Vol 1 - 9th.

FARNHAM GEOLOGICAL SOCIETY

Newsletter - June 1973

The months since the publication of the last newsletter have been a busy time for the society. The Annual General Meeting on February 9th was very well attended. People were pleased at the progress the society has made and several suggestions were made about the organization and scope of the field trips, visits and lectures for this year. Friday March 9th was the first of our events organized for the newcomers to geology. This took the form of a lecture followed by a field trip on the Sunday to local sand and chalk pits. An account of this trip by Julian Bentick is included with this newsletter.

Members of the society were invited to accompany a WEA Evening Class field trip to Swanage, organized by Ted Finch on the weekend of March 17 - 18th. The next weekend on Sunday 25th March we were found among the tertiary and cretaceous sediments of the Isle of Wight. Organized by our Chairman, This trip was luxurious geology. Being chauffered around from exposure to exposure was very pleasant.

The next two months saw two more field trips. A number of people went down to see Mr Fowlers fine collection of fossils from the Bracklesham Bay area on April 15th. This was followed by a look at the beds exposed along the shoreline around East Wittering. Ian Carolan has written a report on this which you will find in the next few pages. The geology of the Cheddar Gorge area and the Mendips was the subject of our weekend trip on May 19 - 20th. Led by Maurice Hewins and for part of the time having the services of Dr. Stanton, we saw the Carboniferous and Triassic Geology and some of the Geomorphology of the area. The effects of glaciation on the scenery were also observed with Dr. Stanton's help. A more detailed report on this trip will be included in the next newsletter.

Those of you who have read the foreward to "The Wealden District", one of the series on British RegionalGeology will have recognised the name of our lecturer on May 26th. Mr Worrsam talked about the denudation of the Weald by sea and river erosion, the formation of subsequent and consequent drainage and the effect of river gravels on the drainage. He then went on to suggest that the accepted explanation of the capture of the headwaters of the Blackwater River by the River Wey is not the correct one but that it is a case of river diversion, due to the build up of river gravels around Farnham restricting the flow of the way and diverting it to the east.

The last occasion on which we met was the members evening on June 4th. Many new people were present and we saw a number of slides of members trips and displays of minerals and fossils by Mr Young and others. It was a successful evening and I would like to thank all the people who contributed towards it.

As you can see, this is a bumper edition of the newsletter and in addition to the field trip reports we have a progress report on the Museum project, also by Julian Bentick, our busy chairman. It is pleasant to see contributions appearing from people other then the editor, but there is plenty of room for more, and the scope is almost limitless. If you know of any lectures, radio or television programmes of geological interest, write a note on it so that it can be included in the newsletter. If you have read a book and you found it interesting and informative, write a review on it so that other people may know of it. If you see something of interest on one of your field trips, holidays or weekends off, write a short article on it. If you know of anywhere locally where we get maps books or pamphlets, let us know. The newsletter should be a means of two way communication and in a society like ours where there is almost every facet of geology covered, we can all

learn from each other, so let's see these articles appearing.

As the number and length of the articles increase, the job of typing them all and getting them duplicated and prepared for distribution also gets longer, so I would like to express my thanks to Jean Smith for the hours she puts in to produce such a professional publication.

We have heard from the Kingston Lapidary Society based in Hull, offering associate membership of their society. For £1.50 you will receive all newsletters and other publications and be accorded visitor status at any of their weekly meetings and at their workshop. We have also been offered the opportunity to rent a cottage at Blebo Crags which I believe is in Fife or a holiday bungalow on the metamorphic aureole of western Dartmoor, not very far from Okehampton. For any further details please contact Pamela Crosby.

The future activities are a lecture on North West Scotland on June 29th, a day trip to Lyme Regis on July 15th and an afternoon trip to the Institute of Oceanography on September 25th.

One final item that I must record with regret, is the death of one of our more active members, Mr Colley. As you will remember, he led the "Geology of Alton" trip in July 1972 and but for his failing health would have led our last trip to the Cheddar Gorge. It is sad when we lose someone with Mr Colley's knowledge and wealth of experience and we extend to his family our deepest sympathy.

