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Vegetational History of the Kentish Chalk Downs as seen at Wingham and Frogholt

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INTRODUCTION

Eastern Kent is that part of Britain which most closely approaches the continental mainland, it is here that occur many plants of limited south-easterly range in Britain, and upon the Chalk Downs occur the remains of natural woods of *Fagus sylvatica,* a tree whose status and Quaternary history in Britain is still far from clear. Into this region successive waves of colonists have landed, the Roman, Norman and Jutish at the end of the tale, but before this the Neolithic camps and Iron Age earthworks that strew the Downs bear witness to very early prehistoric occupation. Yesterday the Downs were largely open grasslands kept for sheep, but after two wars they have been increasingly subject to ploughing. It has been customary for archaeologists (such as PIGGOTT, 1955) to envisage Neolithic man as settling into a landscape that was already open grassland, but ecological opinion would regard tha whole region as one that ought naturally to be covered with deciduous woodland, and would look to human clearance as responsible for the establishment of the grassland plagioclimax.

These circumstances indicate how desirable it seems to the student of Quaternary vegetational history to utilize the methods of pollenanalysis to recover the story of the former natural vegetation of this region, and to trace the effect of human occupation in reducing it to its present condition. Unfortunately the porous soils, the low rainfall/evaporation ratio, the complete freedom from Quaternary glaciation and the long and active interest of man in drainage and peat-cutting for fuel have left this region poorer in deposits suitable for pollen-analytic investigation than any in Britain. On this account we have sought to exploit as fully as possible the opportunity offered by two chance discoveries of reasonably thick peat beds within the area of the chalk outcrop, and we have been fortunate in being able to date each deposit by radiocarbon assay carried out within the Sub-department by Dr. E. H. WILLIS.

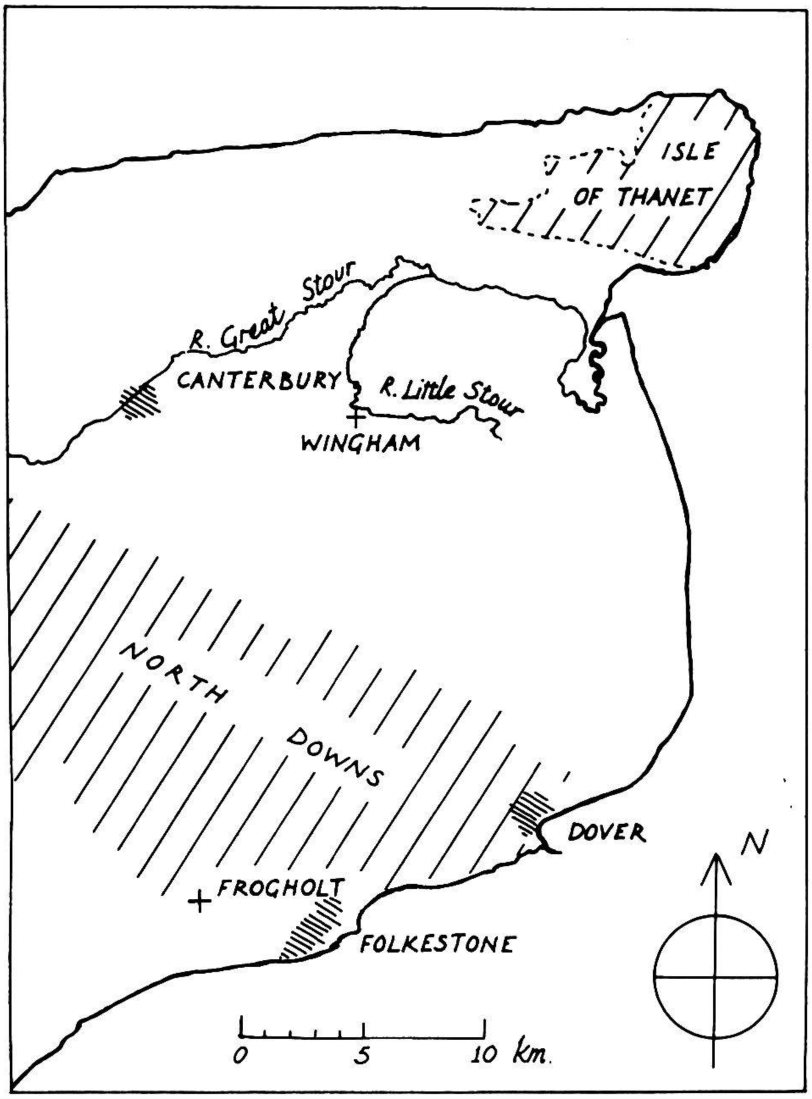


Fig. 1. Map of East Kent showing position of the sites at Wingham and Frogholt

FROGHOLT, NEAR NEWINGTON, FOLKESTONE, KENT

During September 1958 excavation was in progress for a pumping station in the valley of the Seabrook Stream that lies at an altitude of about 200 ft. (61 m) above sea-level between two parallel ridges of the Chalk Downs at Newington, near Folkestone. When the excavation had reached a depth of 18 ft. (5.5 m) the following gross stratigraphy was observed.

m.	
0 —2.15	sandy earth
2.15—3.25	blue clay
3.25—4.6	peat
4.6 —5.2	running sand

For the purpose of closer investigation a massive monolith of the peat 102 cm. thick, was brought back to Cambridge. Examination showed it to be a coarse organic mud, with thinly scattered coarse sand grains throughout, and between 40 and 50 cm. from the top a few stones, two quite large (2 to 6 cm) consisting of a silicified Greensand rock. Small wood and hazel nuts *(Corylus)* were scattered through the upper half of the peat: they became more frequent below 50 cm. and between 80 and 100 cm. wood was abundant. Between 90 and 100 cm. were local lenses of sand, a few pebbles and a flat (worked) flake of wood. The latter, together with compressed flakes of carbonised material suggest local human occupation, as do the reports of local archaeologists that abundant bones of domestic animals had been recovered from the peat. The whole deposit was clearly fluviatile as from a stream-fed pond or meander, and the peat had evidently been preserved by the overlying clay and sand, and by the high water-level.

Radiocarbon datings were obtained as follows:

Q-348	0— 2 cm.	coarse detritus organic mud	2490 ± 130	B. P.
Q-349	20— 22 cm.	coarse detritus organic mud	2640 ± 110	B. P.
Q-354	90—100 cm.	wood from base of peat	2980 ± 130	B. P.

We have therefore to deal with an organic deposit formed approximately from the beginning of the Late Bronze Age, and concluding about the beginning of the Early Iron Age, a period of hardly more than 500 years.

From the residue of the block not required for pollen-analysis or radiocarbon samples, 6 large slices, each 10 cm. thick were broken down by treatment with nitric acid and by washing to yield fruits and seeds. These were examined and identified by Miss C. A. Lambert as shown in Table I.

