"THREE MORE NAMELESS MERES FROM THE OUSE-WAVENEY VALLEY"

By P. A. Tallantire

SUMMARY: The sites are given of 3 more vanished meres in the Ouse-Waveney through-valley in central East Anglia. One of these, Bressingham-Langfen, is described in detail. It appears to have filled up and become a fen by the late Boreal period, ca. 6000 B.C. Evidence is presented suggesting that most of the lake originated in the Allerød period, ca. 9000 B.C., from the thawing out of buried ice and the general thawing of the subsoil and feeding springs in the underlying chalk at the start of the climatic improvement. The origin of the ice as floes grounded in the braided stream channel whilst passing through the Ouse-Waveney gap with meltwater from the Hunstanton icesheet in the north Fenland area is suggested. More information about the ice limits and sea-levels at that time is required.

I. The Sites. (see map A.)

Following the discovery in 1948 of late-glacial lake deposits beneath the fen peats of the upper Waveney valley (Tallantire 1953), further borings were made, with a Hiller handborer, on either side of the Ouse-Waveney watershed near Lopham ford. Lake deposits were found under the fen peats in two places on the Ouse side, on the Blo Norton-Thelnetham-Crackthorn Bridge fens. Borings in the western lake revealed, under the surface, one to two metres of *Cladium* peats, a half metre of calcareous lake-mud resting on a layer of grey coarse sand, of variable depth, beneath which were up to four metres of silty lake-muds underlain in places by a thin peat bed. The lowest half metre of the latter lake-muds contained very little silt, some coarse sand grains at the base, Hypnaceous moss fragments, small pieces of birch leaves and a few fruits and catkin scales (cfr *Betula pubescens* hybrids). On analogy with the nearby site of Lopham Little Fen lake there seems little reason to doubt that the basal peat, the lake-muds, silty lake-muds and overlying sand bed represent late-glacial deposits, probably zones II and III of the generally accepted scheme of Godwin's (Godwin 1956), and the upper calcareous lake-mud and fen peats are post-glacial. In the eastern of these two lakes, three to four metres of calcareous lake-muds, containing frequent *Najas marina* fruits, underlie the *Cladium* fen-peats and rest on coarse grey or brownish sand with occasional flints. The basal half metre of lake mud contains some sand and silt, *Potamogeton praelongus* fruits and a few twigs of *Salix*. *Menyanthes trifoliata* fruits and *Carex* spp. fruits were found at the bottom. This lower layer of silty mud may be of zone IV or zone III age, the upper lake-muds are undoubtedly post-glacial in age. No pollen analyses have yet been made to determine the date at which this lake filled up. The basal sand layer may prove to cover a series of late-glacial muds or may be older outwash material forming the lake basin. Coarse, moist, firm sand deposits of over a metre in depth present difficulties to a mere handborer, though a metre and a half of sand were penetrated at one bore (Z 5) elsewhere. Both these lakes west of the Lopham ford "watershed" are nameless, though it is tempting to suggest that the old "Seymer's Hall" site at Blo Norton may derive its name from a memory of the post-glacial lake's existence. Seamere, a tautological construction, is not infrequently encountered in East Anglia and at Hingham, at least, is associated with a present-day lake. The full stratigraphy and pollen diagrams from these two lakes perforce yet remain to be done (cf. Old Buckenham Mere, Tallantire 1954).

On the east side of the watershed, east of the Lopham fens, quite extensive deposits of post-glacial and late-glacial lake-muds were discovered from borings in the Bressingham Fen and Langfen areas and extending under parts of the Lopham Great Fen and Bressingham Horse Fen. The stratigraphic picture proved complicated and could only be interpreted fully with the aid of pollen analysis. Preliminary samples were taken in 1948 and worked up at the end of my studentship period in March 1949. A further series of samples was collected during the summer of 1950. The tubes were carefully waxed and when an opportunity eventually presented itself in 1959 the samples appeared in good enough condition to work up into pollen slides, thanks to the hospitality of Dr. Palmer Newbould at University College (London University) Dept. of Botany. This series of pollen slides was finally counted in the autumn of 1961 thanks to the loan of a microscope from S. E. Durno at the Macaulay Institute for Soil Research, Aberdeen, and six weeks unemployment assistance from the Ministry of Labour. The collected results from the Bressingham-Langfen lake, for want of another name, now follow. The author hopes that the more obvious shortcomings will be overlooked, he is only too aware of the thin ice in parts of the lake.

II. The Bressingham-Langfen Lake.

a) Stratigraphy—fig. 1, and maps B to G.
b) Macroscopic finds—table 1.
c) Pollen analyses—figs. 2, 3, 4, and table 2.

The stratigraphy and pollen analyses require little comment, they are based on current and accepted practice. Hydrofluoric acid, warmed gently for 3-4 minutes, was used to remove silt and sand from those samples with a high mineral content. No obvious evidence of selective, or any, pollen destruction was noted.

Finds of *Najas marina* fruits in the post-glacial lake-muds here, and in the lake west of the watershed, support further the view expressed in an earlier paper (Godwin and Tallantire 1951) that this plant was common all over Norfolk, at least during the Boreal and Atlantic periods. The approximate extent of open water in the early Boreal, ca. 7000 B.C., and of bores in which fruits of *Najas, Nymphaea* or *Ceratophyllum* were found, is indicated in map D.

Most of the pollen finds and macroscopic finds are the usual late-glacial assemblage and call for no special comment. One pollen of *Ephedra,* in excellent condition, was found in the sample from 335 cms in bore M, middle Allerød period zone II a. A specific identification has not yet been attempted. Two pollen grains attributed to *Koenigia* were found at 310 and 335 cms in the same bore, M, likewise from the Allerød period zones II a and II b. In the absence of a type slide of recent pollen of this plant for comparison the identification remains tentative, but not unreasonable.

III. Discussion and conclusions from the evidence.

The late-glacial sequence of deposits at Lopham Little Fen lake followed the classic pattern described many times now by N.W. European palynologists: two layers of lake-muds with a high mineral content of silt, clay or fine sand, separated by a layer of purely organic lake mud, often with some coarser plant detritus. The stratigraphic succession from even the primary series of bores in Bressingham-Langfen revealed an apparent inconsistency. At the shallower eastern end of the lake, underneath the general post-glacial mantle of shallow fen marl and extensive *Cladium* peats, there were two layers of silty lake-muds separated by an organic mud, the upper silty mud being covered with a thin layer of muddy, coarse, grey coversand. A trial series of samples from bore M in this area were analysed and the pollen content supported the inferred dating, zones I-IV, the main part of the fen marl forming in zone V. The *Cladium* peats were not sampled, since extensive peat cutting has been known to have occurred in this valley up to the start of the present century. A second close-sampled series was obtained from bore M in 1950, as already mentioned, and the results of these analyses, in fig. 2, clinch the argument. The small basin at the eastern end of the lake contains a full succession of late-glacial deposits, although a period of lower water level in the middle of the Allerød period, zone II, deduced from the increased amount of detritus in the mud and from the increases in pollens of Gramineae and Cyperaceae, is indicated here, as in the Lopham Little Fen lake deposits, (Tallantire 1953).

Further evidence for lowered lake levels in the mid-Allerød period is provided by sites from Holland (Waterbolk 1954, p.6). Tracing the distribution of this phenomenon northward and eastward might provide further clues to the climate of this period, when due allowance were made, in comparisons, for the type of basal sedimentary deposit and the prime water supply to the basins concerned.

