Quaternary Field Study Group, Canterbury Meeting 1967

CAMBERING AROUND MAIDSTONE

Introduction

Although cambering is now known to be developed at many places in the Weald (Gallois 1965, p. 69) it is most widespread and best exposed around Maidstone. The formation primarily responsible for it is the Hythe Beds, 60 to 120 ft thick and consisting of alternate beds of hard slightly sandy limestone (ragstone) and compact calcareous sand (hassock). The underlying Atherfield Clay (20 to 60 ft thick) is also cambered, and the downward camber movement was presumably compensated for by squeezing-out and valley-bulging of the topmost 100 ft or so of the next underlying formation, the Weald Clay.

The area most affected by cambering (Fig. 1) is that in which chert layers are developed in the Hythe Beds (Worssam 1963, fig. 10, p. 36). The chert appears to have acted as a reinforcement, causing in the first place the development of a high escarpment, and under periglacial conditions resisting the carving-up of the outcrop by forces of denudation that is displayed where chert is little developed, as in the upper Len valley around Leeds, (Worssam 1963, fig. 9, p. 29), and from Little Chart eastwards to the coast (contrast 1-in Sheet 288 with sheets 289 and 305/6). The westward limit of cambering, in the area of Sheet 287, is not known.

Knowledge of the detailed succession in the Hythe Beds is essential in working out the extent of movements displayed in quarries. A group of beds near the middle of the formation, comprising the Coalman, White, Chance and Flint limestones (Fig. 2) is readily recognisable in most quarries. In Spot Lane Quarry at present (Figs. 3 and 5) the group can be identified at two places. The Coalman may have died out here.

Spot Lane and Pine Farm quarries

Spot Lane quarry is on the cambered dip-slope forming the south side of the Len valley, and shows northerly dipping dip-and-fault structure throughout. Towards the camber edge is the face exposing the synclinal structure of Fig. 4, now partly obscured. Fig. 5 shows the syncline's relation to the cambered slope, leading to its interpretation as a 'sag' (Kellaway and Taylor 1953, p. 361). Gulls (locally known as wents) in the upper part of Spot Lane quarry are lined with chert fragments probably from the Flint lane (local name for bed). In the

/intermediate

intermediate quarry and in Pines (or Pine Farm) Quarry are east-west brickearth-filled gulls, left standing after quarrying, of the type developed strongly in the Medway valley. Gulls in Pine Farm Quarry show no relation to the clay-floored Willington valley, which like the Dean Street valley (Worssam 1963, frontispiece) seems to have been ripped out of the cambered slope at a late stage.

Age of the Cambering

Cambering is later than the 4th (or 200-ft) Terrace (?Great Interglacial age) in the Len and Medway valleys (see Fig. 5). On the other hand cambering had presumably finished by the time some 1st Terrace (Weichselian) deposits, about 30 ft O.D., were laid down in the Medway valley at Teston and Maidstone. The camber along the escarpment from Yalding to Sutton Valence, graded to relics of Head deposits at 150 and 165 ft O.D., dates possibly from the Gipping Glaciation (Worssam 1964). But along the Medway valley downstream from East Farleigh the cambered edge of Hythe Beds more or less coincides with the 50-ft contour. This low altitude and the undissected nature of the camber compared with that on the escarpment seem to suggest that movement in the valley was Weichselian. Some bones found long ago in a loam-filled fissure at Boughton Quarries, and others from Maidstone brickearth, are mostly of cold-climate species, but these and shells recorded from the brickearth give little help in dating (details in Worssam 1963, pp. 106-7).

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WORSSAM, B. C. 1963. Geology of the Country around Maidstone. Mem. geol. Surv.

——————— 1964. Written contribution to the discussion of a paper previously taken as read: 6 March 1964. Proc. Geol. Ass., 75, 573-5.

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QUATERNARY FIELD STUDY GROUP. CANTERBURY 1967

THE QUATERNARY DEPOSITS OF PEGWELL BAY

Pegwell Bay, near Ramsgate, Kent is well known as a Quaternary site from the researches of Prestwich in the last century and more recently those of Pitcher et alia (1954) and Kerney (1965). Further attention has been paid to the sections in the recent six-inch mapping of the Ramsgate (274) Sheet.

HEAD BRICKEARTH (as mapped by the Survey) caps the cliffs over the entire section, except where it has been quarried away. The brickearth was first shown to be a true loess or wind-blown silt by Pitcher et alia (1954), whose findings are confirmed by mechanical analyses carried out at the I.G.S. It also shows most of the other diagnostic characters of loess, such as vertical prismatic jointing and the related tendency to stand in vertical faces, presence of calcareous root-tubes and concretions, general buff to brown colour with darker leached upper layer, etc. A fossil soil showing a dark organic A Horizon over a pale leached B horizon is developed on the loess in places and is covered by Holocene hillwash of very similar general character to the loess. An attempt to date the soil by pollen analysis failed due to the destruction of the contained pollen by oxidation (R. G. West personal communication). Kerney (1965) has suggested a Pleniglacial Stadial B date of origin for the loess, by inference from deposits which apparently overlie it at North Cliff, Broadstairs. It is not, however, clear that the loess at North Cliff is the time equivalent of that at Pegwell, which may thus be of more recent origin.

SOLIFLUCTION DEPOSITS AND CRYOTURBATION PHENOMENA. The sections show evidence of several phases of solifluction and cryoturbation - probably corresponding to the climatic oscillations of the last Glaciation (Weichsel). The composite valley fill exposed in the cliff 100 yds west of Little Cliffsend Tunnel shows convincing evidence of such oscillations:- An early cold phase is demonstrated by the severe frost-shattering of the chalk in place (1), a milder humid period is represented by the chalky flinty 'Coombe Rock' deposit (2); (the interface between (1) and (2) is possibly an erosion surface). A further cold period is responsible for the frost-heaving affecting (2) - it may be the same as that in which the brodelboden seen at the top of the Chalk cliffs east of the Tunnel were formed. Subsequently the channel represented by the surface between (2) and (3) was eroded, cutting through the Coombe Rock to the shattered chalk beneath. A flinty gravel (3) in a fermginous sandy matrix was solifluctod to floor the channel. Deposit (4) the main filling of the channel is a faintly banded grey-brown silty loam probably derived locally from the Thanet Beds and redeposited by solifluction or by water in a milder period. A further episode of solifluction is responsible for the chalky flinty gravel in a brown loamy matrix (5) which lies over the channel fill and beneath the loess; it is strongly cryoturbated, indicating a return to frigid conditions; its interface with the loess (6) is fairly sharp.

Various other features will be commented on during the excursion.

E. R. Shephard Thorn
March, 1967

Head Gravel of Westbere, near Sturry

Terrace-like spreads of rough, crudely bedded but largely unsorted flint-gravel, with a loamy and clayey matrix, have been worked to their base, on the London Clay at about 10 ft. Brickearth has been shown to overlie the gravel and a fine sandy variety to be interbedded with it.

The deposits are referable to a stage II as investigated in the Faversham (273) Sheet area and form part of a series of dissected fans and mantles of probably periglacial drift which can be traced over the Blean hills. They show regional and textural distinctions from the 3 terraces of River Gravels of the Stour but at this level of about 110 to 130 ft O.D. bordering the north side of the Stour Valley they show affinities with true fluviatile gravels, into which they may have graded at a primitive stage of development of the Stour, which later dissected them near their southern limits.

Exposures at Westbere Ballast Pits (1962) Ltd., show ochneous gravels with large battered flints, derived tertiary materials (pebbles, etc) and smaller broken flint, without significant sorting or axial arrangement.

The former Stonerocks gravel-pit, $\frac{1}{4}$ mile to the west of the present workings, yielded Chellean types of artifacts to the indefatigable Dr. Ince of Sturry.

Institute of Geological Sciences S. C. A. Holmes March, 1967.

Quaternary Field Study Group, Canterbury, 1967

DRIFT DEPOSITS OF THE MEDWAY VALLEY between ROCHESTER & SNODLAND

(a) From near Cuxton a view southwards indicates the general distribution of Head Deposits in the Medway Valley and its dry-valley tributary from Nashenden Bottom. Reference to the geological map will show the relationship of these drifts to River Deposits of the Medway and also their distribution as soli-fluxion deposits and hillwashes of essentially local materials on slopes as well as in the valley floors. River Terrace deposits, at one time assumed to be commonly present (as, mistakenly, at the 'Halling Man' site) are very restricted and largely covered by the Head.

Mapping in recent years on the six-inch scale in the areas of the Chatham (272), Faversham (273), Ramsgate (274), Maidstone (288), Canterbury (289), Dover (290) and Folkestone (305) sheets has paid special attention to drifts which up till about 1937 had not been separated in normal Geological Survey practice; it has provided a broad distribution pattern of Head which, particularly in the dry valleys, shows a certain preferential development on N.E. - and S.E. - facing slopes.

The researches led by Dr. Kerney in selected areas have demonstrated many detailed stratigraphical subdivisions of the younger head deposits, grouped by him in the Medway Valley into three stages of Late-glacial (Late Weichselian) and one of Post-glacial.

(b) Sections in the approaches to the Formby Pit of the Rugby Portland Cement Company Ltd. at Halling-on-the Medway [Lower Halling]. See Chatham Memoir pp. 115 and 127, Kerney 1963 pp. 217 and 218 (TQ 700648), Burchell 1965.

Chalky, loamy and stony drifts to a thickness of over 10 ft may be seen in several, now rather limited, exposures.

The Post-glacial and Late-glacial deposits were elucidated by Dr. Kerney's studies of the drifts and their molluscan faunas in exposures at Upper Halling and Holborough which formerly showed much detail. At Lower Halling the brown flinty chalk rubble at the top is Post-glacial. The Late-glacial deposits seen below rest on Full-glacial which may pass eastwards into 1st Terrace deposits of the Medway; certainly the Late-glacial drift above was formerly well seen to pass laterally into a chalky Head Brickearth which in this part of the Medway Valley, on both banks, has been shown to overlie the 1st Terrace deposits (sandy water-lain brickearth and gravels).

A borehole a little to the east of the present sections passed through 20 ft of stoneless drift [? Post- and Late-glacial], 5½ ft of stony deposit [? Full-glacial], and 9½ ft of "large sand and ballast" [Full-glacial; ? 1st Terrace] on the Lower Chalk.

From Mr. Burchell's detailed study of the fresh sections in the tramway cutting he was able to recognize a Middle Weichselian interstadial horizon indicated by the mollusca from a bed of 'brickearth' between two beds of 'coombe rock'.

Selected References:

One-inch New Series Geological Survey Sheet 272 (Chatham)

Burchell, J. P. T. An Interstadial Horizon of the Last Glaciation at Halling, Kent. Journ. Conch., 25, 1965, pp. 353-358.