Among these records there are some for species that have not hitherto been recognised in British post-glacial deposits: *Anagallis arvensis, Juncus acutiflorus, J. subnodulosus, Sagina nodosa, S. procumbens, Stellaria neglecta, Chrysosplenium oppositifolium, Lysimachia nemorum* or *nummularia,* and others only tentatively identified, such as *Cardamine* cf. *flexuosa, Glyceria* cf. *plicata* and *Geranium lucidum* (see plate VII).

Pollen analyses at 5 cm. intervals through the peat deposit were made by Miss R. Andrew, whose results are presented in the three diagrams, Figs. 2, 3, 4. That of tree and shrub pollen (Fig. 2) in its high values for *Alnus* pollen reflects the local development of fen-woods, already indicated by the macro remains and seed identifications. It is interesting to note the rise of *Betula* and *Pinus* at the top of the diagram, perhaps an indication of the increased representation of distant pollen from the acid soils of the Kentish Weald in the late phase of greatly accelerated dis-

Table I

Macroscopic plant remains
(Nomenclature according to CLAPHAM, TUTIN and WARBURG, 1952)
Abbreviations: a, achene; c, carpel; ca, caryopsis; f, fruit; n, nut or nutlet; s, seed; st, stone

Frequency: r, rare 1—3; o, occasional 4—6; f. c., fairly common 7—10; c., common 11—15; a., abundant 16—49; v. a., very abundant

	type of remains	cm.					
		0—10	10—20	30—40	50—60	70—80	90—100
Aquatic, marsh, wet pasture							
Apium nodiflorum	c	o	r				
Berula erecta	c						c
Cardamine cf. *flexuosa*	s			r	r	r	
Carex ssp.	n	a	v. a.	v. a.	v. a.	a	a
Eleocharis palustris	n	o					
Epilobium cf. *parviflorum*	s	r	r	o	r	r	r
Eupatorium cannabinum	a				r		r
Filipendula ulmaria	f						r
Glyceria cf. *plicata*	ca	v. a.	a	v. a.		a	o
Hypericum tetrapterum	s	r	r		r		
Iris pseudacorus	s		a	r			
Isolepsis setacea	n	r					
Juncus acutiflorus	s	a					
J. bufonius	s	r					
J. subnodulosus	s				c		
Lychnis flos-cuculi	s	r	f. c.		r		r
Mentha aquatica or arvensis	n		o	r			r
Polygonum hydropiper	f	r		o		r	
P. persicaria	f	r				r	
Prunella vulgaris	n	r		r			
Ranunculus flammula	a	o		r			
R. cf. *lingua*	a				r		
R. subg. *Batrachium*	a	r					
Sagina nodosa	s	r					
S. procumbens	s	a			r		
Stellaria alsine	s	r	f. c.	f. c.	r	r	r
S. neglecta	s			o	f. c.		
Fen woods							
Alnus glutinosa	f			r	o		o
Chrysosplenium oppositifolium	s					o	r
Lysimachia nemorum or nummularia	s		r		r		
Moehringia trinervia	s			f. c.	c	r	r
Solanum dulcamara	s		r	r	r	r	
Woodland and shade							
Ajuga reptans	n		r		o		
Betula sp.	f						r

	type of remains	cm.					
		0—10	10—20	30—40	50—60	70—80	90—100
Corylus avellana	n			o	f. c.		o
Cornus sanguinea	st						r
Cf. *Crataegus monogyna*	st			r			r
Euphorbia amygdaloides	s			r			
Melandrium rubrum	s				r		
Oxalis acetosella	s				r	r	r
Potentilla sterilis	a			r	o		
Prunus spinosa	st						o
Rubus fruticosus agg.	st	r	f. c.	c	c	r	r
Sambucus nigra	s			r			r
Stachys sylvatica	n			r			
Stellaria graminea	s	r					
Viola reichenbachiana or riviniana	s			r			
Arable and ruderal							
Anagallis arvensis	s		r			r	
Atriplex hastata or *patula*	s	r	r				
Cerastium vulgatum	s	r	r	r			
Chenopodium album	s	o	o	r			
Cf. *Cirsium* sp.	a			r	r	r	r
Cf. *Geranium lucidum*	c					r	
Leontodon autumnalis or *leysseri*	a	r					
Polygonum aviculare agg.	f	r		r		r	r
P. nodosum or *lapathifolium* ...	f		r			r	
Ranunculus acris or *repens*	a		r	r			
R. repens	a	c	v. a.	v. a.	v. a.	o	a
Rumex acetosella	f	r	r			r	
Rumex spp.	f	o	r	c	a	o	o
Solanum nigrum	s			r			
Sonchus asper	a			r			
Thlaspi arvense	s			r			
Torilis japonica	c			r			
Urtica dioica	f	r		r		r	r
U. urens	f	r					
Others							
Galium sp.	f	r	r	r		r	
Potentilla sp.	a		r			r	
Viola sp.	s				r		r

forestation which is possibly attested also by the fall in *Corylus* pollen frequency. It is noteworthy that the beech, *Fagus sylvatica,* is present throughout the diagram. The single grain of *Hippophaë rhamnoides* presumably is from a coastal dune site.

Fig. 3 represents principally the aquatic and marsh plants which reflect local conditions, and are remarkable both for their variety and