At the deeper western end of the lake the basal deposit varied. The distribution of the basal peats or muds are shown in map E. The plant macroscopic remains in these deposits are given in table 2. Trial samples were taken from three types at the bores N 3, Z 5, and NZ 3. The samples were taken from the upper *Cladium* peats down to the basal peat at NZ 3 in order to date the end of the open-water period of the lake in the post-glacial. Full series of samples at N 3 and Z 5 would obviously also have been preferable to the spot samples taken. Time did not allow it. The evidence obtained, however, in conjunction with the succession of lake-mud types, well dated from bores M and NZ 3, will perhaps be accepted.

At bore N3 the silty mud, with some pockets of coarse sand higher up, contains a pollen flora of zone III type. A fruit and catkin scale of *Betula nana* were washed from the pollen sample.

At the base of bore Z5 there were frequent fruits of marsh and water plants and high values of *Gramineae* and *Cyperaceae* pollens. The following sample contained only 2 *Chara* fruits and a tree birch fruit. The *Gramineae* pollen were still high and the deposit was an organic lake-mud, with no silt content but a few coarse sand grains. There is nothing against a zone II dating for these samples.

At the base of bore NZ 3, as in the other bores given the peat symbol in map E, the deposit is a kind of friable humified peat. Frequently it overlies the usual grey-brown sands-with-flints which are stained blackish, reddish or yellowish in bands below, see the plot on map G, sometimes with small pieces of birch or willow wood. At NZ 3 the peat contained a few fruits and catkin scales of *Betula pubescens* agg., and at the junction with the overlying lake-mud there were fruits of *Scirpus* and *Carex* spp. The pollen content was unexceptionable for a zone II deposit, excepting the markedly high *Pinus* pollen content and the fact that the only herb pollens represented were *Compositae*, 2 *Valeriana* grains, 4 of the type A Caryophyllaceous grains and one spore each of *Polypodium* and *Botrychium*. There were very few *Cyperaceae* pollens and practically no *Pediastrum* colonies. In the overlying lake-mud sample the pollen flora agrees well with that of zone II b of the bore M diagram and there is the transitory high value of *Gramineae* pollen. I consider that the peat may represent the humus layer of a damp birch woodland. If any isolated pine trees were growing in south-eastern England in the late Allerød period, as is proven in southern Holland (Polak ?1958) (van der Hammen 1951) then the deeper, sandy-bottomed valleys such as the Waveney would be the place to expect them. Godwin (1956) gives the first records as zone IV in south-eastern England.

When viewed in conjunction with the depth contours of the lake basin as a whole, see map B, I think there is sufficient evidence tentatively to suggest that in the main part of the basin, with bore M lying in a shallower subsidiary basin at the eastern end, we have a late-glacial sequence of deposits analogous with Hartz's classic description (1912) of Allerød gytjes and Allerød mulls. An analogy only, since he was working within the ice limits of the last glaciation where dead-ice blocks were incorporated in the ground moraine and, furthermore, he was able by direct excavation to show rooted trees on the morainic or outwash covering of the ice, which were submerged during the zone II thaw and covered by lake-muds. Other sites showing similar features are now known from Denmark. Andersen (1954, p.191) records one in south Jutland where the final melting of the buried ice and submergence of the terrestrial vegetation occurred as late as in zone V of the post-glacial.

In the deepest parts of the lake, in bores Z 5, N and possibly at O, too, we have zone II marsh or lacustrine deposits. Laterally, and particularly on the more shaded southern bank, we have less marshy or terrestrial basal deposits, also of zone II age. Yet, in the shallower part of the lake, in the eastern basin, we have a full succession of late-glacial deposits from zone I onwards. I suggest that the reason why no zone I deposits are present in the western part was because there was still ice in this part, probably derived from detached lumps of glacier ice stranded in the braided stream channels carrying the outwash from a lobe of the Hunstanton ice sheet in the north Fenland area. The blocks would be partially or wholly covered with outwash material which would protect them from a rapid thaw. The sinuous course of the sand outcrops in the Ouse-Waveney valley, see map A, are suggestive of the former presence of braided meltwater channels preserved in situ by the absence of later stream erosion and the accumulation of fen peats. The sands would probably be augmented by blown material later, nevertheless.

Sand drifts blocking abandoned stream channels and leading to the formation of small lake basins have been described from Friesland (Veenenbos, in Edelman and Maarleveld 1958, p.678). These coversand bars dated from the Younger Dryas period (zone III) and the lake deposits, or peats, from zone IV onward. The older coversands of zone I doubtless had similar effects. The source of the material involved appears to have been principally the estuarine and coastal areas of the Eem and, later, North Seas and the effective winds predominantly westerlies. The Ouse-Waveney lake basins (and perhaps some of the Breckland sandsheets?) might also have arisen in this way at an earlier period, although the main bars, as at Lopham Ford, are obviously sands with sizeable flints in them, hardly windblown nor, to judge from the surrounding terrain, solifiucted. There is also no evidence of a sandbar cutting off the smaller eastern basin at Bressingham Langfen from the main western section, nor any reason to expect blockage several hundred years earlier at one point compared with another.

The various theories about the origin of this singular feature, the Ouse-Waveney through-valley, have been summarised by Baden-Powell and Moir (1944) and more than once it has been postulated that the valley has acted as an overflow channel for meltwater impounded in the Fenland by the Hunstanton ice sheet.

The obvious objection to my hypothesis is the lack of borings from sites west of the Z line of bores. With a handborer the coversand thickness in this region, soon 2 metres or more, presents a hitherto insuperable obstacle. Lake deposits may underlie even Lopham Middle Fen and zone I silty lake-muds may underlie the zone II peats and muds at deeper sites west of Z5. My reason for disregarding this possibility is that with zone I silty lake-muds in the shallower eastern basin there would seem to be no straightforward explanation for their absence in, at least, the 7-metre deep channel in the western basin, unless this had in fact been occupied by ice at that time. Any removal of zone I muds by a period of erosion would be expected to have affected the sites around M as well. Since the primary water supply for the lakes in this area, and in central East Anglia as a whole, is from subterranean springs I find it unlikely that a pool of 4 metres depth should be supplied considerably earlier than a larger pool of 7 metres depth.

West's comments on the Waveney sands and gravels east of Diss (West 1961, p.373) are of obvious interest to anyone concerned with the age and origin of the flinty sands forming the bed of the lake basins east and west of Lopham ford. The present investigations can throw little light on these problems, except to provide a terminus post quem. Unlike the lakes such as Hockham Mere (Godwin and Tallantire 1951), Old Buckenham Mere (Tallantire 1954) and Stow Bedon Mere (Tallantire, unpubl.), in which at least the deeper parts of the lakes were underlain by obviously unweathered material, the sands and flints containing large amounts of chalk fragments, the Ouse-Waveney lakes are underlain by sands with flints only. Chalk fragments were only found in the basal sands in some of the bores abutting the steeper part of the southern lake shore at Bressingham-Langfen, bores U, W 3, NU1, and N 5.