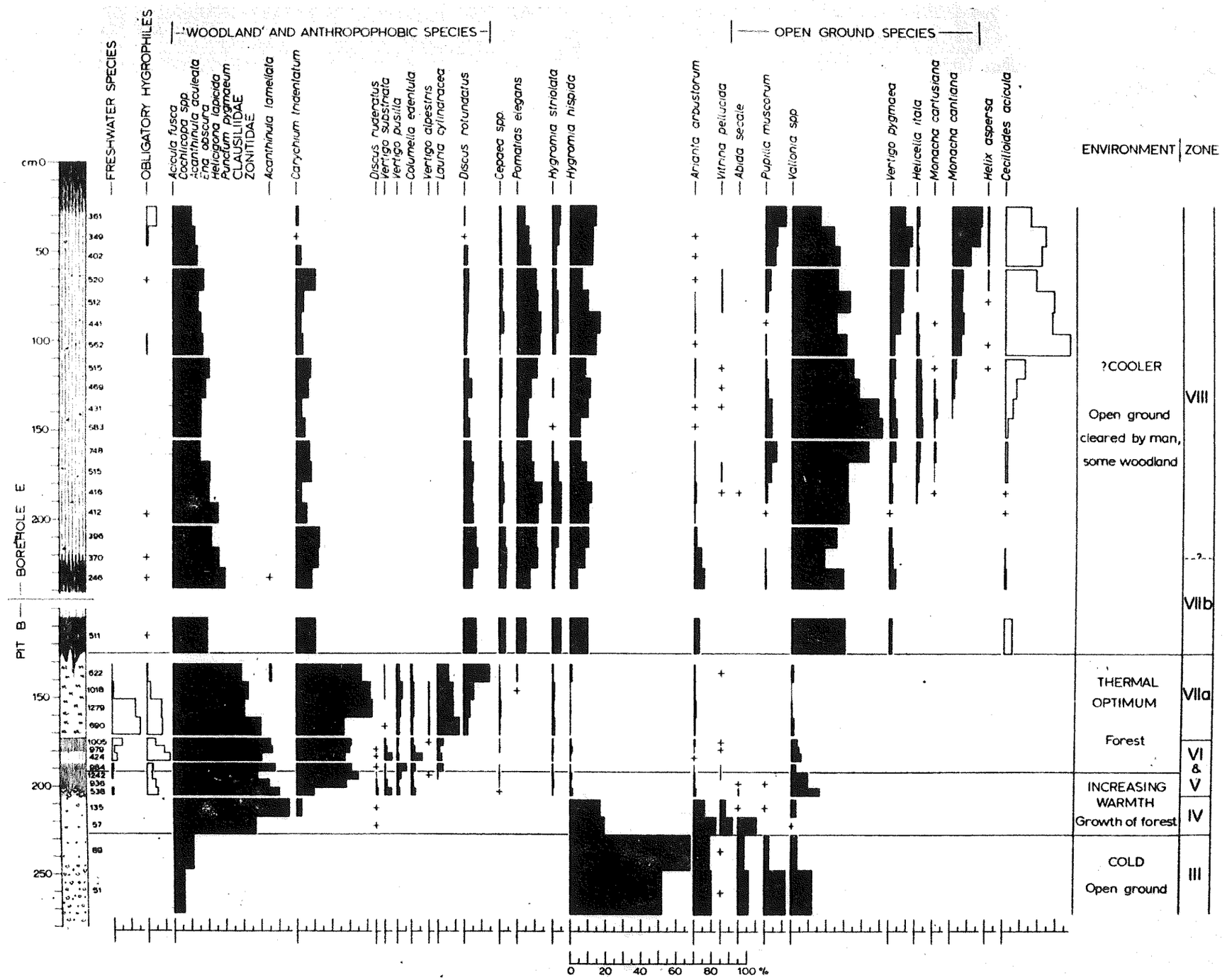
Dines, H. G., et.al. Geology of the Country around Chatham. 1954. Mem. Geol. Surv.

Kennard, A. S. The Crayford Brickearths. Proc. Geol. Assoc., London, 55(3), 1944, pp. 121-169 [see p. 129].

Kerney, M. P. Late-glacial Deposits on the Chalk ofSouth-East England. Phil. Trans. Royal Soc., London, B., 246(730), 1963, pp. 203-254 [see especially pp. 210-219].

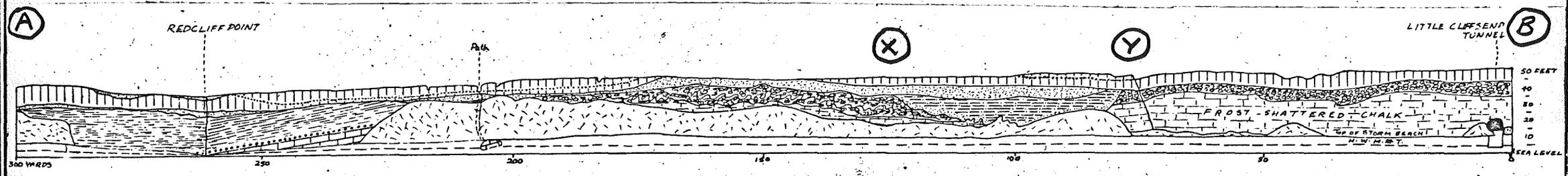
S. C. A. Holmes
Institute of Geological Sciences

March 1967

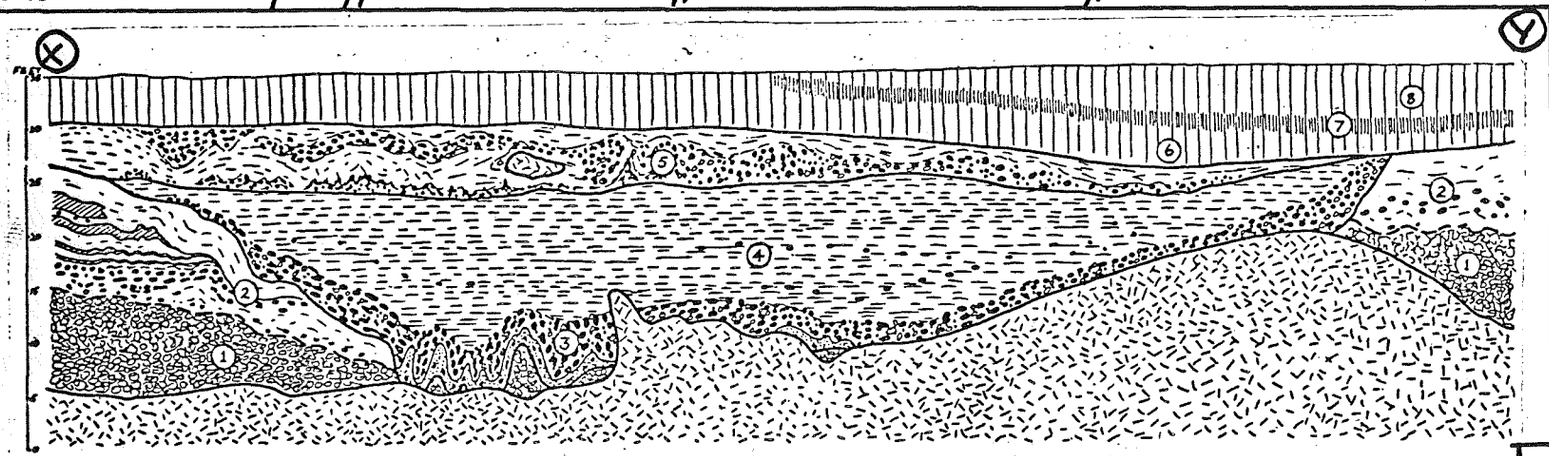

FRESHWATER SPECIES
OBLIGATORY HYGROPHILES
'WOODLAND' AND ANTHROPOPHOBIC SPECIES
OPEN GROUND SPECIES
Acicula fusca
Cochlicopa spp
Acanthinula aculeata
Zua obscura
Helicigona lapicida
Punctum pygmaeum
CLAUSILIIDAE
ZONITIDAE
Acanthinula lamellata
Carychium tridentatum
Discus ruderatus
Vertigo substriata
Vertigo pusilla
Columella edentula
Vertigo alpestris
Lauria cylindracea
Discus rotundatus
Cepaea spp
Pomatias elegans
Hygromia striolata
Hygromia hispida
Arianta arbustorum
Vitrina pellucida
Abida secale
Pupilla muscorum
Vallonia spp
Vertigo pygmaea
Helicella itala
Monacha cartusiana
Monacha cantiana
Helix aspersa
Cecilioides acicula
ENVIRONMENT
ZONE
BOREHOLE E
PIT B
cm
0
50
100
150
200
250
361
349
402
520
512
441
552
515
469
431
583
748
515
416
412
396
370
246
511
622
1018
1279
690
1005
979
424
884
1242
936
538
135
57
88
51
?COOLER
Open ground cleared by man, some woodland
VIII
?
VIIb
THERMAL OPTIMUM
Forest
VIIa
VI & V
INCREASING WARMTH
Growth of forest
IV
COLD
Open ground
III
0
20
40
60
80
100 %

QUATERNARY OF PEGWELL BAY

Q.F.S.G. Canterbury 1967



Sketch section of Cliffs between Redcliff Point and Little Cliffsend Tunnel



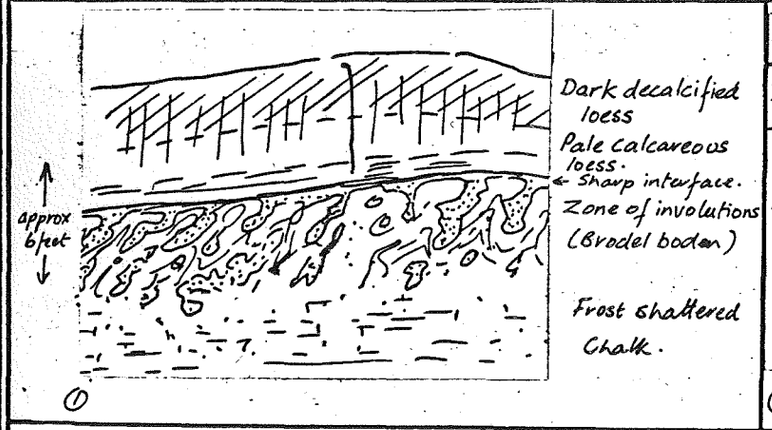
Detail of drift filled channel. Explanation on separate sheet.