MUSEUM PROJECT

Following some negotiations with Mr Booth, the curator of Farnham's museum the Society was offered certain facilities within the museum for the displaying of Geologically interesting material.

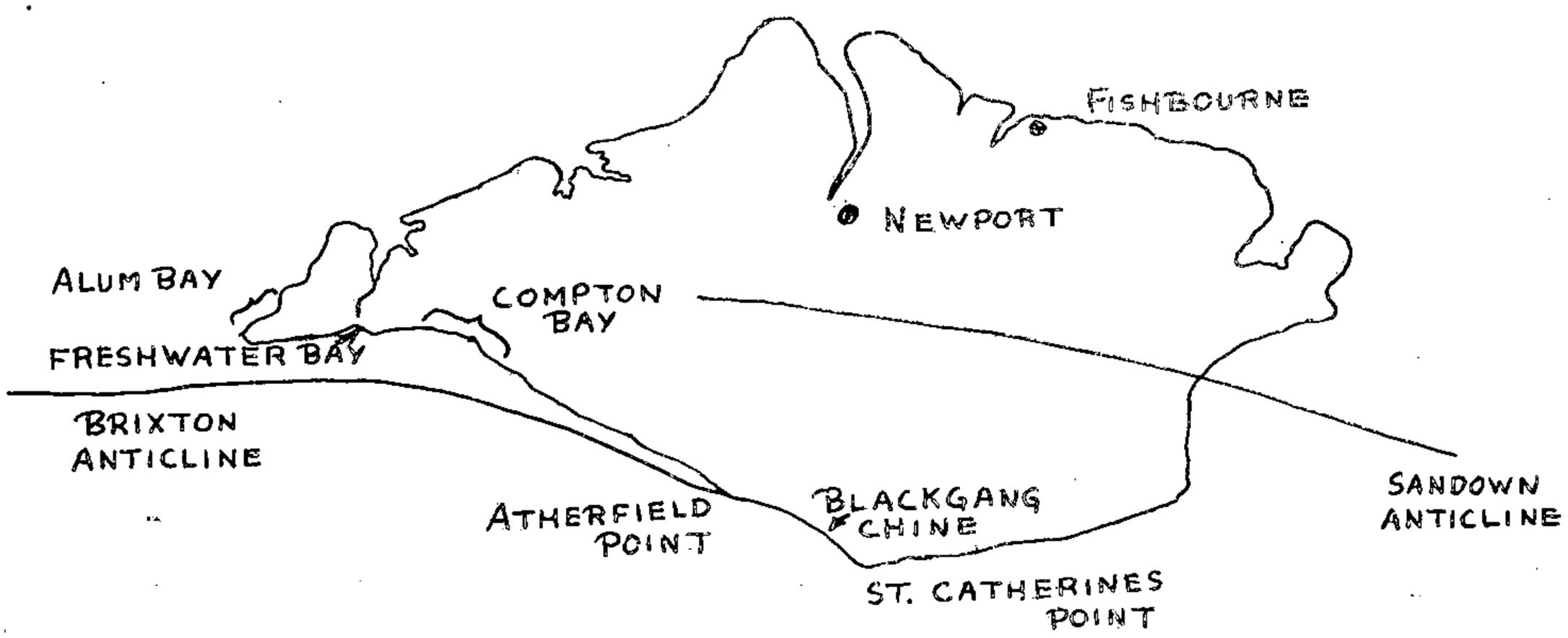
A small working party consisting of J P Bentick, M. Hewins, E M Finch and B Turk have had one or two irregular meetings at the museum in order to work up some ideas for a display.

The first of these meetings was really to make themselves known to the curator and to view the facilities that were to be made available. A second meeting was arranged at which a look was taken at the Geological material that was held in store at the Museum, which, apart from a rather nice suite of Igneous rocks was judged not to be of any great value to the project.

It is hoped that after the initial display has been created that the whole of the exhibition would be of a dynamic nature with a change every few (perhaps six) months with a continuation of the previous theme or the development of a new one. The initial theme is to be the creation of a fossil from the incorporation of the biological material within the detritous through its chemical changes resulting in the object that we find in the ground as Geologists.