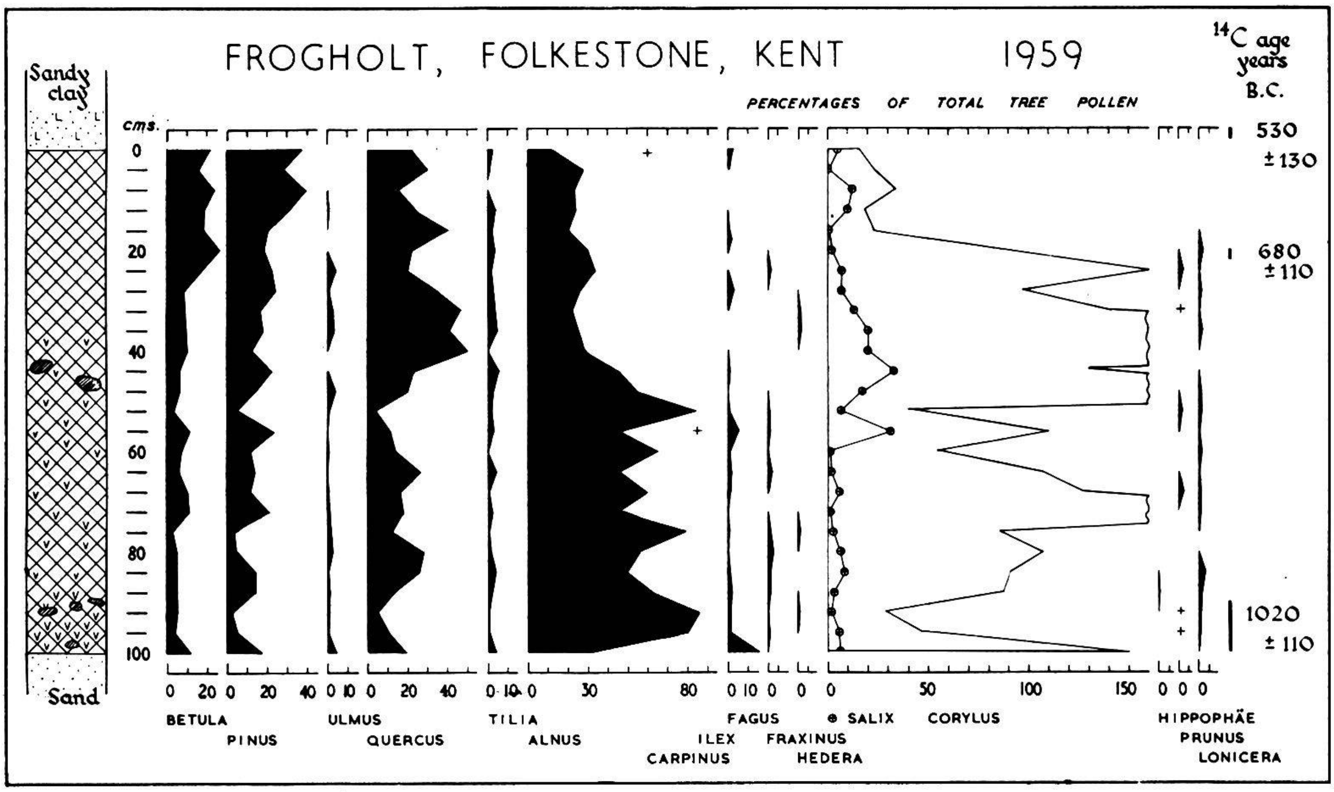


Fig. 2. Frogholt: pollen diagram of trees and other woody plants

correspondance with the fruit and seed records. Of particular interest are the abundant quantities of pollen of *Lotus* and spores of the liverwort *Anthoceros punctatus:* both would seem likely to belong to the marsh vegetation. *Scilla* has not previously been recorded in British pollen diagrams, and the few grains of *Armeria* like that of *Hippophaë,* seem to have a coastal origin.

In Fig. 4 are assembled those curves which seem to be associated with disforestation and agriculture, and the broad correlation of the movements of the several curves is outstanding. The role of *Pteridium,* here as in some other parts of Britain, in responding to woodland clearance is striking, and the irregular behaviour of the *Corylus* curve (Fig. 2) may have a similar cause. It is tempting to attribute the tremendous expansion of agricultural indicators in the upper 20 cm. to the influence of a powerful new culture entering the region, and to speculate whether this might not indicate the first Iron Age settlement. It is difficult to distinguish the presence separately of indicators of pasture and of arable cultivation: both would appear to be present and in proportions that do not differ greatly throughout the diagram. On the other hand the more locally derived fruits and seeds offer very clear evidence of arable conditions, and high frequences of *Cruciferae, Chenopodiaceae, Umbelliferae* and *Rumex* in the uppermost layers can hardly be explained save by the

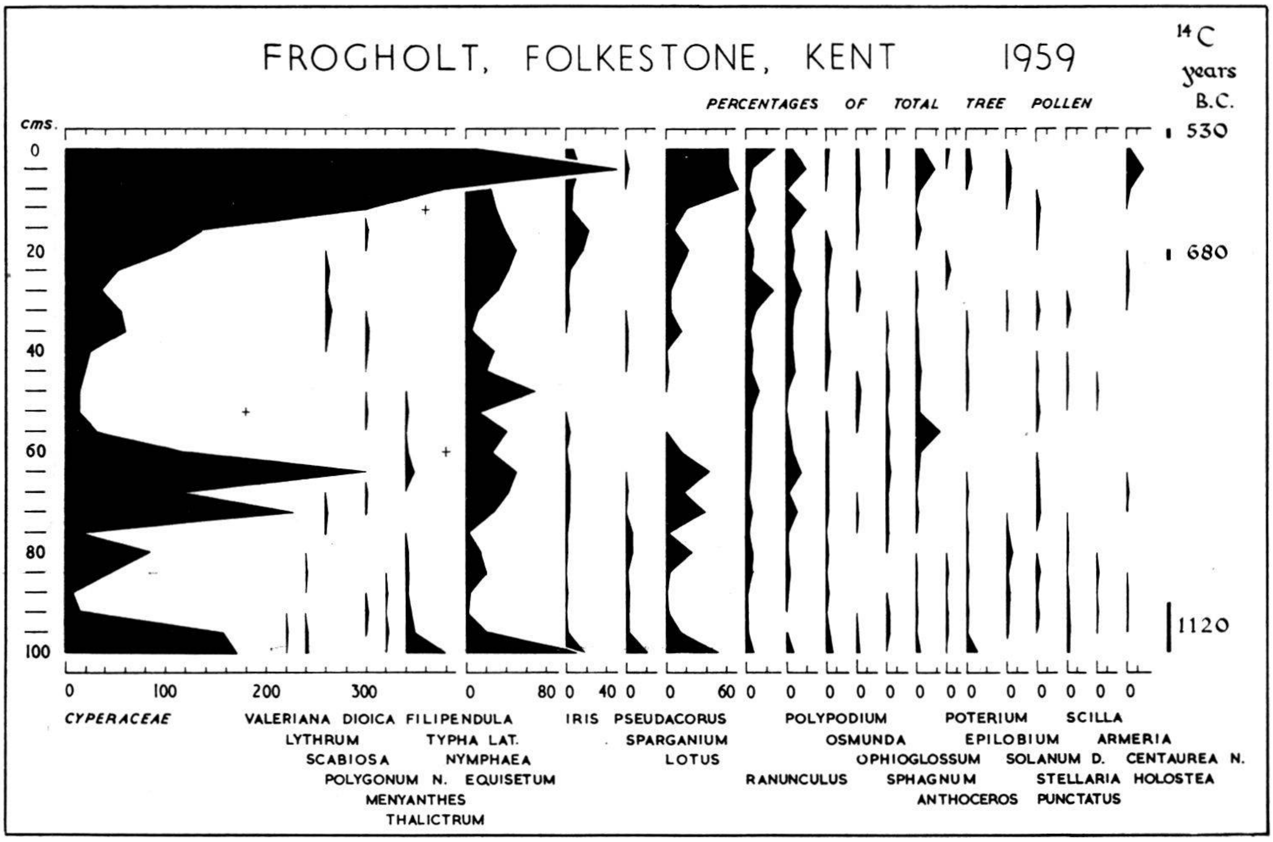


Fig. 3. Frogholt: pollen of herbaceous plants growing in or close to the valley marsh