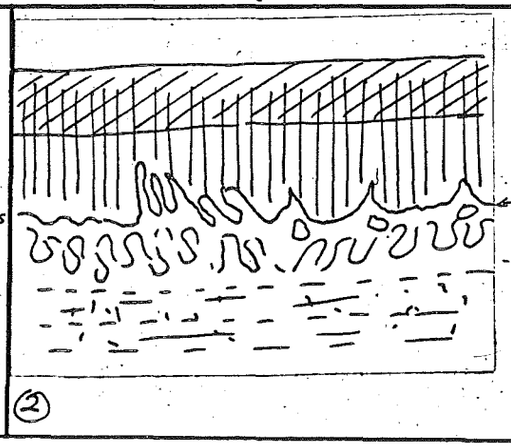
DRIFT

- Head brickearth (loess) with soil horizon
- Flinty, loamy soliflucton deposits
- Loamy valley fill
- 'Coombe Rock' Chalky, flinty soliflucton deposits

SOLID

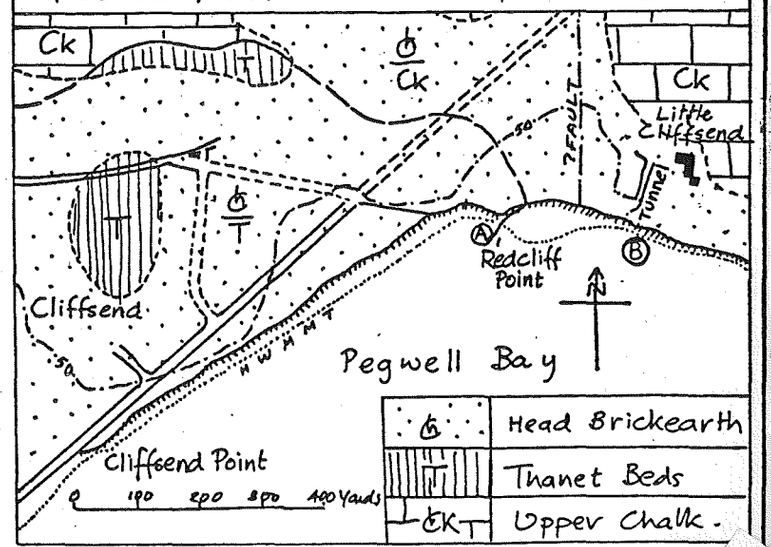
- Thanet Beds
- Upper Chalk
- Frost-shattered chalk
- Obscured.





Differing relations of loess to chalk in adjacent sections. (East of Little Cliffsend).

GEOLOGICAL MAP - PEGWELL BAY



The Lenham Beds.

It is felt that those members of the QFSG unfamiliar with S. E. England would wish to visit an exposure showing piping of Lenham Beds and related material into the Chalk. It is stressed that the visit is more sentimental than utilitarian and that fossiliferous material is not expected to be visible. However, the halt will allow brief discussion of the Lenham Beds and some notes are given here.

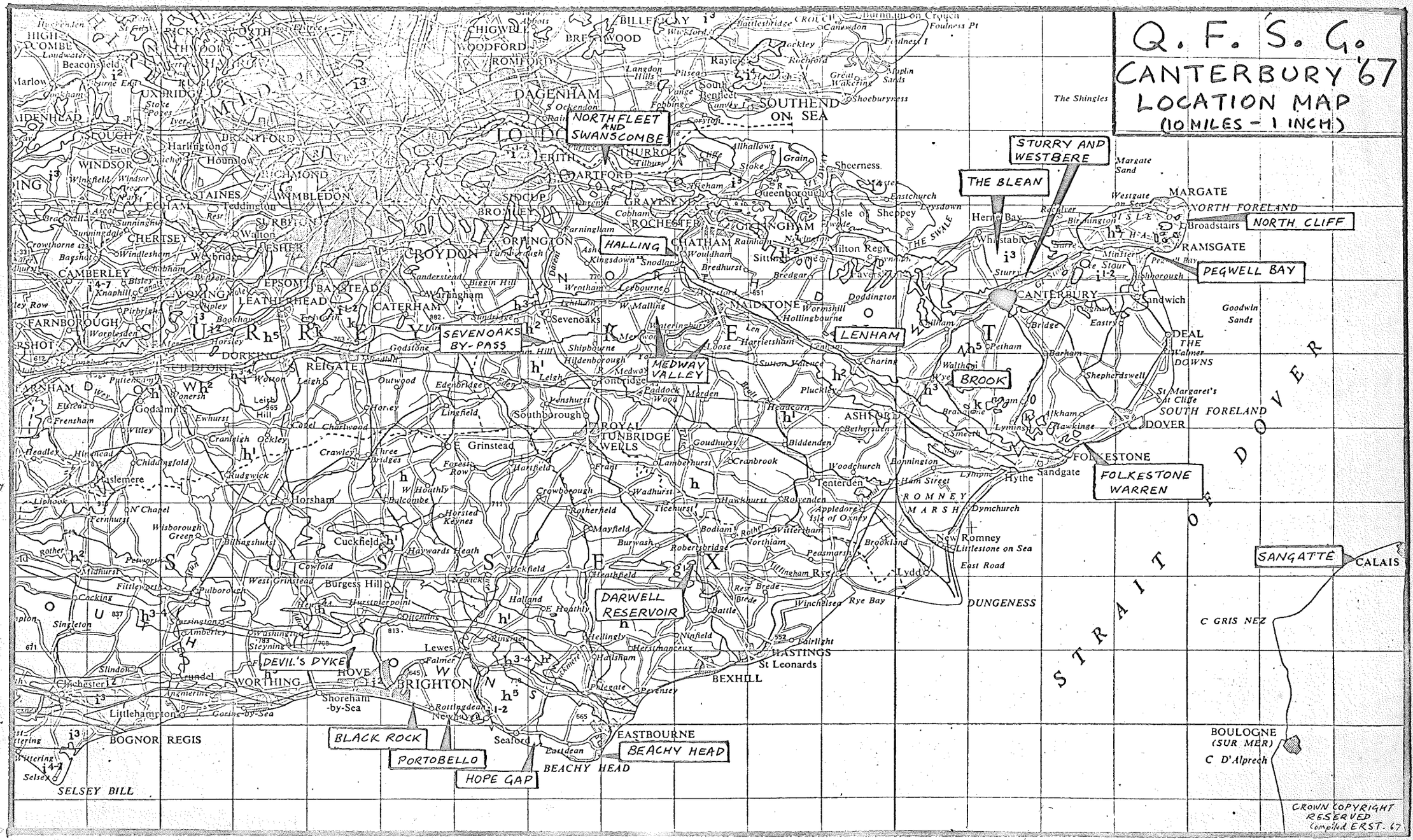
The name Lenham Beds is applied to a range of deposits that are almost certainly polygenetic. The bulk of the material is Clay-with-Flints sensu lato in the sense of Loveday (1962). Deep exposures in this are only seen in temporary excavations when there is commonly seen to be several feet of sandy clay with very large angular flints over a clayey sand with far fewer flints and sometimes hardly any at all. This sequence is not easy to account for and while it could be due to the horizontal transport of flinty material by (say) solifluction, vertical sorting by frost heave seems more probable. The very rich colours suggest a long period of subaerial weathering - reds and orange yellows predominate. A good deal of Tertiary material is probably incorporated.

Associated (the term is deliberately vague) with this material, and perhaps most commonly found in the deep solution features called pipes, are fragments of fossiliferous sandstone. While the fossils are not well preserved, a recent thorough review by Chatwin (Maidstone sheet Memoir) shows that they are generally consistent with a Diestian age (LOwer Pliocene or perhaps Upper Miocene),. This poses the problem that the Netley Heath Beds (near Guildford) which lie on the same c. 600 foot surface as the Lenham Beds contain Red Crag (i. e. Early Pleistocene) fossils, a date which is more consistent with the morphological evidence for the age of this marine bench. Shotton (1962) has suggested that the Lenham Beds fossils might indicate an earlier submergence to c. 900 feet, but the drainage-structure relationships suggest 650 feet as the limit of marine transgression. Admittedly the problem is complicated by the fact that from the Medway eastwards the Early Pleistocene? bench extended south of the present line of the Chalk scarp so that no remnants of the Pliocene land surface are preserved on the Chalk.

Whatever the origin of the infilling material, the pipes are clearly solution features: the convergent movement of percolating water has concentrated solution, opening up the preferred route which has thus led to further convergence of water. The pipes can be of large dimensions, but the most common ones are only a few feet across although commonly tens of feet deep. The material within them is completely disturbed, and this can sometimes be seen in the bedding. The margins are the Clay-with-Flints sensu stricto of Loveday, generally stained black - by manganese?

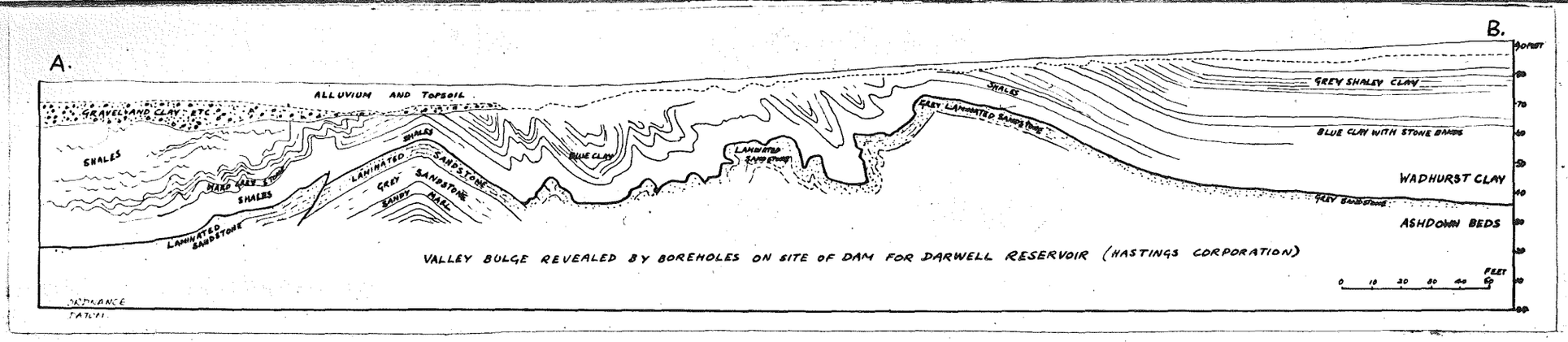
In conclusion it must be stressed that while much attention has naturally been paid to the fossils and also some attention to the heavy minerals, the stratification and weathering profile of the Lenham Beds remains little known and deserves attention.

K. M. C.


Q. F. S. G.
CANTERBURY '67
LOCATION MAP
(10 MILES - 1 INCH)
NORTH FLEET AND SWANSCOMBE
STURRY AND WESTBERE
THE BLEAN
NORTH CLIFF
PEGWELL BAY
HALLING
SEVENOAKS BY-PASS
MEDWAY VALLEY
LENHAM
BROOK
FOLKESTONE WARREN
DARWELL RESERVOIR
DEVIL'S DYKE
BLACK ROCK
PORTOBELLO
HOPE GAP
BEACHY HEAD
SANGATTE
CALAIS
BOULOGNE (SUR MER)
C GRIS NEZ
C D'Alprech
DUNGENESS
SELSEY BILL
STRAIT OF DOVER
CROWN COPYRIGHT RESERVED
Compiled ERST. 67

Q.F.S.G CANTERBURY. 67.

1.