The sand bands and layers in and covering the zone III silty lake-muds in the Bressingham-Langfen lake, as in the Lopham Little Fen lake, probably have a composite origin, sludged, blown and washed into the open or frozen lake shores. Map C shows the depth of this sand, usually grey, muddy and flint-free when thin, at the various bore points. Apart from the marked increase in depth at the western end of the lake, where the sand soon outcrops at the present-day surface, there is great irregularity in the distribution. Some irregularity was also encountered in Lopham Little Fen lake (Tallantire 1953, fig. 3, p.366) and was ascribed to peat-cutting operations, perhaps aided by a few marlpits. The main spread of sand, thickening to the west and south, was thought to be derived from rain-wash, wind-blow, ice flotation and solifluction. These explanations are patently less satisfactory for Bressingham-Langfen. Solifluction would be expected to bring down unsorted material of all grades, and more of it from south and west facing banks, or steeper banks, than elsewhere. Wind-blow now seems the more likely factor. The coversand is pretty even in grade of material. With the opening up of the vegetation cover which is generally assumed to have occurred during the climatic deterioration in Zone III of the late-glacial, and a certain amount of erosion caused by the spring snow melt on the adjacent uplands, any spring or autumn gales from a westerly quarter would produce local sand accumulations, particularly if the surface of the marshes and lakes were still frozen. During the gales of March 1949 I saw plenty of sandblow from weathered drifts and outwash sands all the way from Hockham to Harling, thereafter none until descending into the Ouse-Waveney valley at Lopham. Poser (1950) and van der Hammen (1951) discuss the problem of late-glacial dunes and provide evidence for the prevalence of strong W. or SW. winds at certain periods of the year at this time, over Belgium, Holland and probably southern Britain. Sand transport occurred mainly in zones I and III, in areas which had a continuous and largely wooded vegetation cover during the Allerød, zone II.

The abrupt eastern margins of the coversands in the region of the Z bores and the 5/F series, and probably at Lopham Little Fen also, suggests to me an accumulation of sand and small flinty pieces blown onto the partly frozen surface of the lakes in spring or autumn, and then fossilised in situ when the ice melted later. Had much sand or silt been washed down the side-valleys with spring snow meltwater, one would have expected to find an accumulation where the Hundred River, for example, enters the lake basin. In more recent times some clay is carried down here, shown in the upper *Cladium* peats in fig. 1, but this almost certainly post-dates the cutting of the ditches and general drainage operations. It is interesting to note, incidentally, that the thin but continuous area of coversand in the region of the 5/F bores, also the region separating the eastern and western lake basins, is in the area of the Poor's Fen once known as The Dam.

Only a few well-boring records are available in this area, insufficient to provide a picture of the solid geology. At Bressingham Hall the chalk appears to outcrop at 41ft. (12·5 m.) and at Flint Hall, Garboldisham, at 60ft. (18.3 m.) below the surface of the local drift. Boswell (1913) shows the 0ft. O.D. chalk surface contour, running roughly N-S, at Lopham Ford. Although Diss Mere and many of the Breckland meres would appear to occupy basins in the drift and outwash overlying solution hollows in the chalk, there seems no reason to postulate such an origin for the Ouse-Waveney lakes, which are on a smaller scale, have a very different outline and shallow depth.

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TABLE 1.

MACROSCOPIC REMAINS FROM ALL BORES.

fr = fruit; fst = fruitstone; c.sc. = cone scale; oosp = oospore;
+ = 1 to 5 occurrences; ★ = more than 10 occurrences.

Plant species	Part	A	B1	B2	B3	C	D	E
Cladium mariscus (L) Pohl.	fr							★
Carex spp.	nuts		★	+	+	+		
,, *cf. rostrata* Stokes	fr		+	★				
,, *cf. aquatilis* group	fr			+				
Eleocharis palustris agg.	fr			+				
Scirpus lacustris agg.	fr		+	★				
Menyanthes trifoliata L.	seed		+		+	+		+
Hippuris vulgaris L.	fr			+	+			
Ceratophyllum demersum L.	fr							+
Najas marina L.	fr							★
Nymphaea alba L.	fr						+	+
Nuphar lutea (L.) Sm.	fr						+	
Myriophyllum spicatum L.	nut	+			+			
	leaf	+			+			
Potamogeton filiformis Pers.	fst	+				+		
,, *praelongus Wulf.*	fst	+		+		+	+	
,, *perfoliatus L.*	fst	+		+		+		
,, *pectinatus L.*	fst						+	
Chara spp.	oosp.	★		+	+	★		
Betula nana L.	fr					+		
	c.sc.					+		
,, *pubescens Ehrh.* hybrids	fr		+		+			
,, *pubescens Ehrh.*	fr		★		★			
,, spp.	leaf		+			+		

A—the silty and sandy lake-muds of the M basin, zone 1.

B1—the basal peaty deposits of the main basin, zone 2 (the boxed finds derived from bore NZ3 are from the junction with the B3 lake-muds).

B2—the basal muddy sand of bore Z5.

B3—the detrital lake-muds with little mineral content, zone 2.

C—the silty lake-muds with sand pockets, or layers of sand, zone 3.

D—the postglacial lake-muds and marl, zones 4 to 6.

E—the postglacial *Cladium* peats, disturbed by fuel cutting.

TABLE 2.

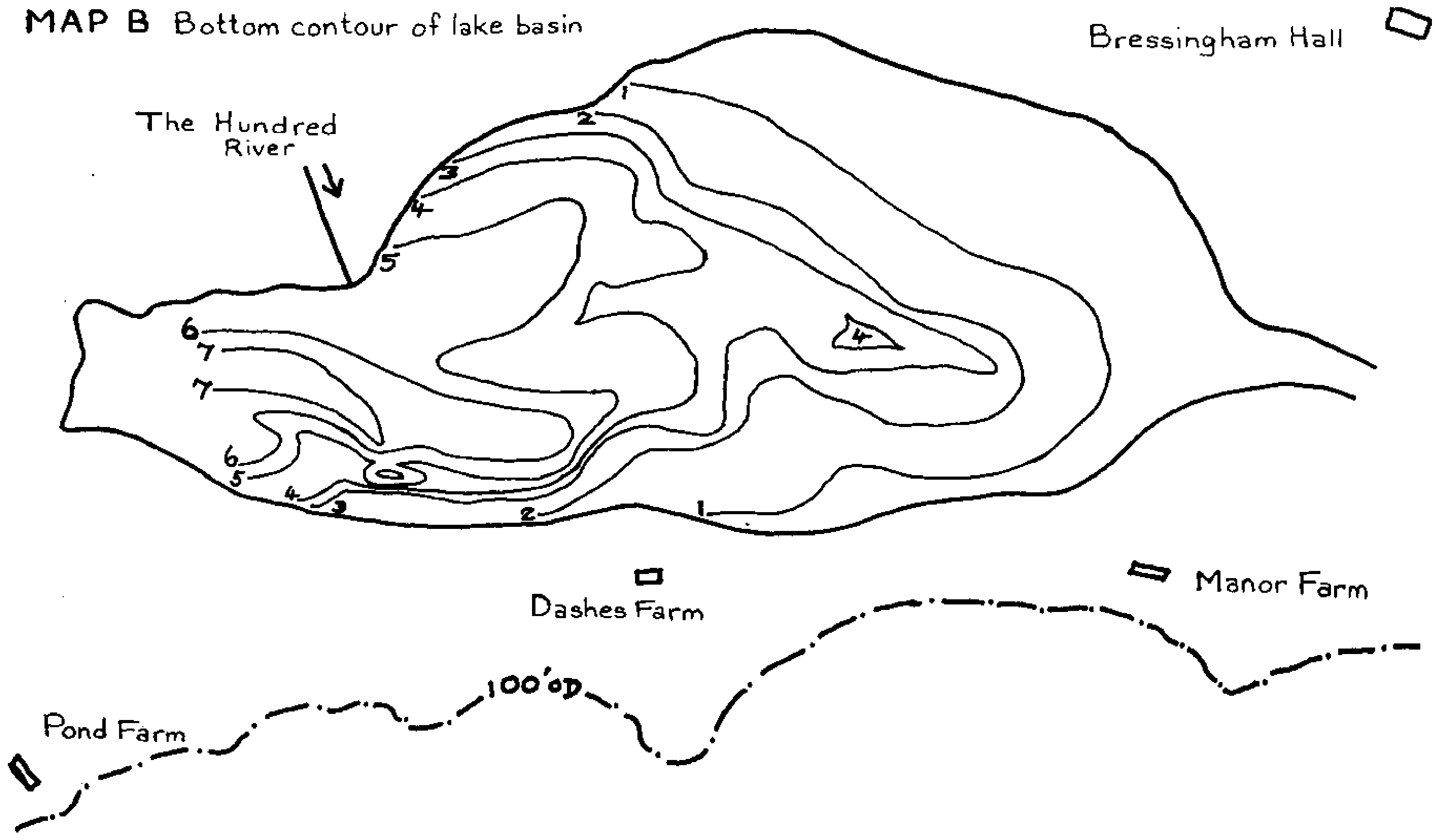
HERBACEOUS AND AQUATIC POLLEN FINDS: BORE M. (based on 10 survey