The design of the display is in the hands of Barry Turk. Maurice Hewins is working on a comparison between the modern Nautilus and its fossil relative the Ammonite.

Some work towards the display is already in hand but it would be right to say that progress is slower than the working party had anticipated. The committee are very aware of the need to ensure that all membership has an opportunity to participate in the project but until the first of the displays is in position and meetings held on a more regular basis the committee have found it difficult to involve more than the original working party. However of you are feeling particularly left out and you have ideas bursting out please do not hesitate to contact one of the working party who will almost certainly be able to channel your energies.



REPORT ON THE ISLE OF WIGHT FIELD TRIP, MARCH 25th 1973

Once Cromwell's prison for Charles I and his children, Prince Henry and Princess Elizabeth, the Isle of Wight now opens its gates to as many visitors as the ferry boats will carry across. On 25th March, some of these visitors were Society members on a field trip to spend a day amongst the Cretaceous and Tertiary sediments of the island.
The Isle of Wight, separated from the mainland by the Solent - Spithead strait, forms the southern part of the structure known as the Hampshire Basin.
The formations present on the island are set out below:-

Oligocene	Hamstead Beds
	Bembridge Beds
	Osborne Beds
	Headon Beds
Eocene	Barton Beds
	Bracklesham Beds
	Bagshot Beds
	London Clay
	Reading Beds
Cretaceous	Chalk
	Upper Greensand and Gault
	Lower Greensand
	Wealdon

At the end of the Jurassic the area was near sea level and largely covered by swamps and lagoons. The beginning of Cretaceous times was marked by an uplift of the surrounding higher land and a change in climate. This produced a revival of active rivers, draining a land area to the west. Their detritus was spread over Southern England and Northern France in the form of extensive delta flats, with large lagoons. The deposits are varied in character, including coloured sands, sandstones, grits, mottled clays and shales. Lignite occurs in abundance and occasional tree trunks and rolled bones are found.

When sedimentation decreased through the lowering of the surrounding land masses, large freshwater lagoons were formed. The deposits of these waters gave rise to finely laminated shales. For the most part, sedimentation kept pace with subsidence, but occasional periods of emergence, when the deposits became dry enough for large reptiles to roam over them, are indicated by the presence of suncracks or footprints. A feature indicating the origin of these beds is the 'Pine Raft' visible at low tide near Brook Chine on the Isle of Wight. This is a mass of prostrate tree trunks that were evidently

washed into the delta, where they became water logged and stranded.

In the Isle of Wight, where the upper part of the Wealdon Series is brought to the surface by two anticlines, two distinct divisions can be seen. The lower division comprises the Wealdon Marls, the upper is the Wealdon Shales. The marls, of freshwater origin, contain red, purple, green and variegated clays with bands of sandstone, sand and sandy limestones. They contain much driftwood, ferns, fruits of conifers and shells, including the freshwater snail Viviparus Sussexiensis and the freshwater mussel Unio Valdensis. Fish remains and water worn bones of the great bipedal dinosaur Iguanodon are also found. The shales are dull blue or blackish clays with layers of clay-ironstone, sandstone and shelly limestone. The higher beds begin to show evidence of marine conditions. At the end of Wealdon Times earch movements that had been in progress became more appreciable and eventually the sea, advancing from the south, broke over most of the area of the Wealdon Delta. The deposits that were laid down are called the Lower Greensand and contain sands, clays, sandstone and grit. The name is derived from the green colour of the fresh unweathered rock, due to the presence of the mineral Glauconite. When weathered or otherwise oxidised greensands are brown. Glauconite is thought to form by the alteration of ferromagnesian silicates, especially biotite. Its presence in a sediment indicates a shallow water marine origin for the deposit.

The Lower Greensand is clayey in the lower part (Atherfield Clay Series) and sandy above (Ferruginous Sands, Sandrock and Carstone). Much of it is richly fossiliferous, particularly the Atherfield Section.