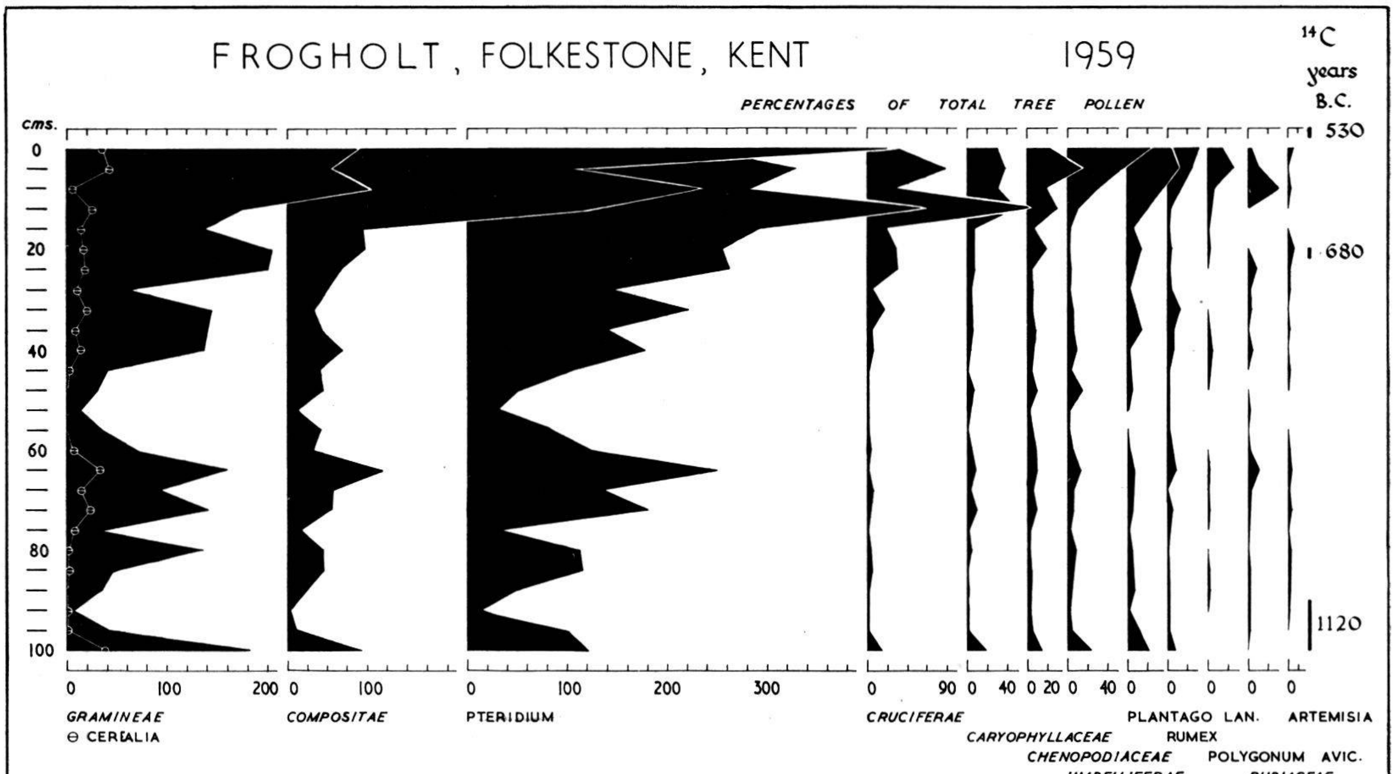


Fig. 4. Frogholt: pollen of plants indicative of forest clearance and agriculture

presence of extensive arable land. The sudden change whereby the stream laid down mineral deposits instead of clay seems likely to have also been due to the general clearance and cultivation, although perhaps assisted by the climatic change at the opening of the Subatlantic period.

WINGHAM, NEAR CANTERBURY

In June 1955 on the outskirts of the village of Wingham, a deep sewer trench had been dug across the east side of a low valley in the Upper Chalk going down to the River Little Stour. It ran beside the site of a Roman villa and consequently attracted considerable archeological interest. Investigations were undertaken by Mr. E. GREENFIELD and by Mr. L. BIEK acting for the Inspectorate of Ancient Monuments and Historic Buildings of the Ministry of Works. A detailed report of the findings of the investigators has now been published.

It was at their request that I visited the site in June 1955 together with Dr. R. G. WEST. The trench which was over 2,000 ft. (610 m.) long, crossed a central deeper section about 550 ft. (168 m.) wide in which there was a substantial bed of peaty organic mud. This was examined and sampled at a deep pumping pit, the bottom 1 m. being sampled by a small borehole.

cm.	
0— 18	plough soil
18— 30	fine mud with a little clay and small chalk pebbles
30—150	coarse detritus mud with *Phragmites, Equisetum, Cladium* and *Menyanthes:* a transition at 150 cm.
150—200	fine detritus mud with much less *Phragmites,* greyer and with more mineral matter and fine shell fragments near 200 cm.
200—230	light brown clay-mud with frequent small flints, abundant fine sand or silt, and occasional small bits of wood: at 225 cm. flints patinated grey and 1 possibly worked.
230—248	bluish-grey silty clay
248—	resorted chalky material with chalk pebbles and flint.

The surface was approximately at + 12 ft. O. D. In the sewer-trench near to this sampling point Roman artefacts of the 2nd and 4th centuries A. D. were found in the peat at depths respectively of 51 cm. and 107 cm. from ground surface, and a bruised scraper was found in a scatter of small flints between 60 an 75 cm. At the end of the trench, outside the limits of the peat bed there was also found a pit containing artefacts of Neolithic 'A' culture; it is very difficult to correlate these with any part of the peat section, and it appeared to predate the peat formation.

Radiocarbon datings were obtained as follows:

Q-106	90-100 cm.	coarse detritus mud of reed swamp	2340 ± 130 B. P.
Q-110	175-185 cm.	fine detritus organic mud	3105 ± 110 B. P.

The two dates provide a basis for the chronology of the whole deposit, which appears approximately to extend from 1700 B. C. to 200 A. D. The record accordingly embraces most of the Bronze Age, the pre-Roman Iron Age, and part at least of the Roman occupation.

Three large blocks of peat at 90-110, 140-155 and 165-185 cm. were digested and examined for their content of plant macrofossils and these records were supplemented by identifications of similar remains recovered in the preparations of the samples for pollen analysis. The identifications, all made by Miss C. A. LAMBERT, are presented in Table II.