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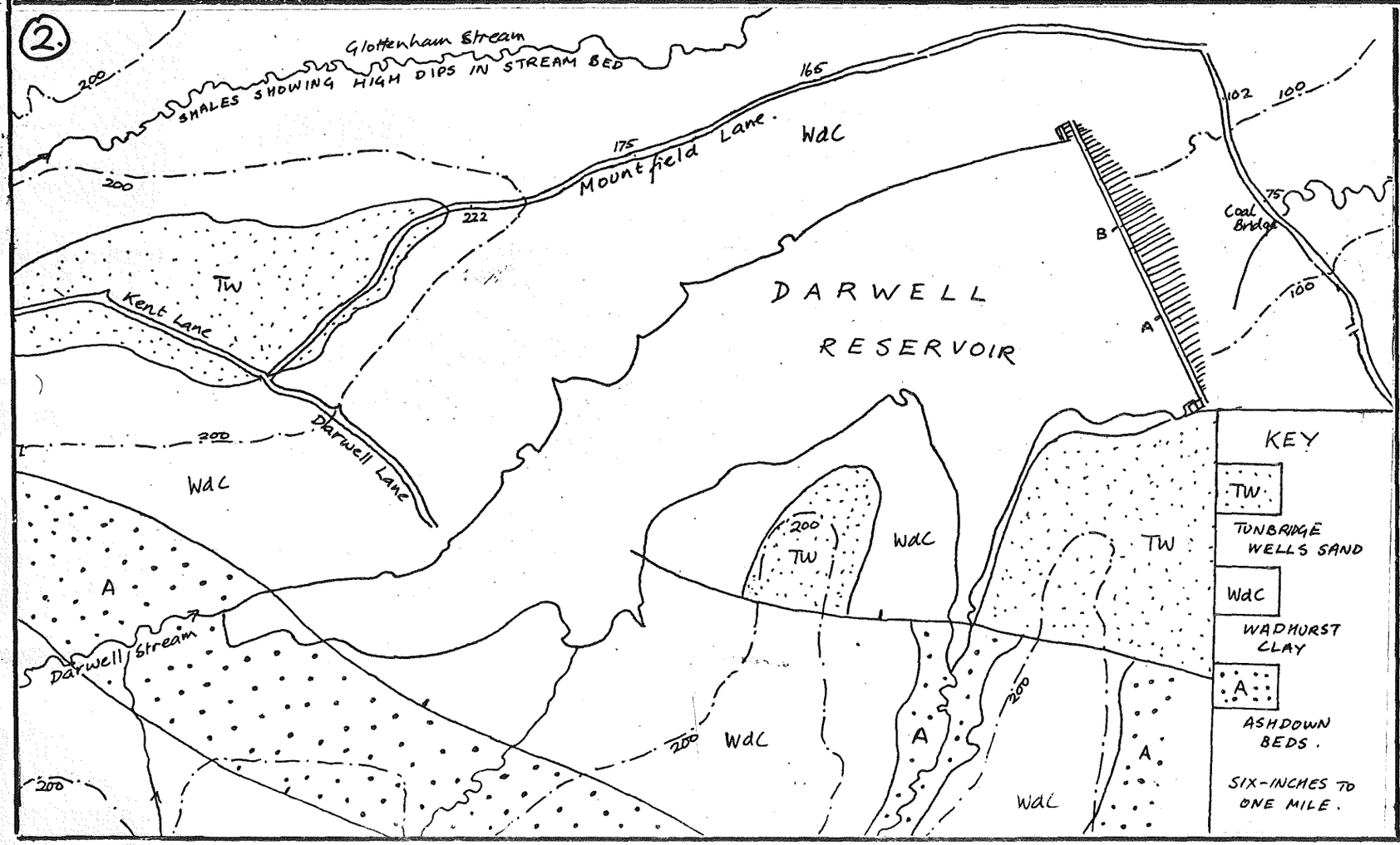


VALLEY BULGE AT DARWELL RESERVOIR

The section A-B was constructed with information from a series of boreholes on the line of the cut-off trench.

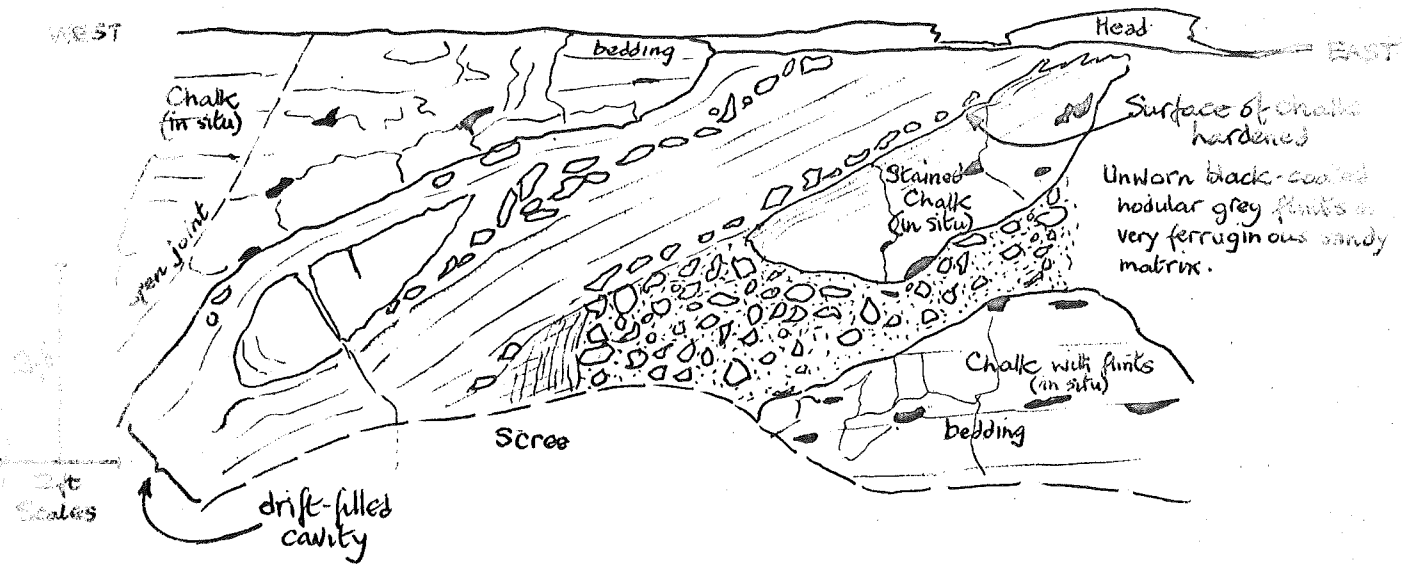
The geological Map (2) shows the regional setting of the bulge. High dips in the Wadhurst Clay shales exposed in the bed of the Glottenham Stream show that bulging is also present there.

The structures shown are typical of this phenomenon

ERST March. 67.

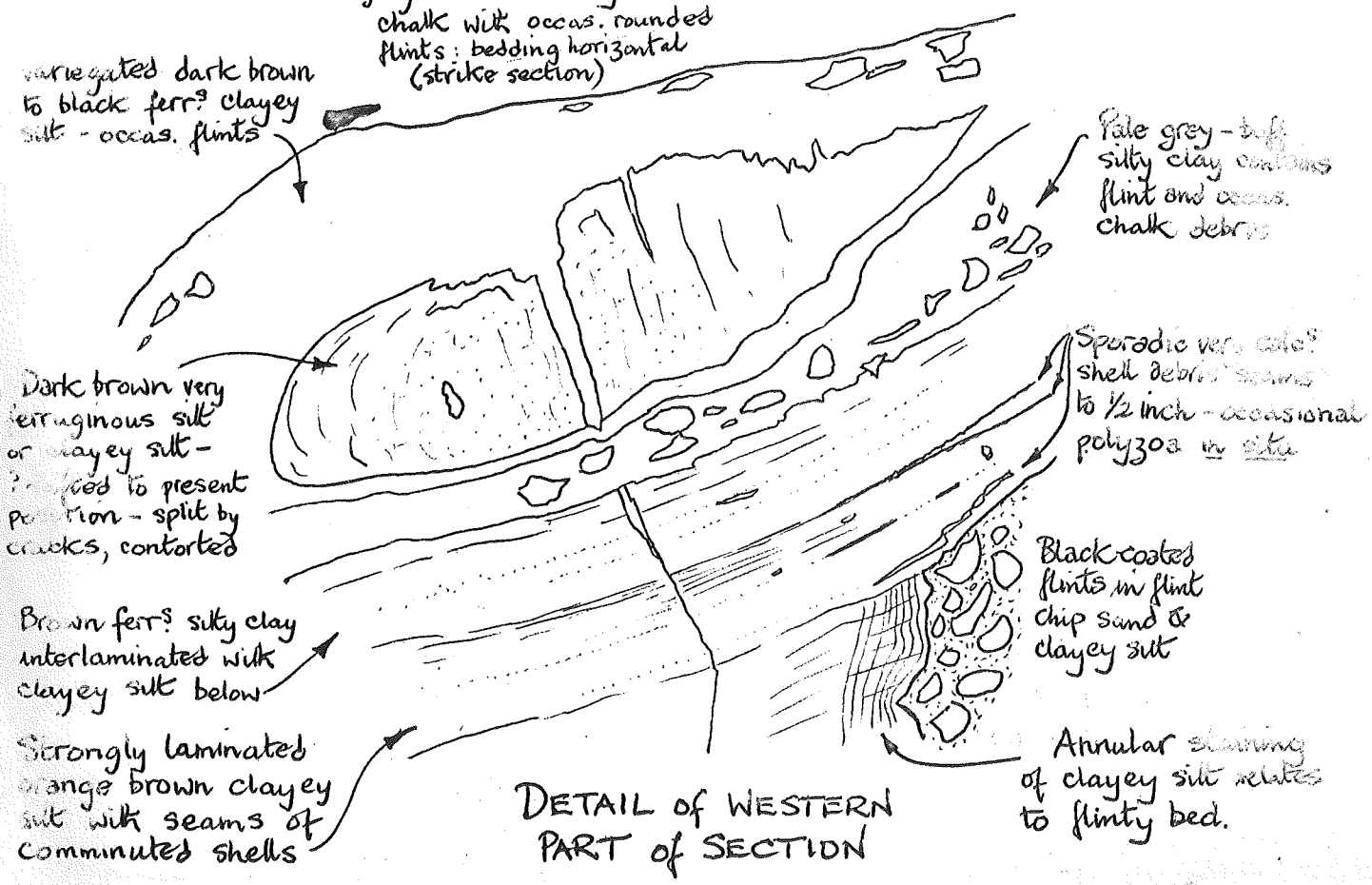
QUATERNARY FIELD STUDIES GROUP : 1967

TEMPORARY SECTION - UPPER BEEDING



A Drift-filled crevice in bedded Upper Chalk at approx. 50 ft A.O.D.
[Grid ref. TQ 1995 0840, in cutting 200 yd south of cement works]