A further downward movement followed, more rapid and extensive than that which proceeded it. There was also a slight tilting towards the east, so that the sea as it swept westwards, eroding as it went, spread its deposits on successively older strata. These deposits, Gault and Upper Greensand, are regarded as variations of one formation. The former name is used when the deposits are mostly clays and the latter when sandy beds predominate. The transgression of the Cretaceous seas still continued and at its maximum extent almost the whole of the British Isles must have been submerged and a bed of rather unusual lithology, the Chalk, was deposited.

The surrounding land areas must have been reduced to peneplains across which flowed rivers carrying their load almost entirely in solution. The waters of the Chalk seas were warm and saturated with calcium carbonate, ideal conditions for the deposition of calcareous oozes. These oozes were composed of cocoliths, the skeletons of very minute lime-secreting algae with some Foraminifera. Chalk cannot be compared with the foraminiferal oozes which are being formed today at sea depths of greater than 2000 metres. The rare echinoids and lamellibranchs found in the chalk are not deep water forms, so it is unlikely that the depth of the Chalk Seas exceeded 400 metres.

Chalk varies considerably in constitution and the many varieties include the common soft chalks, gritty but briable chalk and hard or nodular rock.

Towards the end of the Cretaceous there was a great change in geography which was due not to great earth movements but to the final regression of the Mesozoic seas and the formation of a new basin of sedimentation around the southern end of the North Sea. The surrounding land areas were uplifted and eroded. The basal tertiary beds everywhere rest on the Chalk with conformity, but there are several indications of a considerable break in deposition. There is an abrupt change in lithology from very pure limestone to coarse, even pebbly, sands. The sands contain numerous rounded flint pebbles showing that a considerable thickness of chalk must have been destroyed. Slight earth movements took place at the same time producing gentle tilting and folding. The Eocene sea planed down the crests of these folds producing local variations in thickness of the upper zone of the chalk in the Isle of Wight. Notable changes in the life forms had also taken place; and the contrast between the fossils of the Eocene and Chalk is as marked as the nature of the beds which contain them.

The great reptiles like the ichthyosaurs and dinosaurs disappeared, the ammonites died out and true birds took the place of the flying reptiles. In the tertiary era mammals became the dominant vertebrates, while invertebrates such as the mollusca and corals became more akin to present day forms.

The Eocene beds were deposited during several minor cycles of sedimentation. Each cycle began with an invasion of the sea, followed by shallow and deeper water; then came a reversal through shallow water to estuarine and finally continental conditions. As a result, the beds of the Hampshire basin vary rapidly in lithology, both vertically and horizontally. In the east they are mainly marine clays but in the west they are composed mainly of sands, often current bedded, and mottled clays. In the centre of the basin the two bacies overlap in a complicated manner.

The Oligocene Beds, which are present only in the Isle of Wight and the southern New Forest, were laid down almost entirely under non-marine conditions for at the close of the Eocene the open sea moved far to the east and only its most extensive transgressions penetrated into southern England.

A long interval of time elapsed between the laying down of the last of the Oligocene and the formation of the next series of deposits which are mostly superficial plateau gravels. These are fluviatile in origin, but the streams that produced them were of much greater volume than the streams of today. The constituents of the gravels consist of subangular flints mixed with flint pebbles and other materials derived from Eocene deposits.