Zone and sample depth	240	255	260	265	270	275	280	285	290	295	299	305	310
Plant pollen													
Empetrum			1		3	1	1		1			1	
Helianthemum			1	4	3	5	5	2		2		1	1
Plantago maritima													
Plantago media & major					1	1		5	1	1		1	3
Polemonium		1											
Succisa cf. pratensis							1			1		1	1
Sanguisorba cf. officinalis			1	3									
Rumex acetosella agg.	5			1		3		1	1				
Galium	2	1	2	3	2	2	5	1	5	2	1	1	1
Chenopodiaceae	2	1			1	3	1						
Caryophyllaceae A								1					
Caryophyllaceae B		1	1	1	2	2	3			1			
Compositae—Tubuliflorae A		1		2	2	5	2	7		3	7	1	1
Compositae—Tubuliflorae B	1			1	1	1	1		2	2			
Compositae—Liguliflorae	1			1			1				1	2	
Umbelliferae A		1		2	1	1	4			2	2	1	
Umbelliferae B						1		4	3				
Selaginella (microspores)	1	1	1	1		1		2	1		1	1	1
Koenigia													1
Ephedra													
Cruciferae		2		1		1							1
Filicales (intines)		1		1		4			1	1	2		
Utricularia												1	
Batrachian Ranunculi	1	2		3			1		1			2	1
cf. Caltha													
Menyanthes trifoliata	1					1	1						
Potentilla cf. palustris				1							1		
Valeriana cf. officinalis													
Typha latifolia—tetrads	5	2	2	5	2	1	1	1		2	1		3
Typha-Sparganium—singles	4	5	7	8	6	4	1	3					
Potamogeton			3			1			1	2	1	1	1
Pediastrum colonies:													
estimated frequency	o	o	o	f	f	f	o	o	r	r	o	r	o

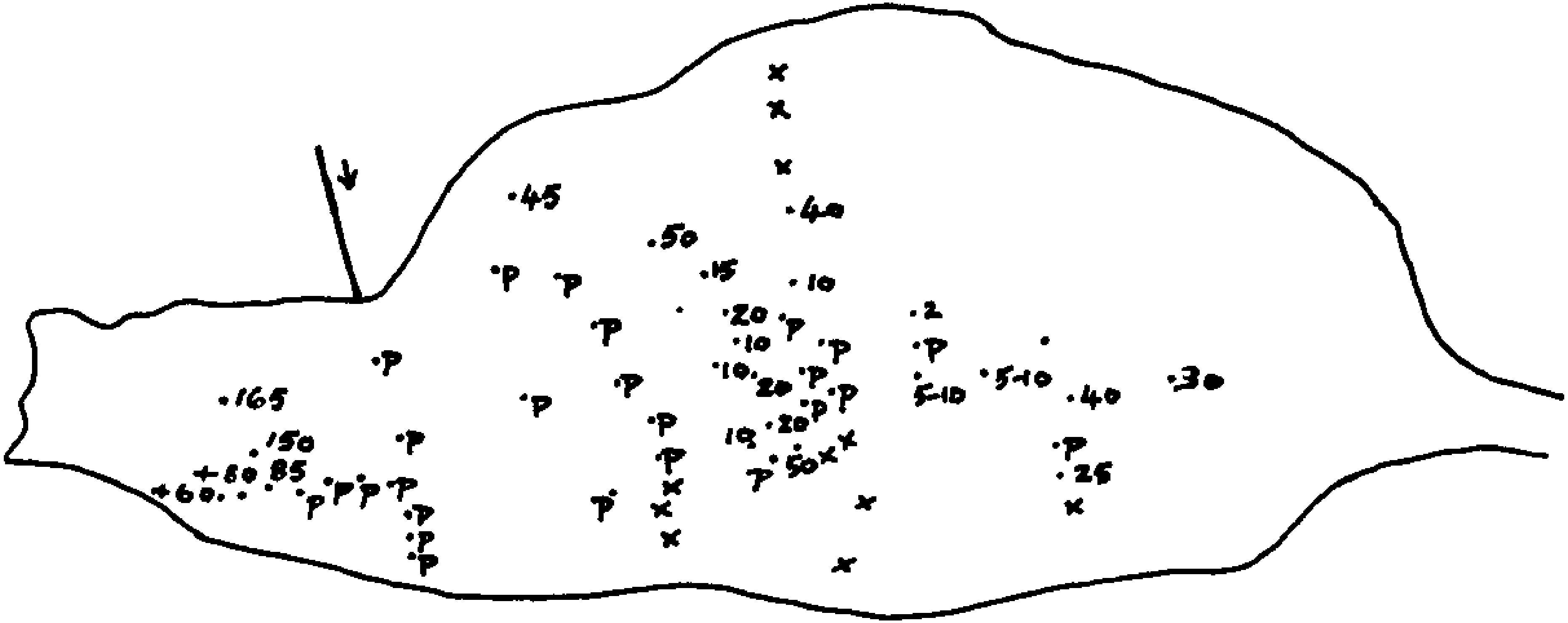
traverses per slide, 20 p.s. below 360 cm. with general low pollen densities).

315	320	325	330	335	340	345	349	355	360	365	370	376	381	385	390	395	399
1	1		2			2	3	1			1		2				
		3	3		1	4	12	1	2	6	4	8		1		1	2
										1		1					
2	1	1	1	1	2				1			1					1
												1					
		1	1				1										
				1			3	5	2								
1	1	1		1		2	2	1	1		6	6		1	2		1
							3		1						1		3
	1	3							1	1	3			1			1
			1				2	1		1							
1	3	2	3	2	1	2	2	3	4	2	1	1		1	1		3
	1						1		1					1			1
	1	4	6	5													
																1	1
				1													
				1													
					1	1	1								1		
1	1	2	2		1					4	21	10	10			1	1
2		5			1												
										3							
						2											
		7	5	3				2	10								2
		2	12			1			7						2		1
5	5	2	1							1							
f	f	f	f	r	r	o	r	a	f	o	r	r	r	r	—	r	r

