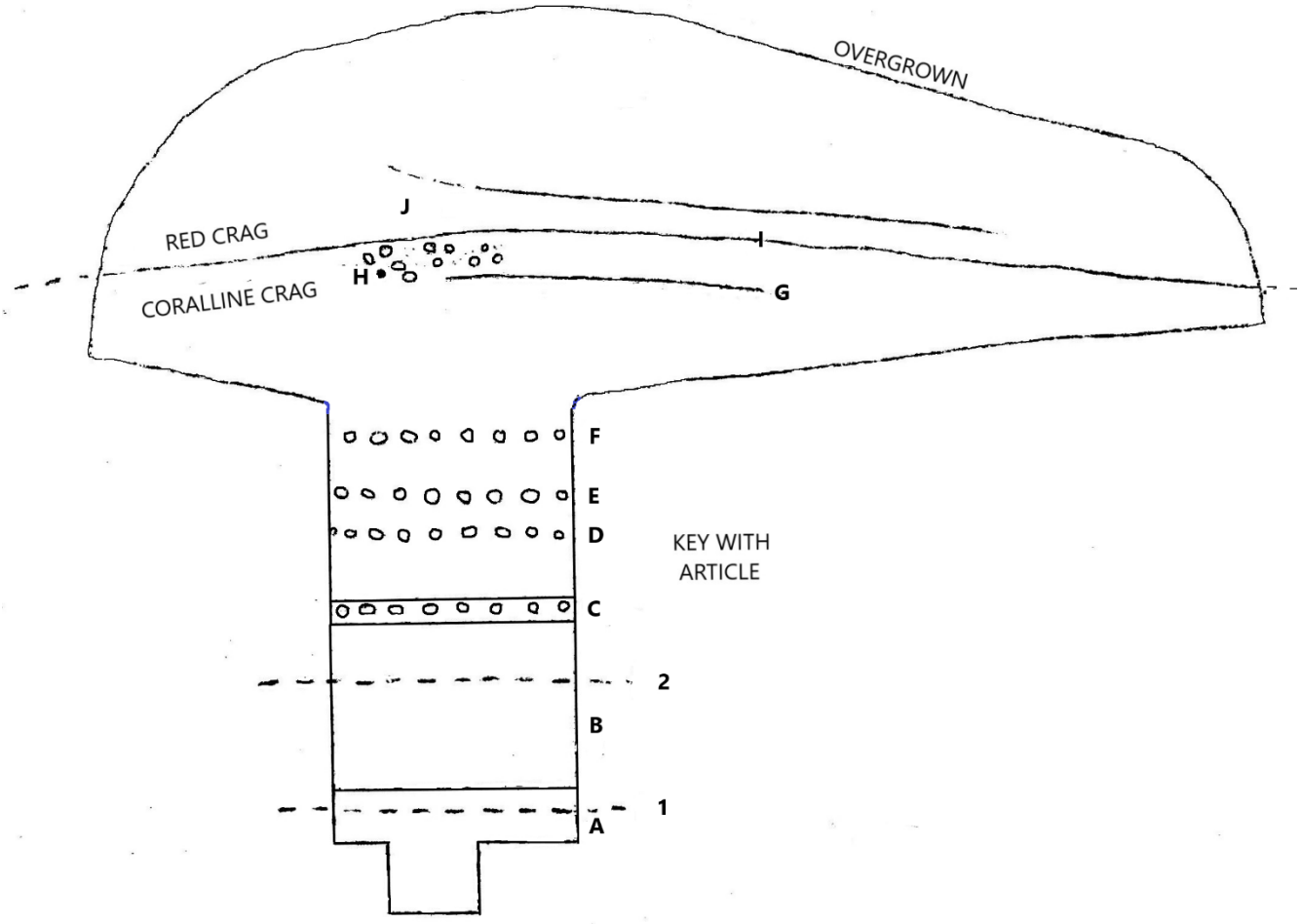
- speaks of Coralline Crag exposed for about 70 yards. Its thickness was 6 feet, and in attempting to dig through it work was stopped by the appearance of water at the further depth.

TATTINGSTONE (13 APRIL 1963)



PLAN VIEW OF SECTION





WALDRINGFIELD CRAG

The Red Crag (about 2 ½ cu. yd.) kindly donated and delivered by Messrs. Wilding and Smith Ltd. (from their Waldringfield Heath pit) for the National Nature Week 1966 Exhibition at Ipswich Museum has been sieved and sorted, yielding the fauna listed below. Many have been identified from fragments, and 100% accuracy is not guaranteed.

(The Red Crag used as a foundation for Civic Drive, Ipswich, apparently came from this pit, numbers of Arctica islandica being common to both places.