Sketches by R. G. THURRELL
17 March 67



DETAIL of WESTERN PART of SECTION

N

RIVER OUSE

LEWES

Cliffe

539

Glyndebourne

Glynde Reach

Mount Caburn 491

The Brooks

Firle Park

Firle Beacon 712

624

River Ouse

368

408

331

188

NEWHAVEN

221

Portobello

Friars Bay

Chalvington

River Cuckmere

116

HAILSHAM

268

188

131

Hurstmonceux Castle

80

84

P E V E N S E Y

L E V E L S

O-36 Monxey Level

Hooe Level

Pevensey Haven

Walders Haven

Pevensey Castle

Pevensey Bay

Polegate 91

+Wilmington

The Long Man

Windover Hill 589

Alfriston

493

409

385

Combe Hill 638

Willingdon Level

Crumbles

SHINGLE

Langney Point

EASTBOURNE

Westdean

Exceat Bridge

SEAFORD

SHINGLE BAR

Seaford Head

Hope Gap

Cuckmere Haven

Seven Sisters

Birling Gap

Belle Tout

Friston

355

+Eastdean

506

512

536

341

LANDSLIPS

ERODED LANDSLIPS OF LOWER GREENSAND & GAULT CLAY

FISSURED UPPER GREENSAND OF HEAD LEDGE

BEACHY HEAD

ALLUVIAL DEPOSITS

HEAD (INCLUDING VALLEY GRAVELS)