We may call special attention to two species, here only tentatively recognised however, *Juncus subnodulosus* and *Centunculus minimus* that have not hitherto appeared in the British fossil record. It is to be noted that in addition to abundant seeds of *Nasturtium officinale,* those of the hybrid with *N. microphyllum* have been here tentatively identified for the first time in British Post-glacial deposits. Of particular interest also is the discovery by Miss LAMBERT upon the utricles of the fossil *Carex vesicaria* of fungal fruit-bodies of the *Microthyrium* type described previously by GODWIN and ANDREW (1951), but hitherto not associated with known hosts. The fruit and seed identifications are very rich in those species typical of calcareous fen and marsh. There is little indication of open water on the one hand (save perhaps that of *Plumatella, Potamogeton* and*Menyanthes* in the wetter levels) or of progression to fen woods or acid bog on the other. One may suppose that the dwarf *Aphanes arvensis,* (cf.) *Centunculus minimus, Juncus bulbosus* and (cf.) *Minuartia* sp. came from the seasonally wet margins of the valley where permanent dense marsh vegetation did not extend. The cultivation indicators will be referred to alongside the pollen of that character.

Pollen analyses were made by Miss R. ANDREW at 5 cm. throughout the deposit. The pollen of trees and shrubs (Fig. 5) is apparently undistorted by local fen woods and the curves are presumably generally representative of the region. It is interesting that *Fagus* should be present from the earliest samples: there is other evidence for the presence of the beech even earlier in Britain (GODWIN 1956). The curves for *Ulmus, Fraxinus, Corylus* and *Polypodium* show a distinct gap or large decrease between about 175 and 100 cm. and in view of the conclusions reached for the Frogholt diagram and the evidence given in Fig. 7, it seems possible that this is a phase of increased disforestation. It remains to draw attention to the pronounced rise of the *Pinus* curve between 110 and 75 cm. It is not easy to discern whether this reflects a local increase in the pine over two or three centuries, or whether severe felling of local oak woods was permitting the abundant pine pollen from the sandy soils of the Weald to figure more prominently. It will be noted that the absolute date of this rise is close to that of the similar rise at Frogholt where however

Table II

Macroscopic plant remains

Abbreviations: a, achene f, fruit; n, nut; p, perianth; s, seed; st, fruit-stone; sbt, statoblast; u, utricle

Frequency: r, rare 1—3; o, occasional 4—6; f. c., fairly common 7—10; c., common 11—15; a, abundant 16—49; v. a., very abundant

Aquatic and marsh	type of remains	35—40	45—50	55—70	75—85	* 90—110	95—110	115—130	135—150	* 140—155	155—170	* 165—185	175—190	195—199	205—215	215—230
		cm.														
Alisma plantago-aquatica	f					r			r	r	r	o	r			
Apium nodiflorum	f						r	r	r	r			r		r	
Berula erecta	f					r				o		f. c.				
Bidens cernuus	a		r							o		f. c.				
Callitriche sp.	f													r	o	
Carex paniculata	n + u					f. c.				o		f. c.				r
C. vesicaria **	n + u											r				
Carex spp.	n	o	r		r	r		o	r	r	r	o				r
Eleocharis palustris agg.	f												r			
Hypericum tetrapterum	s		r	r	r											
Juncus cf. articulatus	s	r	r	r												
J. effusus or *conglomeratus*	s											r				
J. inflexus	s											r				
J. cf. *subnodulosus*	s											r				
Juncus spp.	s				o		r	r				r			r	
Lychnis flos-cuculi	s	r		r	o	f. c.	r	r								
Mentha aquatica or *arvensis*	n														r	
Menyanthes trifoliata	s	r														
Montia lamprosperma	s									r						
Nasturtium officinale	s					r	r		r	c	r	f. c.	r	r	a	o
N. cf. *officinale X microphyllum* ..	s										o		r	r		
Polygonum hydropiper	n									r						
Potamogeton polygonifolius	st											r				
Ranunculus flammula	a			r						r						
R. sceleratus	a	r														r

Sagina sp.	s												r	r	
Solanum dulcamara	s							r							
Sparganium ramosum	st														r
Stellaria sp.	s					r						r			
(*Plumatella* sp.)	sbt									r		r			
Cultivation indicators															
Chenopodium album	s											r			
C. rubrum	s														
Chenopodium sp.	s									r		r			
Polygonum aviculare agg.	n					r									
P. lapathifolium or *nodosum*	n									r	r				
Ranunculus cf. *acris*	a		r												
Rumex acetosa	n + p										r				
R. cf. *acetosella*	n										r				
Rumex spp.	n									r					
Wet base indicators															
Aphanes arvensis	a					r									
Cf. *Centunculus minimus*	f				r										
Juncus bulbosus	s					r							o		
Cf. *Minuartia* sp.	s			r											
Others															
Cerastium sp.	s			r	r		r								
Polygonum sp.	n											r			
Ranunculus sp.	a					r						r			
Thalictrum minus	s											r			
Unidentified	f or s									r		o			