PELECYPODS

- Glycimeris glycimeris
- Nucula sp.
- Ostrea edulis
- Pycnodonte cochlear
- Anomia sp.
- Pecten maximus
- Aequipecten opercularis
- Chlamys harmeri
- Chlamys ?tigerina
- Mytilus edulis (thick and thin)
- Lucina borealis
- Diplodonta astartea
- Dosinia exoleta
- Venus casina
- ?Venus ovata
- Arctica islandica
- Pygocardia rustica
- ?Tapes sp.
- Cardita senilis
- Cardita scalaris
- Cardita chamaeformis
- Cardita corbis
- Astarte omalii
- Astarte basteroti
- Astarte obliquata
- Astarte burtini
- Astarte gracilis
- Ensis siliqua
- Donax sp.
- Macoma oblique
- Macoma praetenuis
- Arcopagia crassa
- Cardium edule
- Cardium parkinsoni
- Cardium angustatum
- Cardium ?interruptum
- Panopaea faujasi
- Mya arenaria
- Corbula sp.
- Spisula arcuata
- Spisula constricta
- Spisula sp.
- ?Mactra glauca
- Syndesmya sp.
- Pholad
- Corbulomya complanata

VERTEBRATES

- Fish vertebrae and bones
- Thornback Ray spine
- Wolf-fish teeth
- Ray teeth
- Sharks teeth – Isurus hastilis
  - Odontaspis
  - ?Lamna oblique
- Bone fragments (indeterminate)

GASTROPODS

- Liomesus dalei
- Nucella lapillus
- Nucella tetragona
- Neptunea contraria
- Neptunea (dextral sp.)
- Searlsia costifera
- Sipho sp.
- Buccinum sp.
- Nassa reticosa
- Nassa granulate
- Nassa labiosa
- Turritella incrassata
- Turritella sp.
- Potamides tricinctus
- Lacuna suboperta
- Littorina littorea
- Natica multipunctata
- Lunatia sp.
- Polinices hemiclausa
- Scaphella lamberti
- Bela sp.
- Rostellaria lucida
- Calliostoma sp.
- Trivia coccinelloides
- Capulus ungaricus
- Diodora sp.
- Burtinella bognoriensis

SCAPHOPOD

- Dentalium sp.

CEPHALOPOD

- ?belemnite (derived, Cretaceous)

BRACHIOPODS

- Terebratula sp.
- Rhynchonellid (derived, Cretaceous)

ARTHROPODS

- Barnacles
- Crab claw

CORALS

- Balanophylia calycula
- Sphenotrochus intermedius
- Sphenotrochus boytonensis

BRYOZOA

- Cellepora
- ?Lunulitiform bryozoans
- ?Trigonophora
- Cheilostomes (on Glycimeris and Arctica).

ECHINOIDS

- Cidarid spine
- Cidarid? Spine in phosphatic nodule.

WORMS

Polydora (boring in Cyprina)
?Protula
Ditrupa subulata

SPONGES

Cliona (borings in Glycimeris)
?sponge (in flint) (Cretaceous)

?ALGAE

?borings in Glycimeris

R. Markham

NOTES ON WEAVERS PIT, TUDDENHAM ST. MARTIN

c.TM194493

Three main units visible (Spring and Summer 1966), -

D - Brown Till, 8ft.plus
C - Buff Gravel and Sand, c.12ft..
A - White Sand, 17ft.plus

About 4ft. of sand and greenish loam (B) occurs between A & C. Further notes below.

D ---brown till (chalky in part). C.8ft. measured (probably greater). - not studied in detail (has appearance of Gipping Till).

C ---buff – pale-coloured gravel and sand, c.12ft.; cross-bedding - small channels. Some (apparently) shell and carbonaceous fragments (see below). Quartz pebbles prominent (see below); one vein-quartz measured c. 4ins. x 3ins. x 2 ½ins. A fragment of mineralised bone found loose by P. Grainger may have come from this horizon. Rests irregularly on B.

B ---predominately flat-bedded sands and silts, 4ft. maximum. Small channels at top (with greenish loam) and base (often stony at their base). Upper channels and flat-bedded deposits - thinly-bedded loamy sand (grey, green, buff, with brown staining, also some black staining), occasional thin green and brown loam. Rests irregularly on A.

A ---whitish sand, c.17ft., base not seen. Small-scale cross-bedding; scattered stones, Sometimes in thin bands, more common towards top. Ferruginous staining - a few small lenticles (seemingly not always co-incident with bedding); short vertical, tubular, ferruginous structures common; c.6ft. ferruginous staining in upper part of sands in part of pit; orange-coloured sand below pit floor (water level c.2ft. below floor); shell(?) fragments more noticeable in ferrug. lenticles. Thin patches of detrital (?carbonaceous) fragments along many bedding planes.

Four samples looked at in more detail –

i. sand at water level - pale orange colour, some mica flakes; many minute black fragments; some fragments of ?shell, but indeterminate
ii. 'carbonaceous' sand – light grey sand, some white mica flakes; some fragments of ?carbonaceous material.
iii. 'shelly' sand - pale-brownish sand; 'shells' - pieces of white flint cortex. One fragment of rotted, silicified Inoceramus shell.
iv. pebbly sand from upper part - light brownish-yellow colour; shell fragment -?Mytilus?; ?shell fragments (including ?Cardium?); fragment of black wood.