CLAY-WITH-FLINTS

DISTURBED EOCENE

EOCENE

CRETACEOUS

BASE OF UPPER CHALK

BASE OF U. GREENSAND

·409 SPOT HEIGHT

—·—100 CONTOUR IN FEET ABOVE ORDNANCE DATUM

—·—5— SUBMARINE CONTOUR IN FATHOMS

⊙-70 LEVEL OF SUB-DRIFT SURFACE PROVED IN BOREHOLE

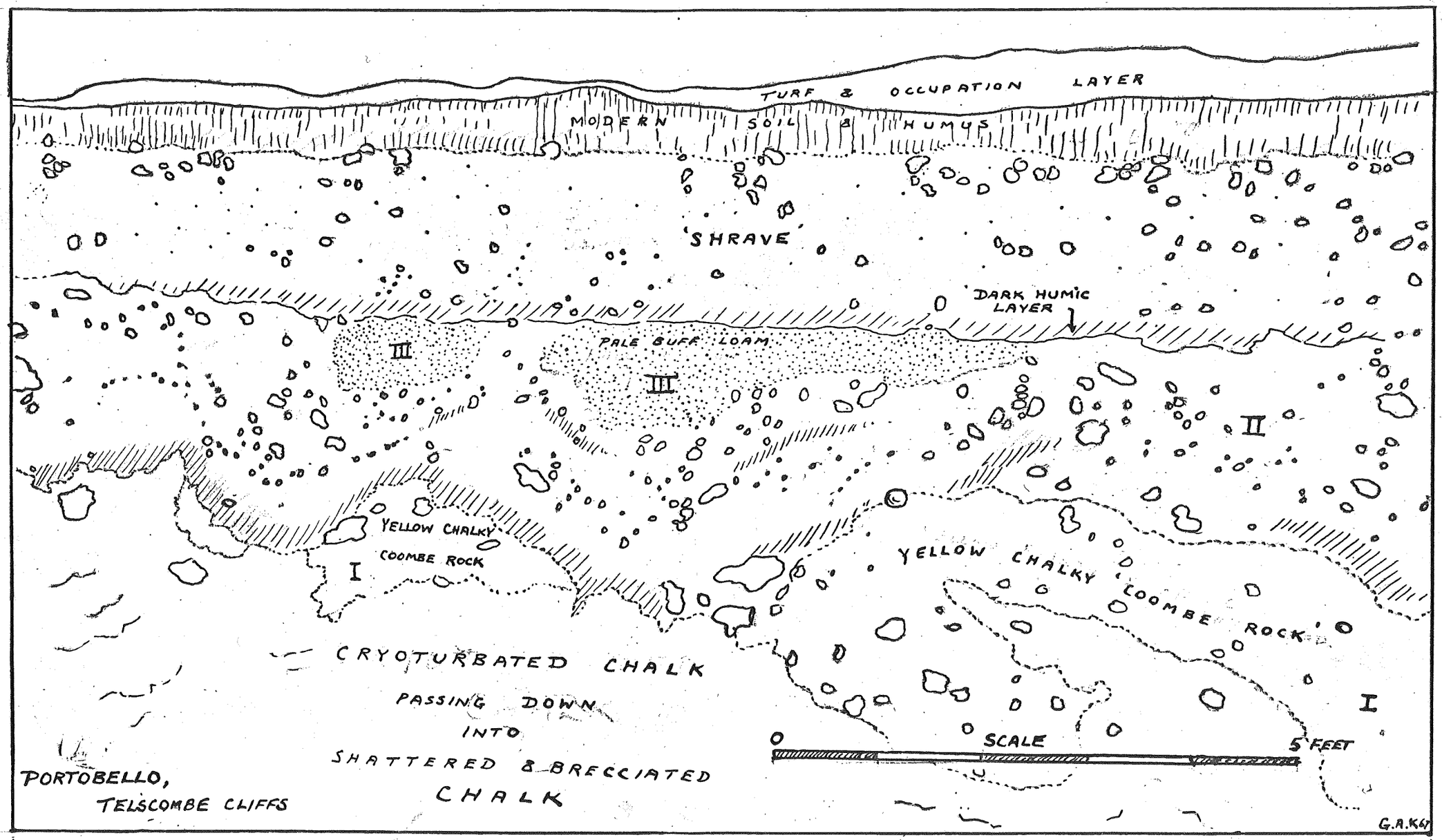
-70 SUBDRIFT FLOOR NOT PROVED

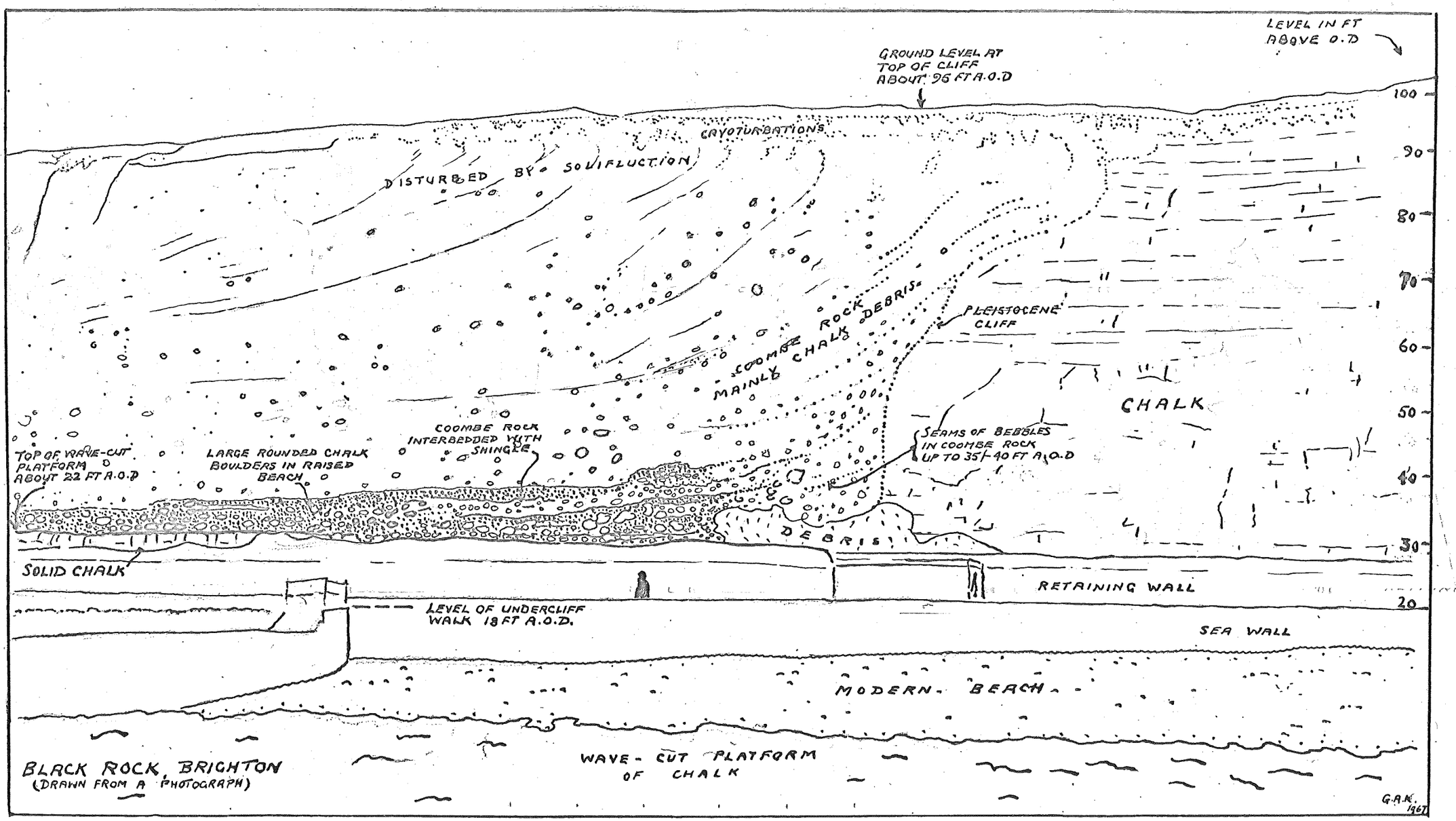
0 1 2 3 4 5 MILES

SCALE

Based on Geological Survey NS Sheets 319 & 334

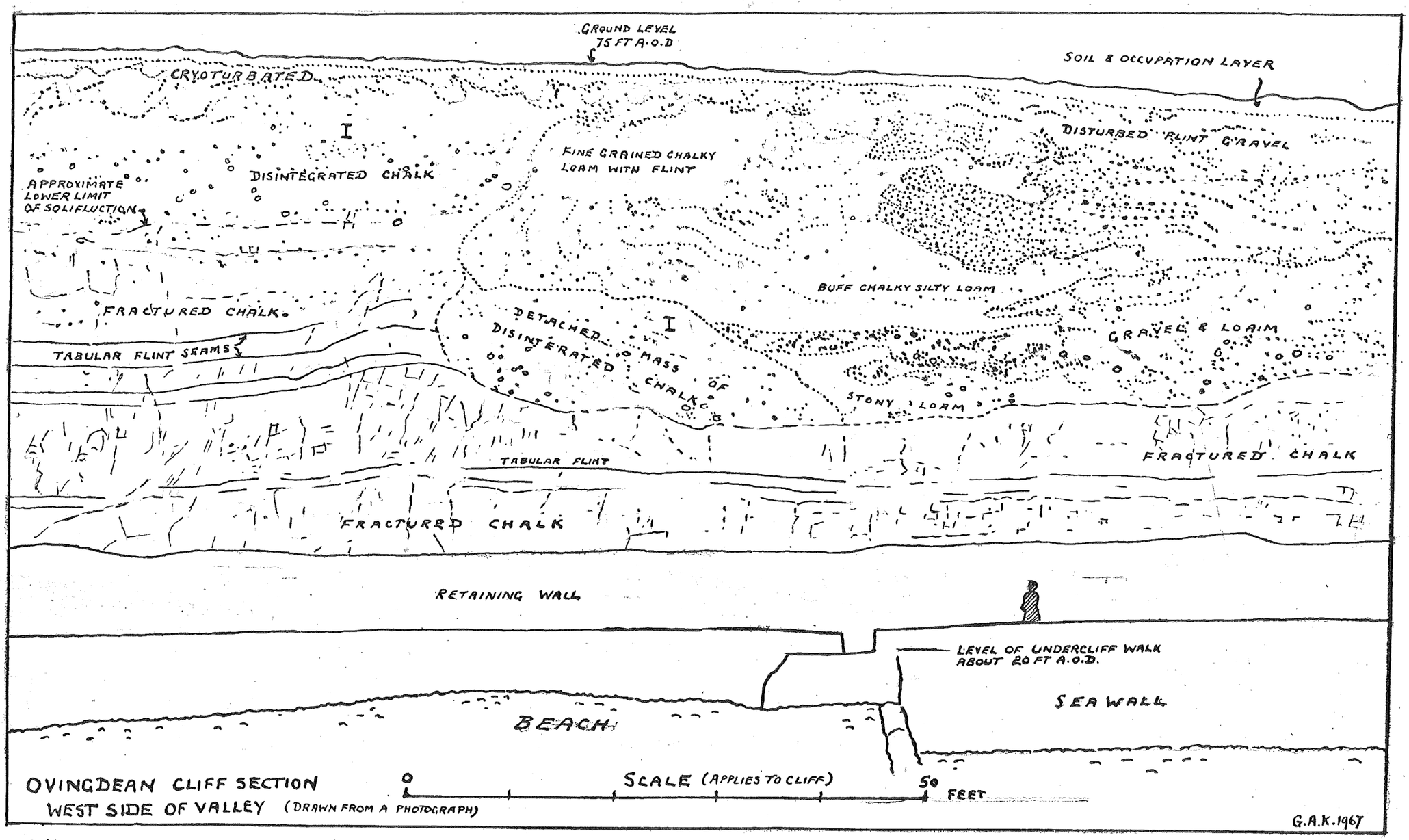
G.A.K. 1967


TURF & OCCUPATION LAYER
MODERN SOIL & HUMUS
'SHRAVE'
DARK HUMIC LAYER
PALE BUFF LOAM
III
III
II
I
YELLOW CHALKY COOMBE ROCK
YELLOW CHALKY COOMBE ROCK
I
CRYOTURBATED CHALK
PASSING DOWN
INTO
SHATTERED & BRECCIATED
CHALK
PORTOBELLO,
TELSCOMBE CLIFFS
0 SCALE 5 FEET
G.A.K.47



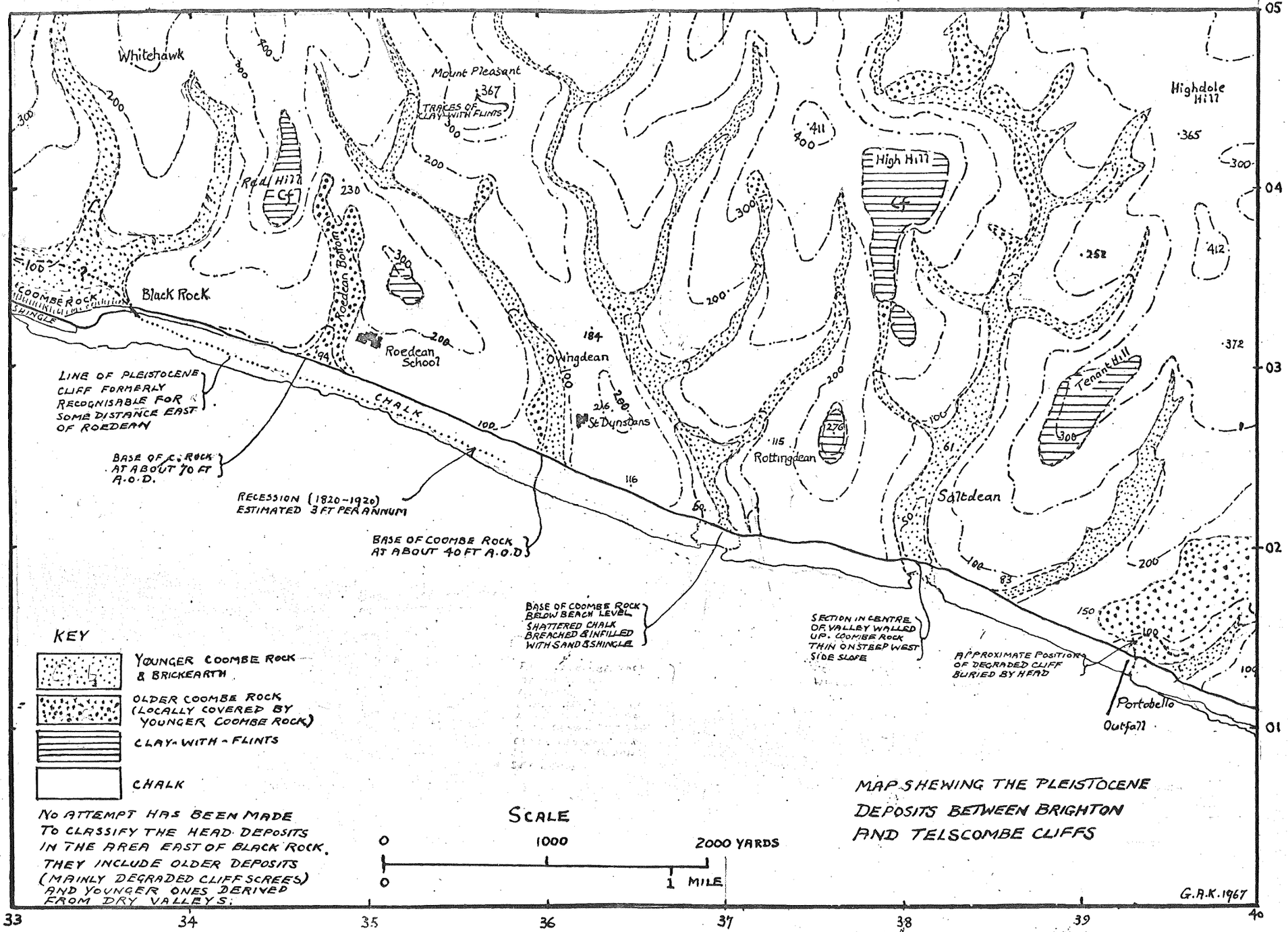
BLACK ROCK, BRIGHTON
(DRAWN FROM A PHOTOGRAPH)

G.A.K. 1967



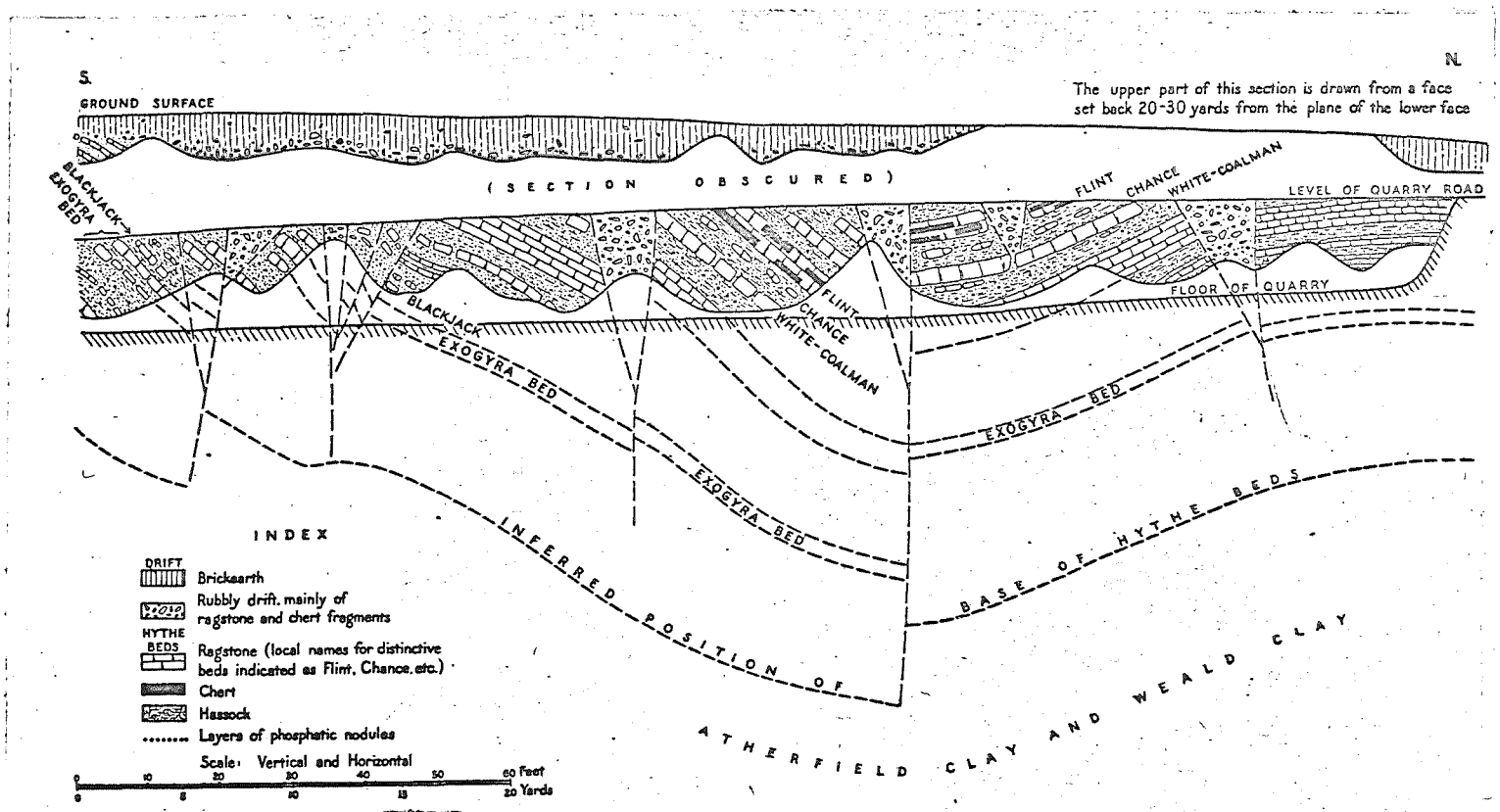
OVINGDEAN CLIFF SECTION
WEST SIDE OF VALLEY (DRAWN FROM A PHOTOGRAPH)