** With fungal fruiting bodies on the utricle

* Bulk peat samples

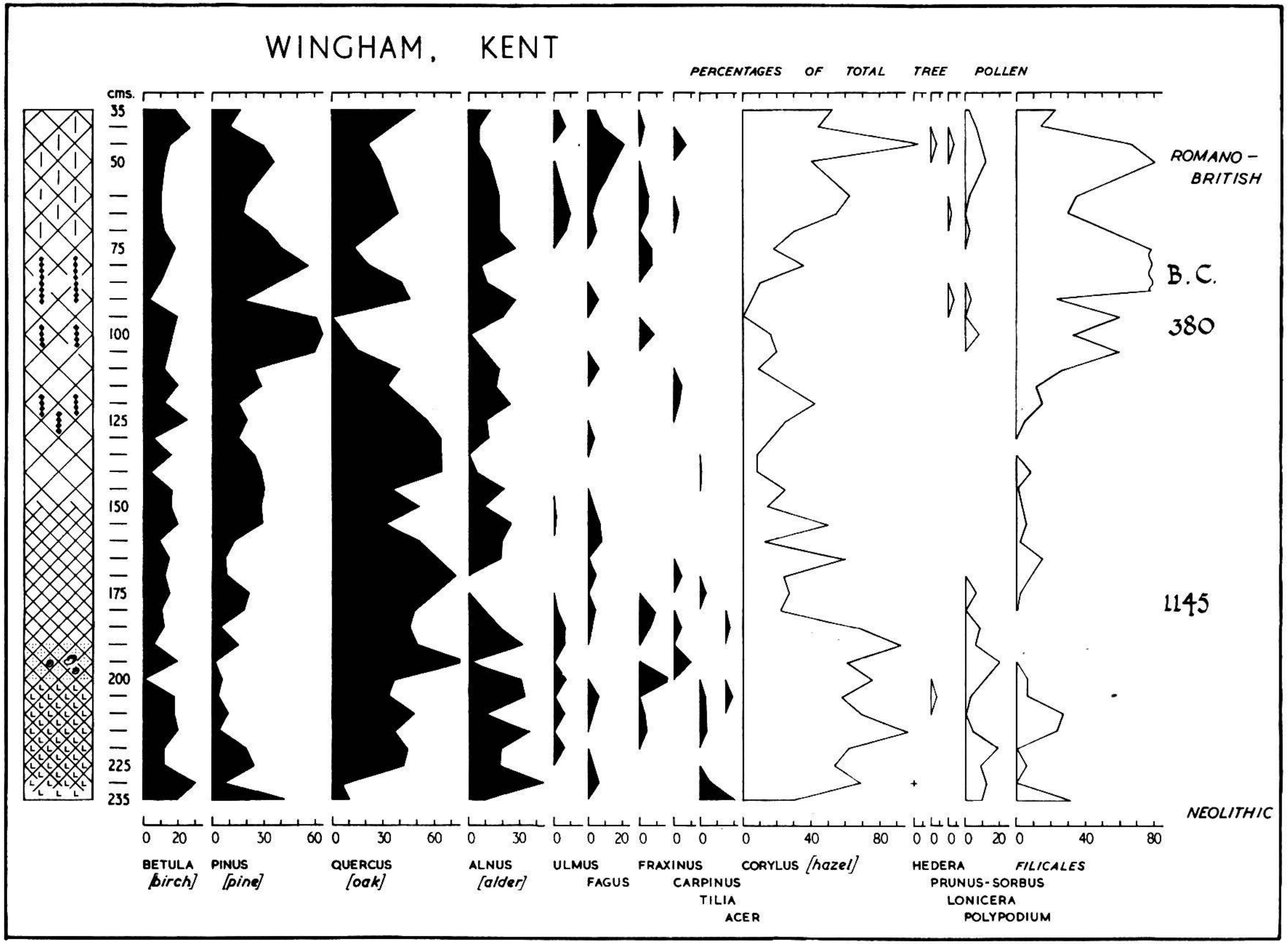


Fig. 5. Wingham: pollen diagram of trees and other woody plants (plus fern spores)