MAP B Bottom contour of lake basin

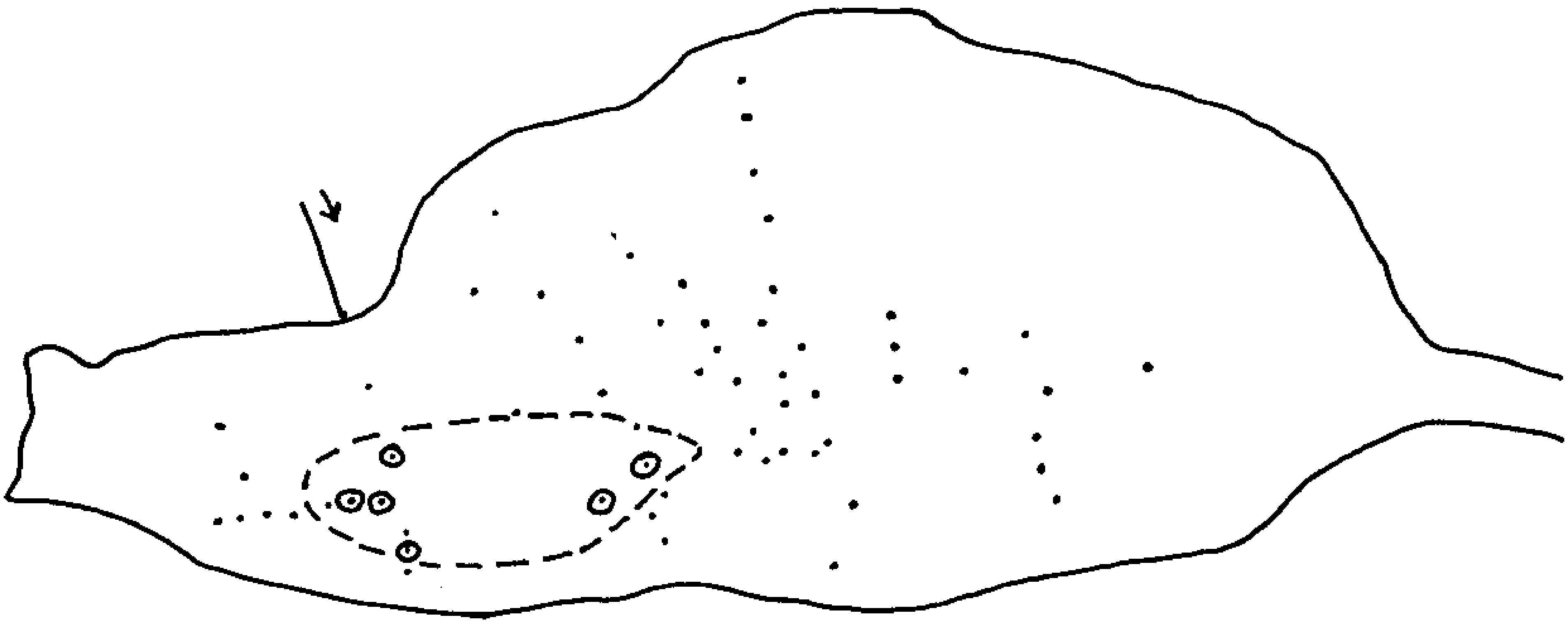


MAP C Distribution and thickness of Zone III coversands



p = pockets of sand in the silty lake-muds; figures give coversand thickness in cms.

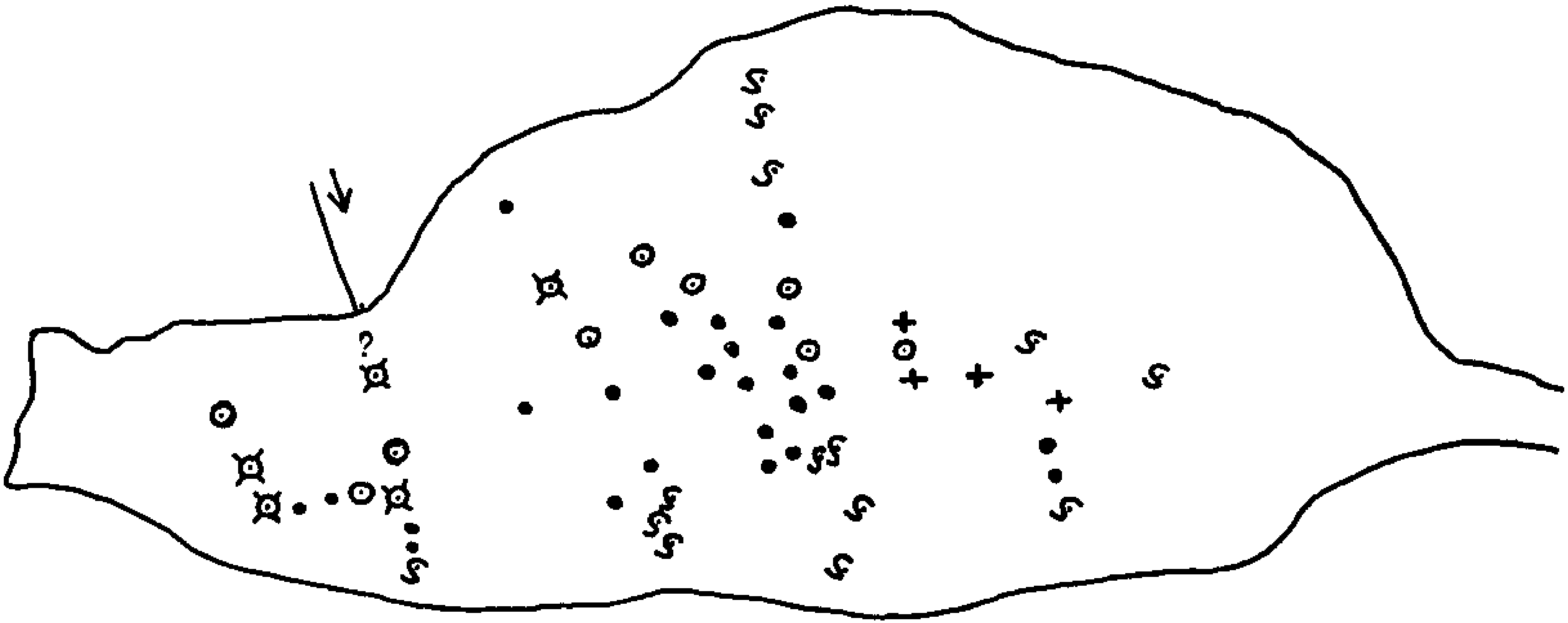
MAP D The postglacial lake and marginal fen



⊙ *postglacial muds containing Najas Nymphaea or Ceratophyllum fruits*

- - - *early Boreal open water limits, ca. 7000 B.C., estimated*

MAP E Type and distribution of the basal lake deposit



S sand with flints only, no lake deposits found beneath the postglacial fenmarl. and peats