(note: wet and dry colours of sands are slightly different).

No comment on age of sand is made for this note on pit; it may be possible at a later date.

Further notes on Gravel C –

Four samples were further examined- i. 'shelly' sand - what appeared to be shelly sand in the field contained nothing definitely determinable as such, the fragments in question all apparently being white cortex (of flint); a few pieces of ?carbonaceous matter

ii. 'carbonaceous' - pieces of black powdery (?some carbonaceous) matter common (giving dark grey colour to specimen); fragments of ?shell (indet.).

iii. sieved gravel - ¼ " diameter and greater. 714 stones in sample for identification; majority broken open; with small stones, identification often difficult or impossible, especially those listed below under 'chert' and '?volcanics' (difficulty to see constituents and structures).

	no. of stones	%
Flint	397	55.61
Quartz	164	22.97
Quartzite and quartzitic sandstone	48	6.72
Chert	38	5.32
Ironstone	28	3.92
Sandstones	26	3.64
Volcanic Rocks?	8	1.12
Silt	2	0.28
(Lost in breaking)	3	0.42
Total	714	100.00

(Flint 55.61% : Non-flint 43.97%)

Notes on Rock Types -

Flint - various colours; total includes a few white, apparently cortex. One specimen with mould of echinoid spine.

Quartzitic and Quartzitic Sandstone - quartzite generally compact. Various colours – white, brown, reddish, purplish. The fine-grained specimens difficult to identify with certainty.

Chert - various colours and appearance (some porous, some compact; one with mould of crinoids ossicle). Identity of many of these uncertain; various fine-grained siliceous looking; possible some volcanic rocks.

'Ironstone' - some clay-grade; some sand-grade.

Sandstones - containing material additional to quartz; light-coloured, brown etc.. Identity of finer-grained specimens often uncertain. Volcanic Rock? -dark to light in colour; difficult to tell.

Silt - one hard, one soft.

iv. sieved gravel -larger stones looked at:- generally, of the larger flints, the majority are subangular; the quartz is generally subrounded.

(The above notes are not meant as a 'formal' report on the pit; they are given in the hope that they may gradually be added to through the medium of this bulletin).

Sources of pebbles in gravel:-

Flint - source presents little or no difficulty. Two points may be noted with respect to the lack of rounding of much of this material -i) it is in marked contrast to the rounded quartz (which must have a longer history of wear, either having been derived from a greater distance, or from an older deposit in which it was already well rounded); ii) it is similar in this respect (of angularity) to material in Glacial gravels rather than to Crag pebble gravels (the apparent lack of contemporary fossils is also in agreement with this).

Non-Flint - various sources of the non-flints of Early Pleistocene gravels have been suggested by authors -e.g. from Southern Midlands, Thames Valley, Weald, local, Rhine drainage basin. I have no comments in connection with the Tuddenham stones.

Name of Gravel:-

- gravels of this type are generally included in the Westleton Series (a broad term includes Westleton Beds of Westleton, in which quartz and quartzite are not present in the quantities seen at Tuddenham). Several gravels with high percentage of quartz and quartzite are known; it is here suggested that the name 'Tuddenham Gravel' be used to describe this type found near Ipswich, until more is known of its relationships and stratigraphic position; this name is of course only meant for this bulletin.

The Westleton Series is usually placed somewhere in the stratigraphic range of the Norwich Crag, Cromer Forest Bed, or Norwich Brickearth.

Previous work:-

little appears to have been published.

Prof. J. Prestwich (1890), Quart. Journ. Geol. Soc., 46, p.126, mentions "In the lane leading from Witnesham Street to Tuddenham

Light brown Boulder-clay	5ft.
White sands and gravel (Westleton)	2-4ft.
Red Crag	8ft.

Notes made by R. M. in the mid-1950's (when at school) record brown chalky till resting on white sand. There seems to have been no trace of the gravel C in the section then measured; the white sand then included an orange-coloured layer with clay-ironstone layers. The thickness of the sand was approximately the same as that now recorded for A and B (and possibly included that I have here separated as B).

R. Markham

ACKNOWLEDGEMENT -a great deal of useful fieldwork and laboratory work has been achieved this year (1966), much of which will find its way into these bulletins. I wish to here acknowledge the work of the students and others who have contributed to 'digs' and to 'sieving and sorting', especially Messrs. J. Norman, S. Macfarlane, P. Grainger, C. Garrod, and Miss S. Olley.

R.M.

GEOLOGICAL GROUP IPSWICH

BULLETIN No. 1

SEPTEMBER 1966 (for August 1966)

Published by an informal group of Ipswich geology students, the object is to encourage interest and research into local geology. Editor: R. A. D. Markham, c/o The Museum, High Street, Ipswich, Suffolk.

The editor, R. A. D. Markham, wishes to thank the many people who have made this bulletin possible - contributors, subscribers, those who have helped with production, and Ipswich Museum for facilities granted; the stencils have been typed by the editor, to whom all comments should be sent.