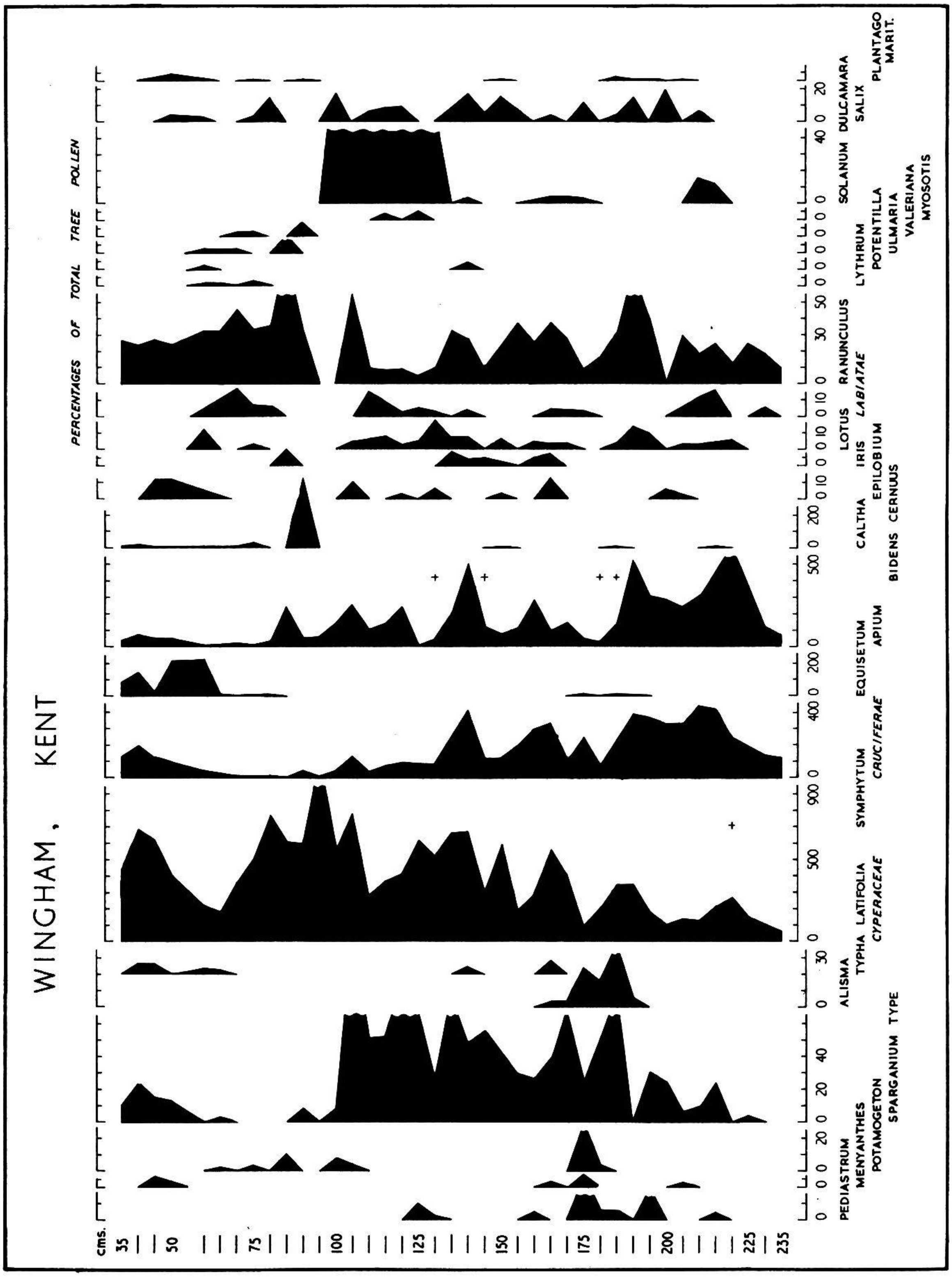


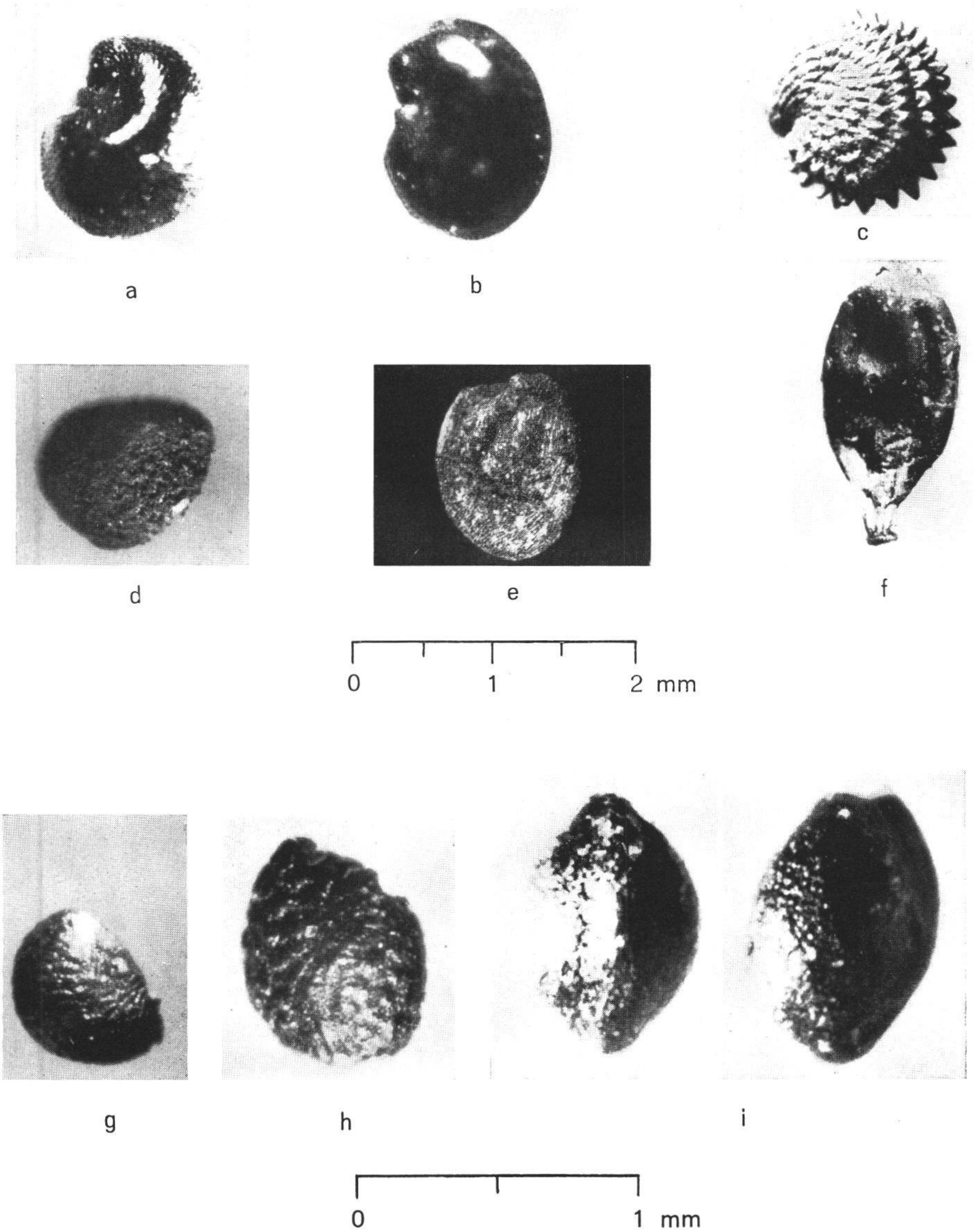
Fig. 6. Wingham: pollen of herbaceous plants growing in the valley fen or marsh

the explanation seems clearer. The only other diagram with which we can make comparison is that from Amberley Wild Brooks, also in the Chalk Downs but 75 miles (120 km) to the west. Here the tree pollen curves pursue a very similar course although the rise of pine is replaced by one of birch at the western site, and the base of the Wingham diagram seems to correspond at Amberley with the onset of peat formation after brackish water clay had ceased to be deposited (GODWIN 1943).

It is noticeable that diagrams from both sites exhibit the virtual cessation of the *Tilia* curve in the lower part of the diagram at a date that is probably about 1200 B. C. This has in the past been used as a zone boundary indicator for the opening of the zone VII/VIII, but its significance requires reconsideration. It would perhaps be possible to equate the late rise in the frequency of *Fagus* at the top of the Amberley diagram with that of about 200 B. C. in the Wingham diagram. We badly need to establish and date the late increase of the beech in this country so as to see more clearly the relationship with the well-dated Dutch and German history of that tree.

In Fig. 6 have been assembled the pollen-curves for those very numerous marsh and aquatic plants that occupied the valley during formation of the deposit. It is clear that the wettest period occurred between 220 and 170 cm. (say 1300 to 1100 B. C.) for here are maxima in the curves for *Pediastrum, Menyanthes, Potamogeton* and *Alisma,* with the initial rise in the «*Sparganium*», a curve that includes the separated grains of *Typha angustifolia. Cyperaceae* reach their greatest frequency at higher levels where *Cladium* remains were found in the section. *Iris, Lotus, Solanum dulcamara, Myosotis, Caltha* and *Equisetum* follow with maxima in that sequence and convey a clear impression of floriferous wet marsh or fen. Other curves are less easy to comprehend, but the high values for *Cruciferae* pollen are likely to be associated with the abundant seeds of *Nasturtium officinale,* a view supported by the morphology of the pollen itself. We note similarly that the abundant *Apium* pollen is matched by frequent fruits of *A. nodiflorum,* that seeds of *Sòlanum dulcamara* occur with the maximum of its pollen, that *Bidens* pollen is matched by fruits of *B. cernuus.* It is likewise possible that the abundant Labiate pollen is that of *Mentha.* The presence of pollen of *Plantago maritima* through the diagram, although in low frequency, reflects the nearness of tidal water. The level of 200 cm. where it first appears will be below + 6 ft. O. D., and one may wonder whether it was a marine transgression about the opening of the Bronze Age that initiated peat formation in the valley. Although the Isle of Thanet is now dry land, it was separated by sea-water from the rest of Kent until recent times, and there is much evidence along the south coast of Britain for a marine transgression that might correspond with this (cf. Amberley Wild Brooks, GODWIN 1943). Whether

Plate VII



a and *b* Moehringia trinervia, seeds
c Stellaria neglecta, seed
d Anagallis arvensis, seed
e Cardamine cf. flexuosa, seed
f Glyceria cf. plicata, caryopsis
g Sagina procumbens, seed
h S. nodosa, seed
i Chrysosplenium oppositifolium, seeds

the cause was increased activity of springs from the Chalk, or rising sea-level, there can be little doubt that the site became much more water-logged not long after Neolithic 'A' people had occupied the valley floor.