G.A.K. 1967


Whitehawk
Mount Pleasant
367
TRACES OF CLAY-WITH-FLINTS
Red Hill
Highdole Hill
High Hill
Black Rock
COOMBE ROCK
SHINGLE
Roedean Bottom
Roedean School
Ovingdean
St Dunstans
Rottingdean
Saltdean
Tenant Hill
CHALK
LINE OF PLEISTOCENE CLIFF FORMERLY RECOGNISABLE FOR SOME DISTANCE EAST OF ROEDEAN
BASE OF C. ROCK AT ABOUT 70 FT A.O.D.
RECESSION (1820–1920) ESTIMATED 3 FT PER ANNUM
BASE OF COOMBE ROCK AT ABOUT 40 FT A.O.D.
BASE OF COOMBE ROCK BELOW BEACH LEVEL. SHATTERED CHALK BREACHED & INFILLED WITH SAND & SHINGLE
SECTION IN CENTRE OF VALLEY WALLED UP. COOMBE ROCK THIN ON STEEP WEST SIDE SLOPE
APPROXIMATE POSITION OF DEGRADED CLIFF BURIED BY HEAD
Portobello Outfall
KEY
YOUNGER COOMBE ROCK & BRICKEARTH
OLDER COOMBE ROCK (LOCALLY COVERED BY YOUNGER COOMBE ROCK)
CLAY-WITH-FLINTS
CHALK
NO ATTEMPT HAS BEEN MADE TO CLASSIFY THE HEAD DEPOSITS IN THE AREA EAST OF BLACK ROCK. THEY INCLUDE OLDER DEPOSITS (MAINLY DEGRADED CLIFF SCREES) AND YOUNGER ONES DERIVED FROM DRY VALLEYS.
SCALE
0 1000 2000 YARDS
0 1 MILE
MAP SHEWING THE PLEISTOCENE DEPOSITS BETWEEN BRIGHTON AND TELSCOMBE CLIFFS
G.A.K. 1967
05
04
03
02
01
33
34
35
36
37
38
39
40

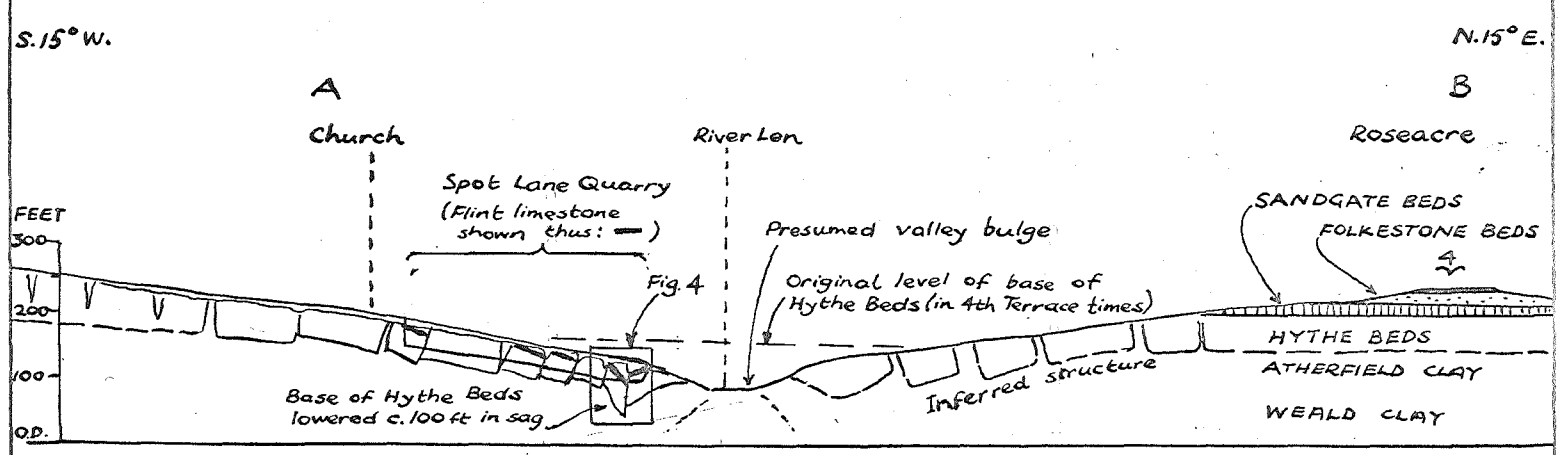
CAMBERING AROUND MAIDSTONE

Q.F.S.G. Canterbury 1967



—Section of cambered Hythe Beds at Spot Lane Quarry, Otham.

FIG. 4.—FACE NEAR CRUSHING PLANT, SPOT LANE QUARRY (FIG. 16 OF MAIDSTONE MEMOIR)



HORIZONTAL SCALE AS IN FIG. 3; VERTICAL SCALE 3× THE HORIZONTAL

FIG. 5.— SECTION ALONG LINE AB OF FIG. 3

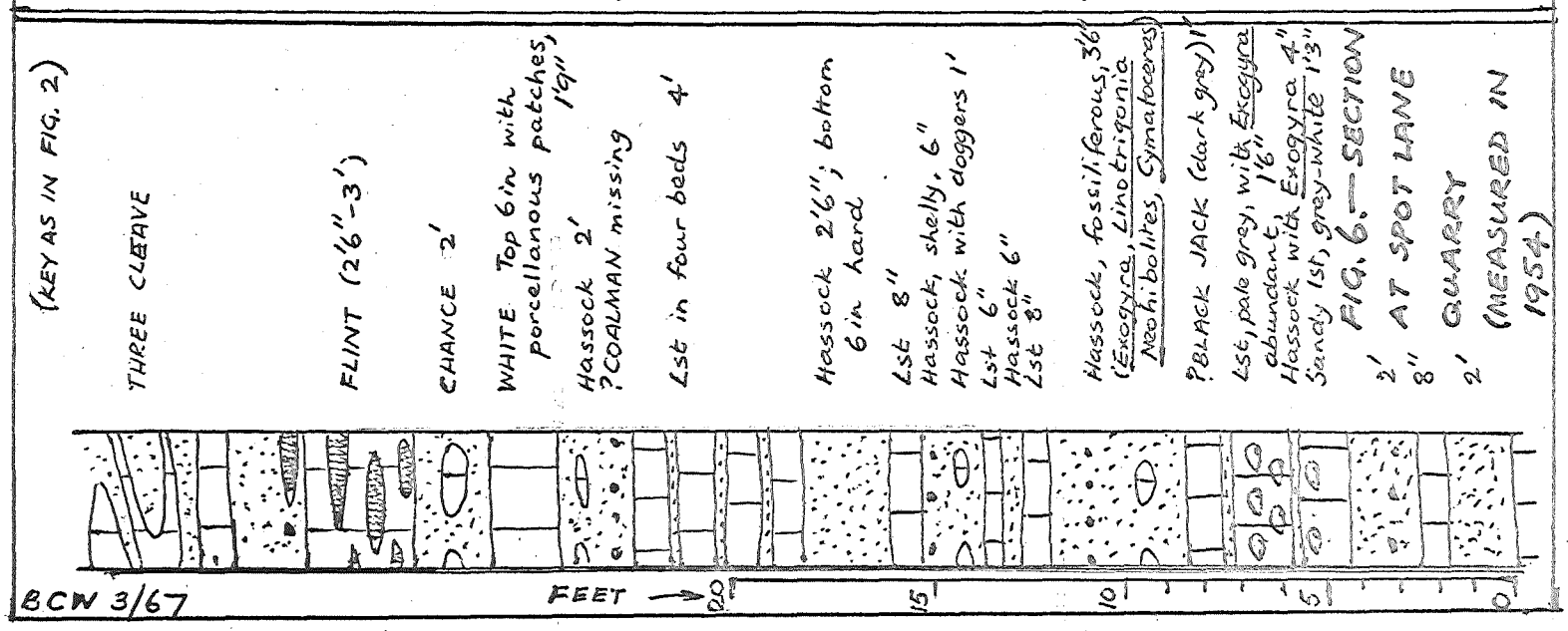


FIG. 6.— SECTION 2' AT SPOT LANE 8" QUARRY 2' (MEASURED IN 1954)