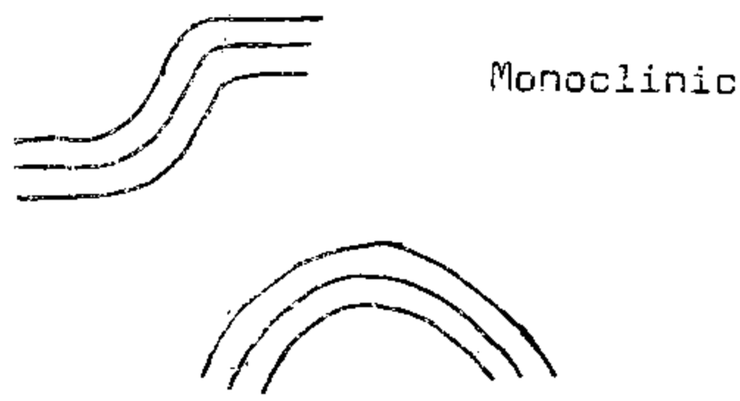
The first visit was to Alum Bay, where a complete sequence of Eocene and Lower Oligocene beds are exposed. The southerly end of this bay is bounded by the promontory of High Down, terminated by the Needles. The cliffs vary in height from 45 to 90 metres and are composed of vertical Eocene sands and clays, striking approximately east to west. High Down is almost vertical chalk. To the north of the chine, down which we approached the bay, is Headon Hill. This is formed by Oligocene beds which are nearly horizontal and rest conformably on the Eocene. This section from Headon Hill to High Down is cut through the lower limb of the great monoclinal fold which controls the tectonics of the whole of the Isle of Wight. The change of dip from horizontal to vertical occurs within the space of 200 metres immediately to the north of the chine. In all, the geology of this bay is quite spectacular and to someone who sees it for the first time, the differential weathering of the vertical multi-coloured beds provides a strange and unnatural landscape.

Ironstone band, Alum Bay.

We worked our way up the succession starting from the junction of the Upper Chalk and the Reading Beds. The basement bed consisted of a brown sand and progressed upwards to a red mottled clay. These fluviatile beds, continental in origin, were succeeded by the London Clay, beds wholly marine in character. They are dark grey siltey clays in the lower part changing to pale sands alternating with grey and blue clays. Some fossils were found including the bivalve

Pholodomya Margaritacea. The Bagshot beds, consisting of bright yellow and white sands was the next succession. The most obvious feature of these beds was the sharp ridge formed by a thin band of Ironstone. This served as a useful reference for the purpose of identification. Near the middle of this bed is a 1.8 metre layer of white pipe clay called the Alum Bay Leaf Bed. Pipe clay is a special type of argillaceous rock which is a deposit of reworked china clay.

Types of folding



At the top of this section of the cliff there could be seen an unconformity, consisting of the horizontal plateau gravels resting on the vertical Eocene beds. This is a continuation of the plateau gravels forming the cap of Headon Hill to the north of the bay.

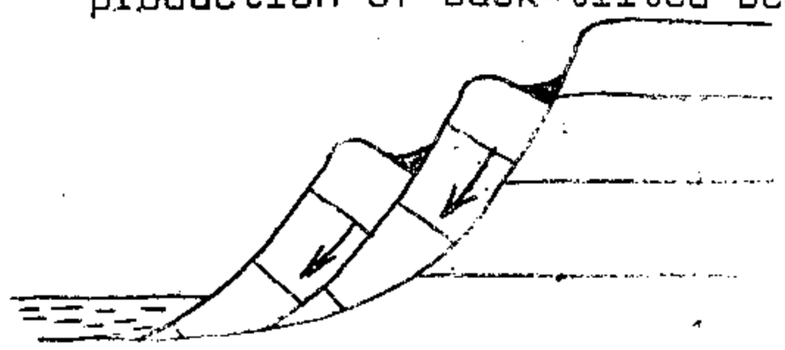
Many members of the society will be experts on the next set of beds that were seen. These were the Bracklesham Beds, but they were of a quite different character to those seen in Bracklesham Bay. These beds show considerable lateral variation and in general there is a lateral passage from marine conditions in the east to freshwater in the west. At Bracklesham the beds are wholly marine. At Alum Bay they are nearly all estuarine with lignite bands

and pebble beds. Further west at Bournemouth the greater part of the beds are fluvio-marine and freshwater. Fossils are few and there are no sharks teeth to be seen at all.

Proceeding eastwards along the south coast of the island, we stopped briefly at Freshwater Bay. Here only a manmade breakwater stops the sea breaking through into the headwaters of the river Yar, which are only a few yards from the beach. The Yar draws to the north, reaching the coast at Yarmouth. If the sea were to break through, all the land to the west of the river would become another island.