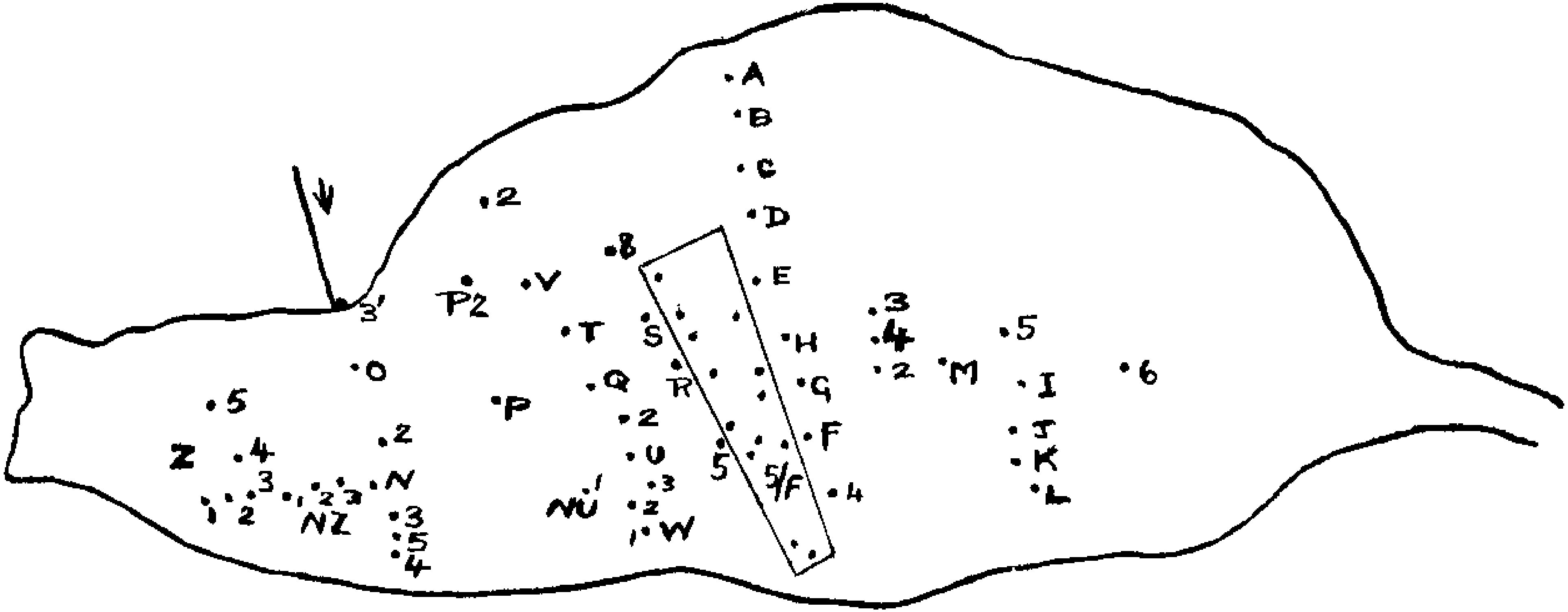
• Zone III silty and sandy lake-muds

⊙ Zone II organic lake-muds, often with

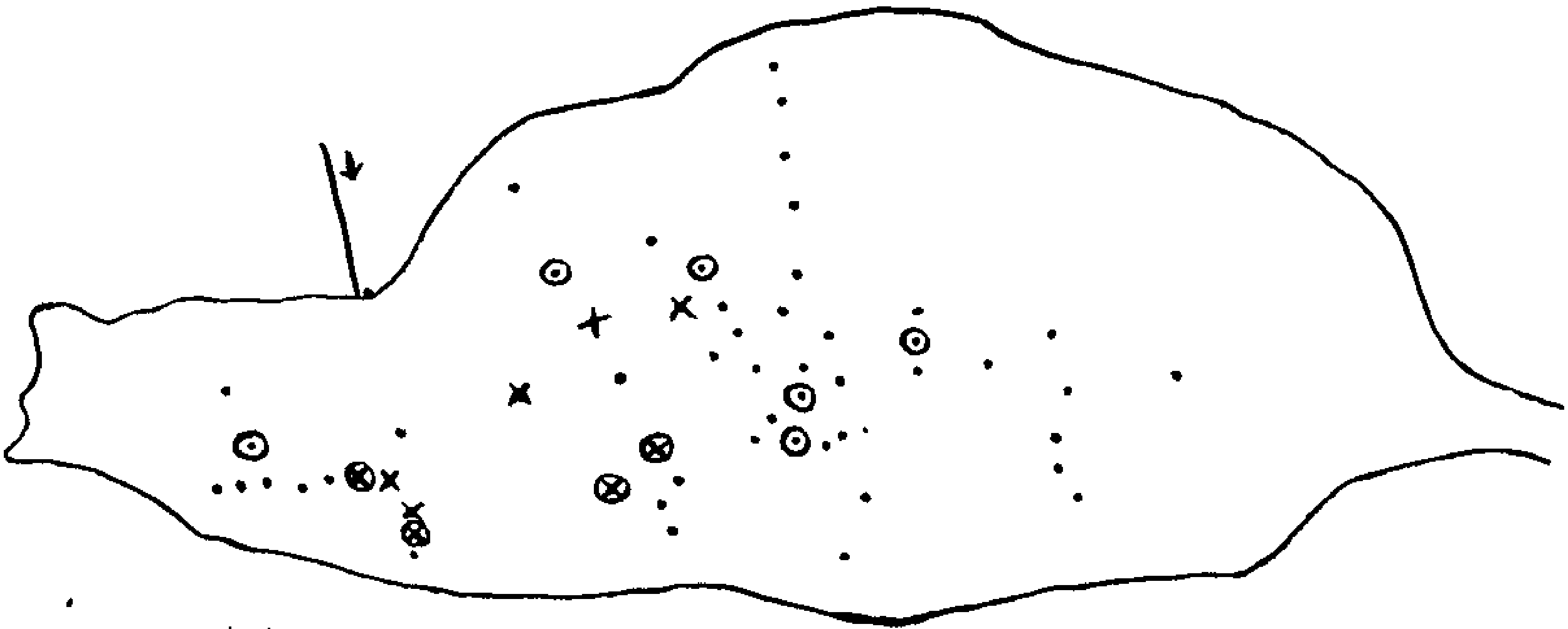
⊙ Zone II highly humified peat or mull

\+ Zone I silty and sandy lake-muds

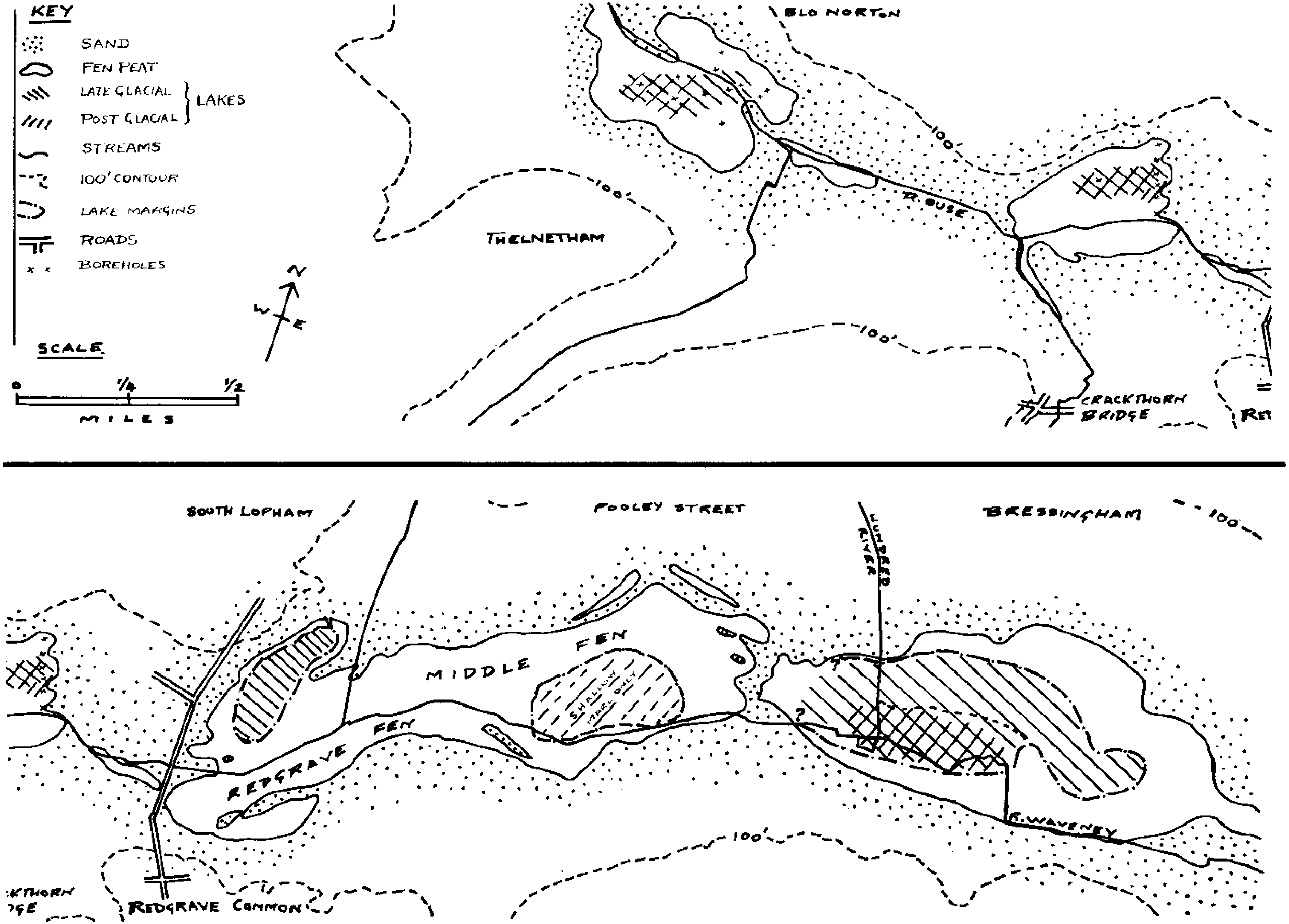
MAP F Bore points

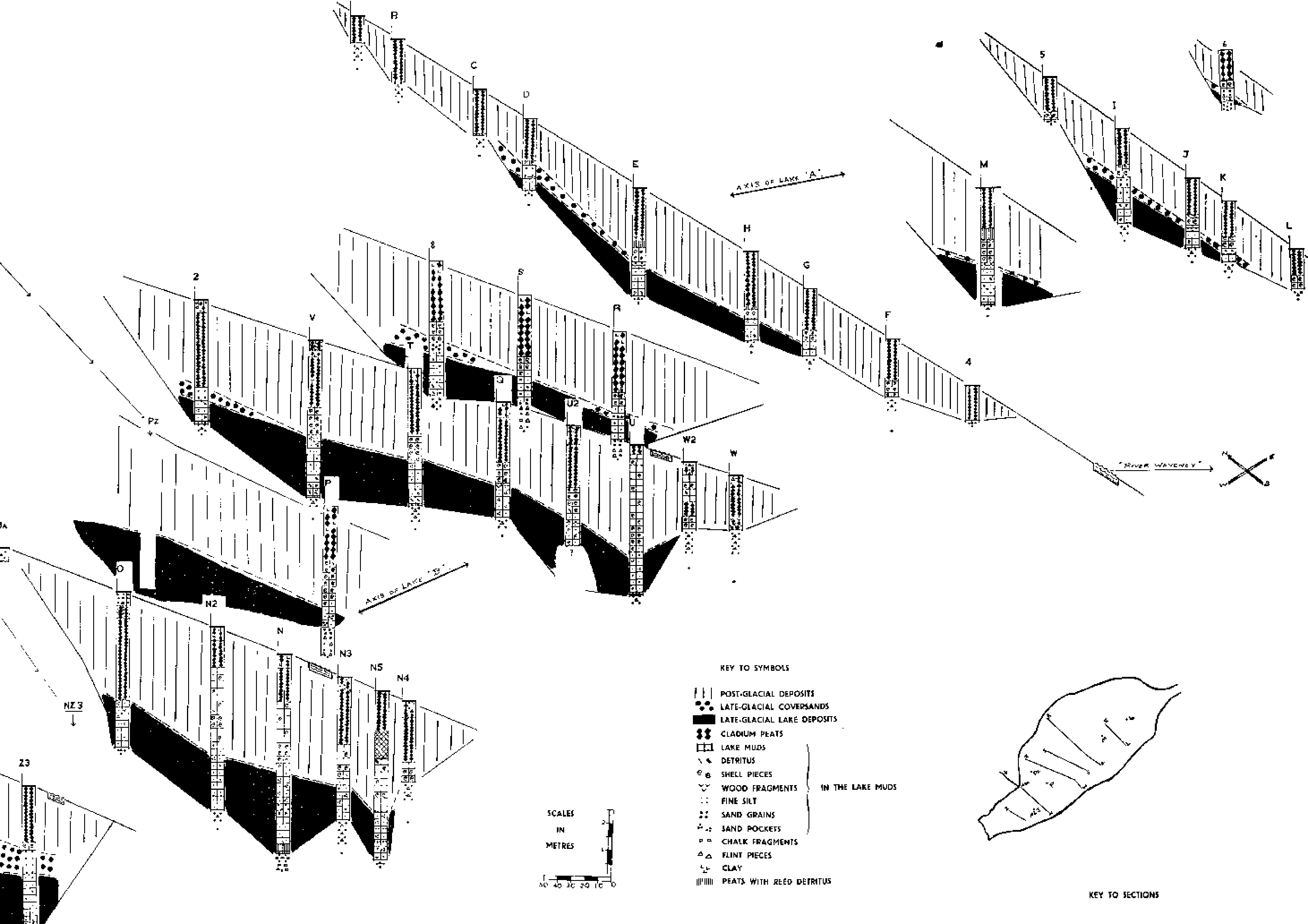


MAP G Stained bands or wood fragments in basal sands with flints



- · no staining, no wood
- ⊙ finds of wood fragments in unstained basal sands with flints
- ⊗ finds of wood fragments in stained basal sands with flints
- × bores at which the basal sands with flints contained stained bands (see text)