BCW 3/67

Q.F.S.G. Canterbury 1967

CAMBERING AROUND MAIDSTONE

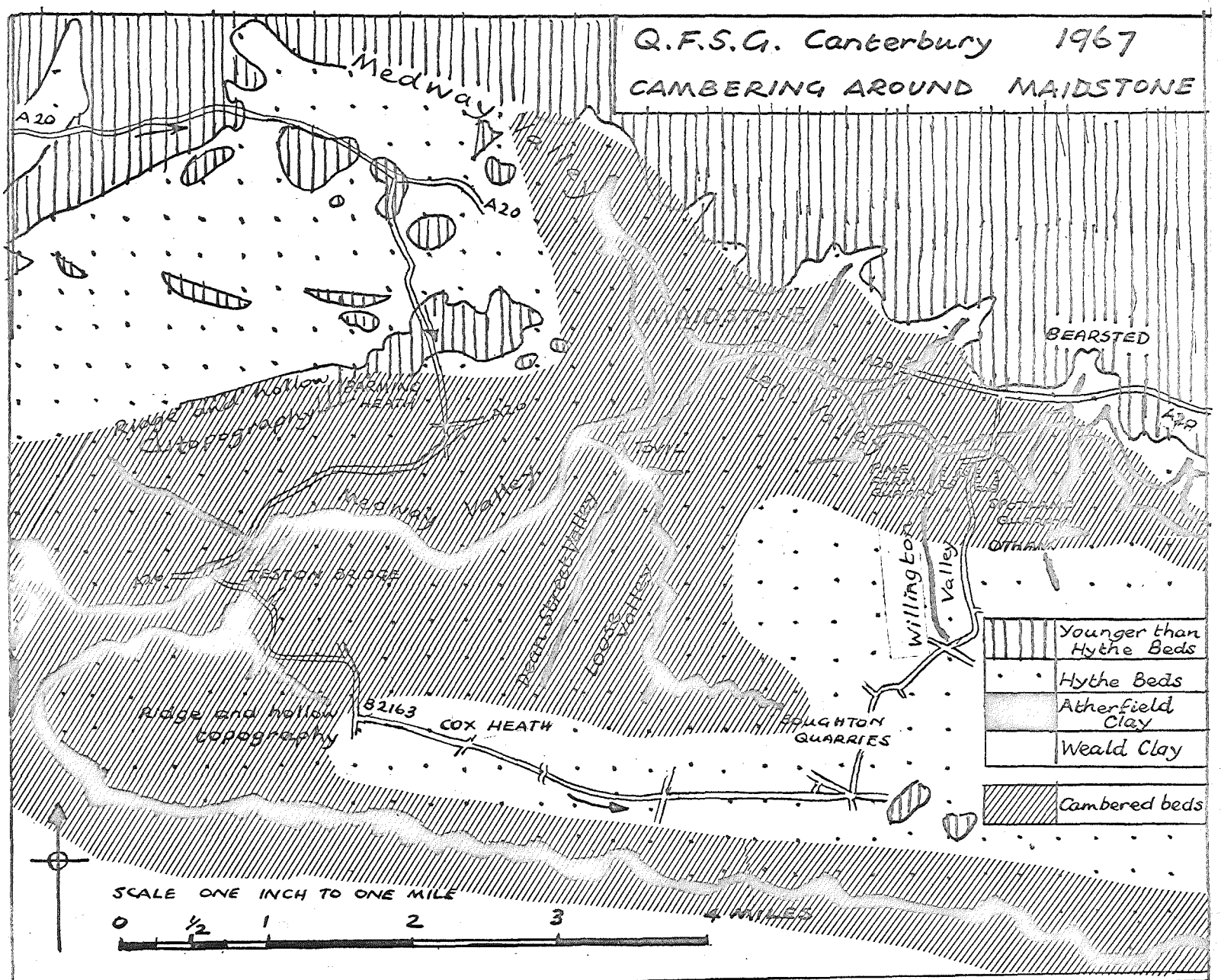


FIG. 1.—LOCALITY AND ROUTE MAP

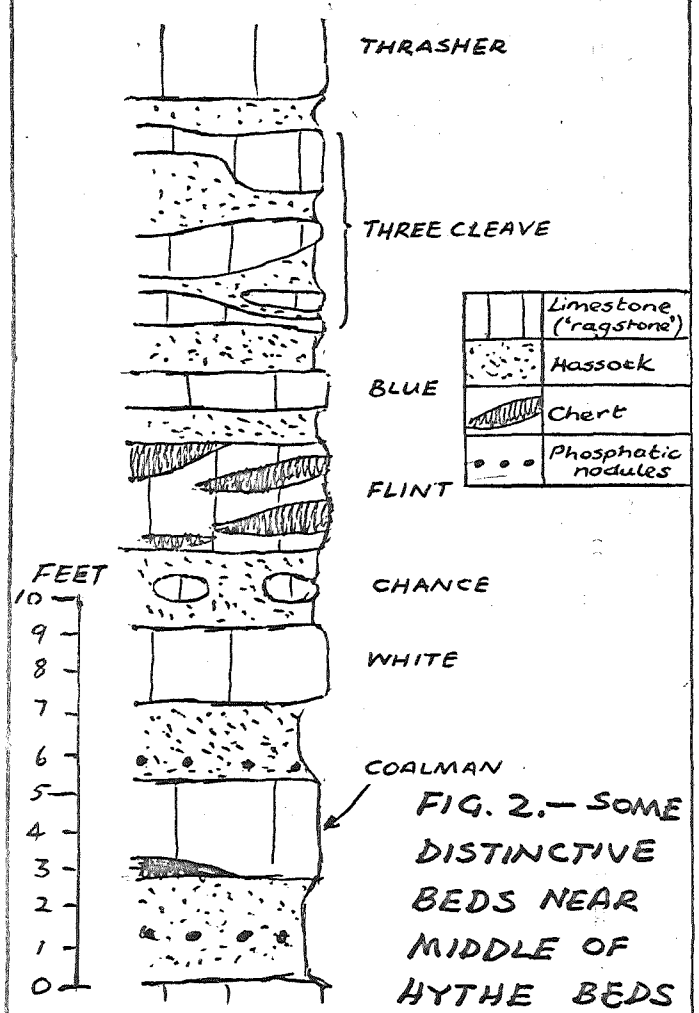


FIG. 2.— SOME DISTINCTIVE BEDS NEAR MIDDLE OF HYTHE BEDS

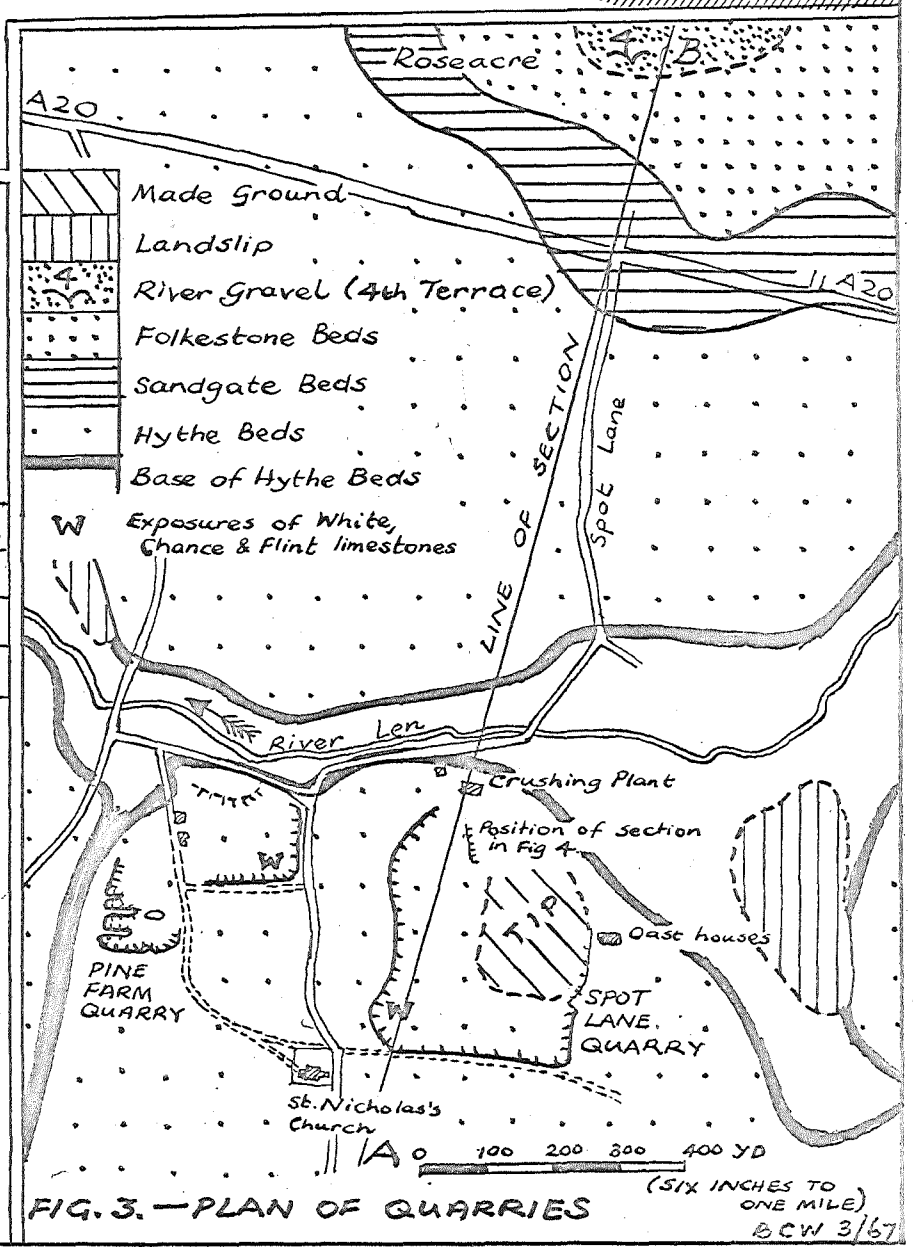


FIG. 3.—PLAN OF QUARRIES

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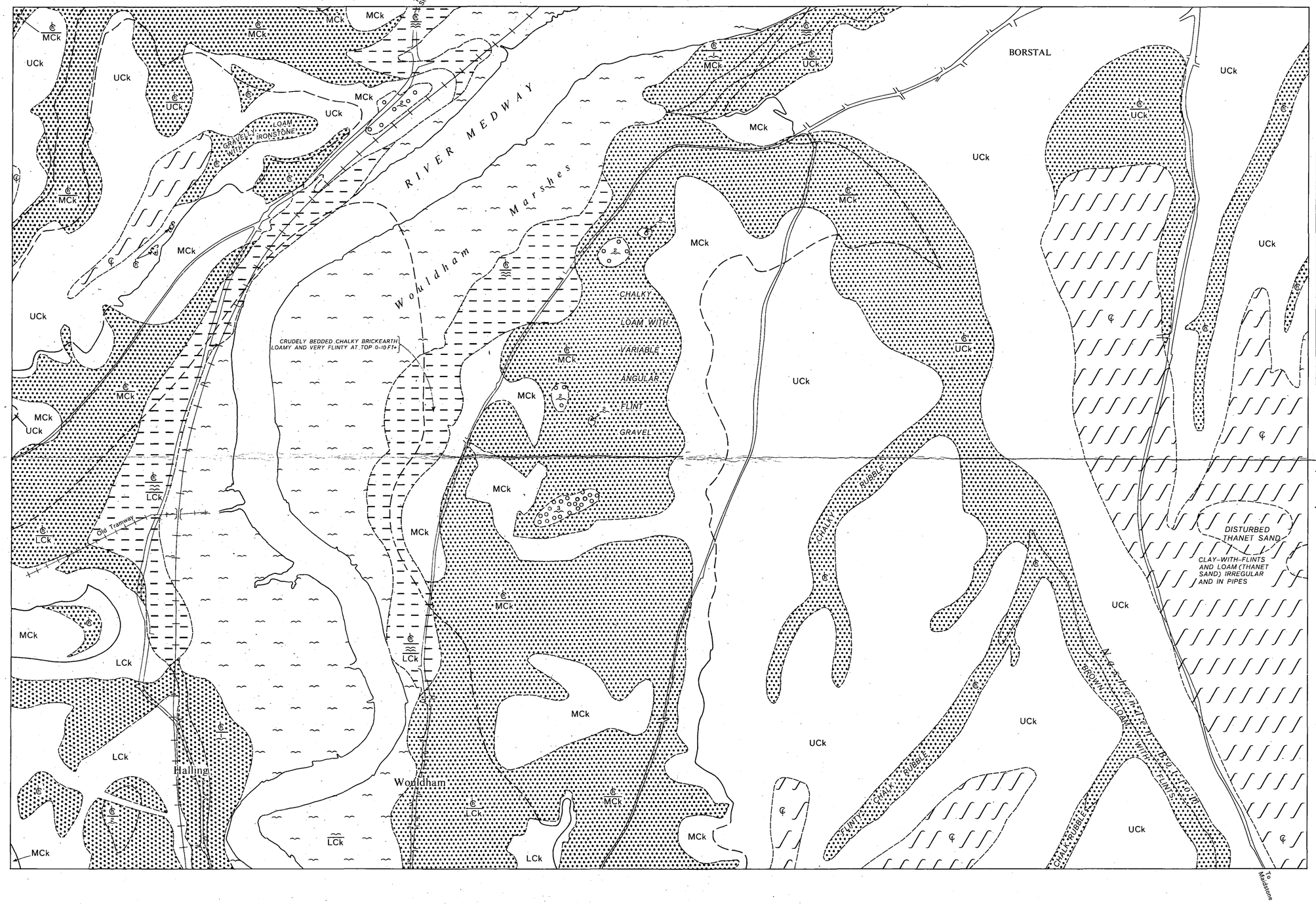
DRIFT DEPOSITS OF THE LOWER MEDWAY VALLEY

BASED ON KENT SHEET 19 SW



EXPLANATION of Geological Signs

DRIFT

- Alluvium
- Head
- Head Brickearth
- River Brickearth
- 1st Terrace
- 2nd Terrace
- 3rd Terrace
- Clay-with-flints

River Gravel

Geological boundary, Drift

Geological boundary, Solid

Broken lines denote uncertainty

SOLID

- UCk Upper Chalk
- MCk Middle Chalk
- LCk Lower Chalk

Geological survey by S. C. A. Holmes in 1938.
C. N. Bromehead, District Geologist.
E. B. Bailey, Director.

Scale— Six Inches to One Mile

0 ¼ ½ ¾ 1 Mile

0 ½ 1 Kilometre

Reproduced by the Dyeline process at the Institute of Geological Sciences, London, *March, 1967.*