Six of the seven zones of the Upper Chalk are exposed in this bay. The lowest is the Holaster Planus which is the basal zone. The highest is the base of the Offaster Pilula zone. The cliffs to the west of the bay showed two interesting features. One was a number of regularly spaced, nearly vertical lines of flint. This is a characteristic of the chalk of the third and largest zone, the Micraster Coranguinum zone. The second interesting feature was the work of man. A sunken roadway was seen leading to the edge of the cliff. This same roadway was seen to continue in the cliffs to the east of the bay. This is a good demonstration of the erosive power of the sea along this coastline. Near to the steps leading down to the pebble beach, a lens on sand and fine graded gravels was seen in the cliff face. This is the ancient bed of a river that once drained a landmass to the south of the present island.

Slumping on curved surfaces with production of back-tilted beds.



At Compton Bay we were unable to see the Pine Raft referred to earlier in this account because of the state of the tide. Instead we walked along from Compton Grange Chine, in the top of the Wealdon Marls, through the younger Wealdon Shales up to a fault where the older marls are again brought to the surface, a distance of about 400 metres. The beds were dipping at about 30^{o} to the horizontal and were capped by a horizontal gravel bed. The Wealden Beds include paper-shales, a shale which splits uniformly into thin slightly flexible laminae and are usually regarded as representing deposition under very quiet lagoonal or lacustrine conditions. Shelly limestones, clay-ironstone layers and sandstones are also present.

The sea again beat us at the Otherfield coast section. This is a classic section of the Lower Greensand and will be visited again when we next visit the island.

The final visit was made to see the recent landslip at Blackgang, a type example. The essential conditions for slumping of this type are a heavy rock, Upper Greensand in this case, overlying a weak and easily lubricated formation, which at Blackgang is Gault Clay. Slumping takes place on curved shear planes. These are often spoon shaped and leave an arcuate sear on the defaced cliff. Because of the rotational slip, backward tilting of the surface and of the dip of the bed occurs. Great masses of Upper Greensand are seen with a very apparent dip to landwards, due to this rotational slipping.

BRACKLESHAM BAY FIELD TRIP SUNDAY 15th APRIL 1973

The warm sunshine brought about twenty members of the society and their families to Bracklesham.

Our first stop was at Mr Fowlers house where members were able to see and examine his fine collection of macro and micro fossils from the local Eocene and Pleistocene formations. Tea and biscuits were kindly provided by Mrs Fowler, then the party moved down to the beach at East Wittering.

The Bracklesham Beds exposed at low tide on the foreshore represent marine conditions, which pass into freshwater and esturine conditions as one travels westwards to Bournemouth and the Isle of wight. The beds have yielded a rich and varied fauna with species that indicate tropical or sub-tropical conditions around the depositional basin.

These marine beds consist of glauconitic sands, sandy clays and clays, deposited in an environment apparently suitable for the large assemblage of species represented in the fossil record.

A trowel or other digging tool is required for examining these beds and collecting fossils material, rather than the traditional hammer and chisel of the hard rock geologist.

From East Wittering the succession of beds examined by the party started with the Cakeham beds. These beds of blue grey clay are characterised by fossils of Turritella and Venericor planicosta.

To the east of Bracklesham Bay Hotel the Barn bed yields a similar fauna to the Cakeham beds.

The Polate bed which succeeds the Barn bed has in the past provided many good specimens of the tooth plate of the Eagle Ray. On this occasion portions of the anterior edge and biting surface were collected. This area of the beach also provided some of the sharks teeth that were collected.

The succeeding Nummulits bed and Little bed were examined by a few members of the party. By this time the tide had turned and was rapidly covering the exposures we had previously walked over, we therefore returned to the car park.

Summary of the succession of beds along part of Bracklesham Bay.

Bed	Characteristic fossils
Miocardia bed	Miocardia pectiferna
Little bed	Tirelina striatula
Camparsile bed	Molluscs. position unknown
Nummulite bed	Nummulite laevigatus
Polate bed	Fish remains and fruit
Barn bed	Venericardia and Turritella 2sp
Cakeham bed	Venericor planicosta. Turritella 2sp