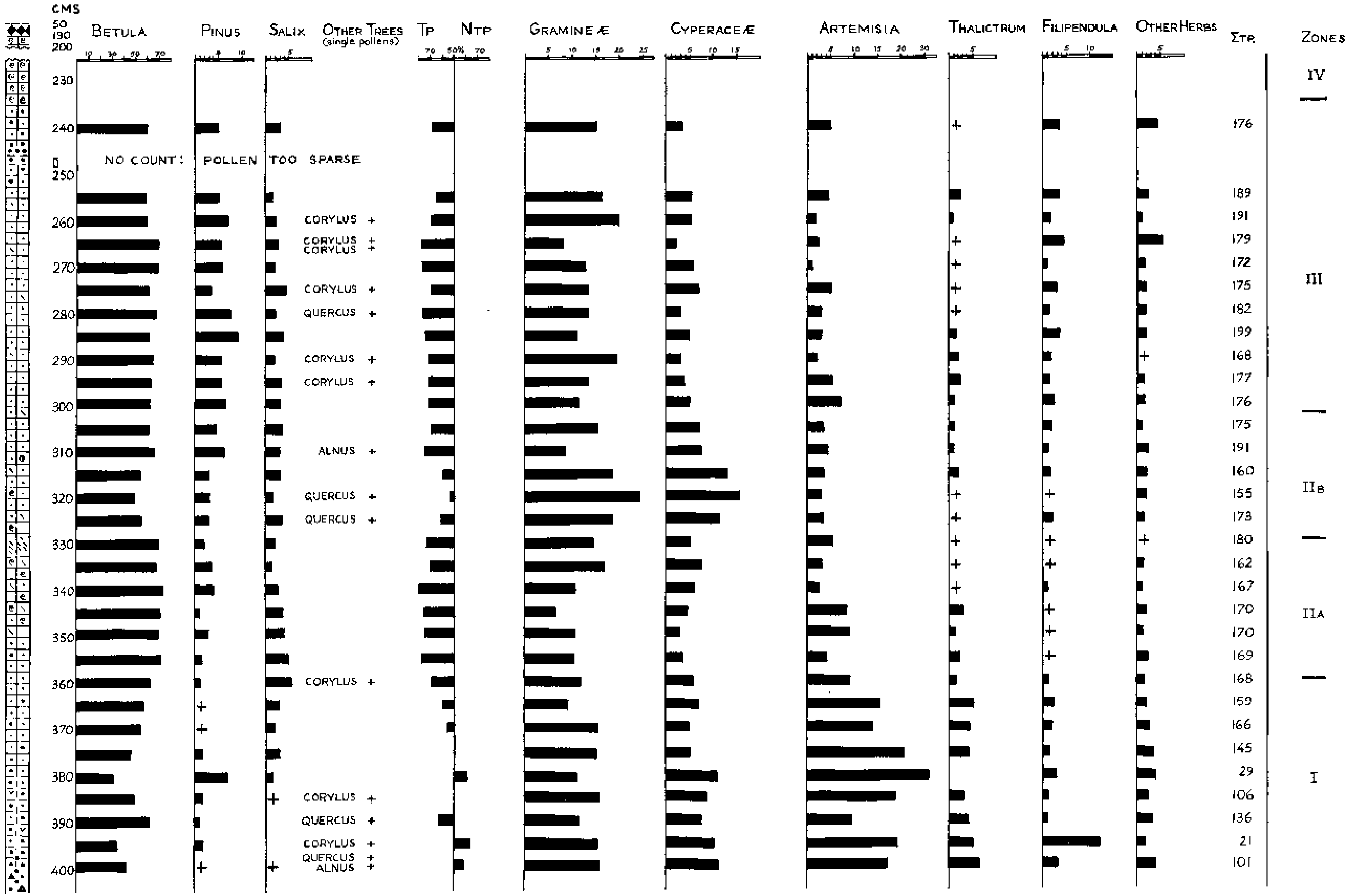

KEY
SAND
FEN PEAT
LATE GLACIAL
POST GLACIAL
LAKES
STREAMS
100' CONTOUR
LAKE MARGINS
ROADS
BOREHOLES
SCALE
0
1/4
1/2
MILES
N
W
E
BLO NORTON
THELNETHAM
100'
R. OUSE
CRACKTHORN
BRIDGE
SOUTH LOPHAM
FOOLEY STREET
BRESSINGHAM
HUNDRED RIVER
MIDDLE FEN
SHALLOW MARL ONLY
REDGRAVE FEN
R. WAVENEY
REDGRAVE COMMON

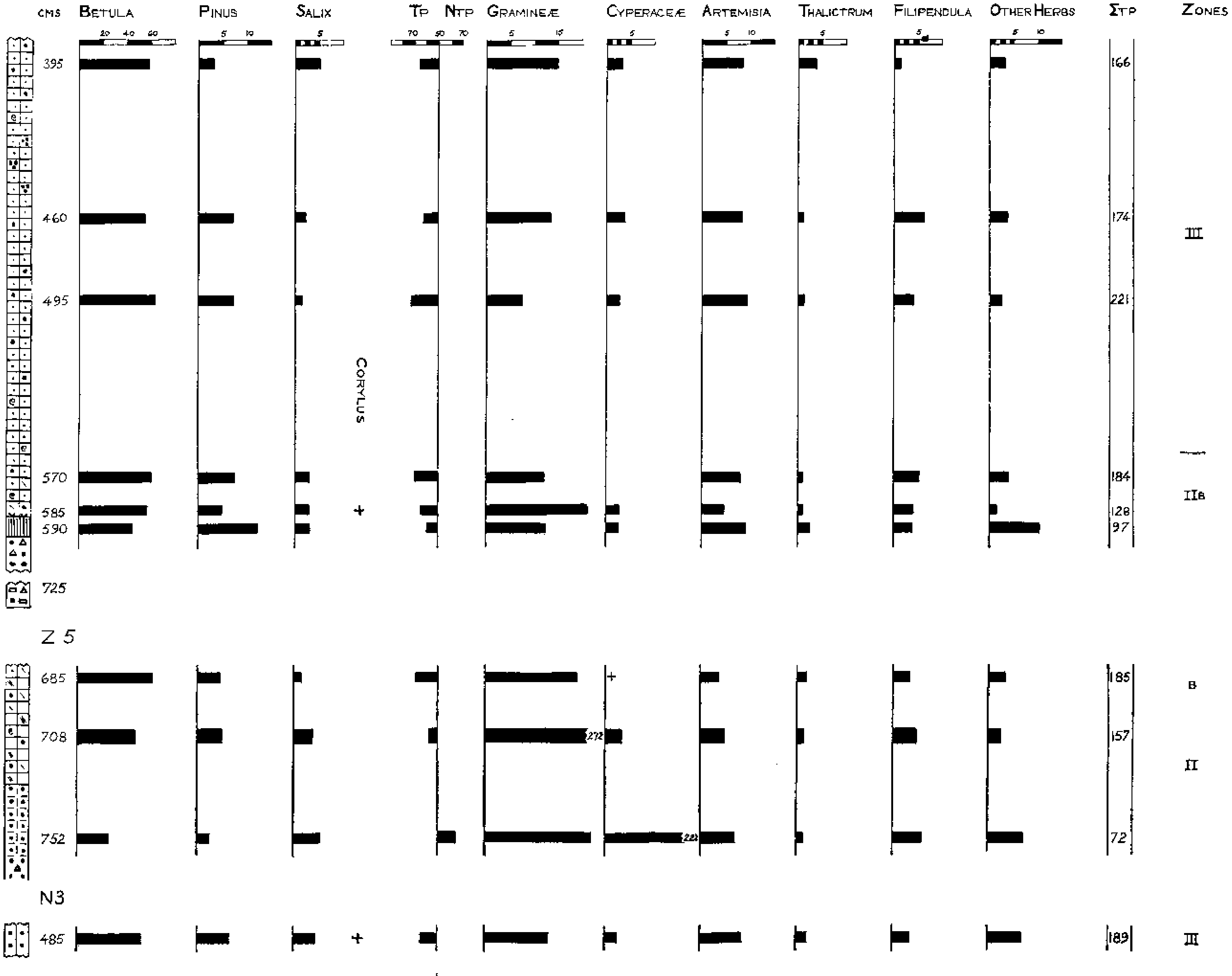


B
C
D
E
H
G
F
4
5
6
I
J
K
L
M
AXIS OF LAKE 'A'
2
V
8
S
R
T
Q
U2
U
W2
W
Pz
P
O
N2
N
N3
N5
N4
NZ 3
Z3
AXIS OF LAKE 'B'
"RIVER WAVENEY"
KEY TO SYMBOLS
POST-GLACIAL DEPOSITS
LATE-GLACIAL COVERSANDS
LATE-GLACIAL LAKE DEPOSITS
CLADIUM PEATS
LAKE MUDS
DETRITUS
SHELL PIECES
WOOD FRAGMENTS
FINE SILT
SAND GRAINS
SAND POCKETS
CHALK FRAGMENTS
FLINT PIECES
CLAY
PEATS WITH REED DETRITUS
IN THE LAKE MUDS
SCALES
IN
METRES
50 40 30 20 10 0
KEY TO SECTIONS

Fig. 2

Bressingham-Langfen Bore M





CMS
BETULA
PINUS
SALIX
TP
NTP
GRAMINEÆ
CYPERACEÆ
ARTEMISIA
THALICTRUM
FILIPENDULA
OTHER HERBS
ΣTP
ZONES
CORYLUS
395
460
495
570
585
590
725
166
174
221
184
128
97
III
IIB
Z 5
685
708
752
185
157
72
B
II
272
222
N3
485
189
III

Fig.4 Bressingham Fen-Langfen