In Fig. 7 have been set out the pollen-curves most directly indicative of agricultural activity. It will be seen in the first place that the consis-

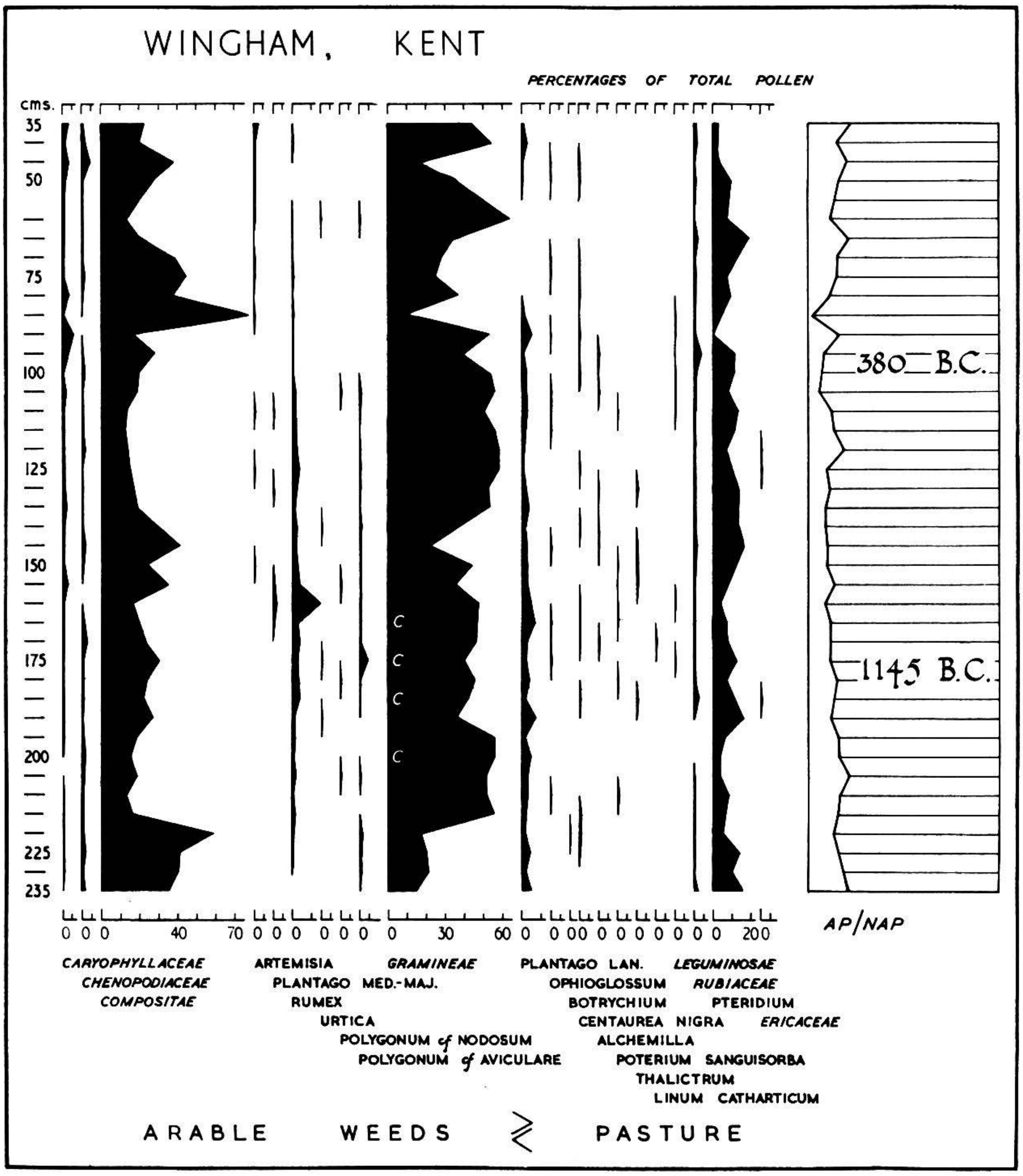


Fig. 7. Wingham: pollen of plants indicative of forest clearance and agriculture

tently low AP/NAP ratio indicates that from as early as 1600 B.C. the region had been largely disforested. As at Frogholt there seems no possibility of distinguishing succeeding phases with dominance of arable or pastural economy: both seem to have coexisted. The most familiar agricultural indicators, *Plantago lanceolata* and *Artemisia* show their greatest frequencies between about 190 and 90 cm., which is the section that also embraces the greater part of the records for the variety of indicators of lesser frequency. This represents a time span of about 1350 to 300 B. C. (i. e. Mid Bronze Age to Early Iron Age) but the highest cereal frequencies occur only in the first third of this period (200 to 160 cm.) which happens to include also most of Miss LAMBERT's macroscopic records of indices of cultivation. The indicators themselves, both pollen and seeds, deserve some closer mention. It will be noted that as with the fen and marsh indicators, there is much correspondence between the two sources of evidence, so that many genera or species are proven by both. The dwarf Pteridophytes, *Botrychium* and *Ophioglossum* are both present, with the calcicolous *Linum catharticum* and *Poterium sanguisorba*. As might be expected in this chalkland region ericoid pollen is extremely meagre: the low *Pteridium* values seem as much attributable to general disforestation however as to the absence of deep neutral to acidic soils. The pollen represented as *Leguminosae* in Fig. 7 is exclusively of *Lotus* type pollen (see Fig. 6) and includes grains that closely resemble those of *Trifolium*, *Astragalus*, *Ornithopus*, and *Ononis*.

CONCLUSION

Two sequences have been described from eastern Kent, England, shown by radiocarbon dating to be one 500 years and the other almost 2000 years in duration. The pollen analyses throw little light upon the English pollen-zonation, though indicating a significant decrease of *Tilia* about 1200 B. C., the presence of *Fagus* from the Early Bronze Age and an increase in its frequency in the Late pre-Roman Iron Age.

Both sites are remarkable for their extensive lists of macro-remains and for the variety of herbaceous pollen. On this account both witness excellently the local development of calcareous fen or marsh, and provide new fossil records for the history of the British flora.

At Wingham there is evidence of increased water-logging after Neolithic 'A' time, and there is some suggestion that it might be associated with rising sea-level.

Both sites are of particular interest as showing that parts at least of the Chalk of south-eastern England were largely disforested at an early date (at Wingham as early as about 1700 B. C.). Indications of arable and pastoral farming are abundant at both sites.

These historical vegetational facts do not seem to be in conflict with the archaeological evidence. It is known that there was considerable occupation of eastern Kent in the Early Bronze Age (Fox, 1943), so that the Wingham clearance as early as this is readily explicable. During the Iron Age, commencing strongly in Iron Age 'A', the plateaux of the Downs were brought under intensive arable tillage, as is shown by the multitude of small fields still evident there: the massive agricultural effects at this time in the Frogholt diagram seem to reflect this stage. In Roman time however the tops of the Downs were forsaken, for the field traces have not been disturbed or overlain since Iron Age time (Fox, 1943). I had already conjuctured (Godwin, 1956) that the expansion of the beech in Britain might well have been due to changing population pressures, and if the *Fagus* rise at the top of the Wingham diagram is truly the onset of the large rise observed elsewhere, it might indeed represent the post Iron Age withdrawal from the tops of the Downs and reinvasion by the beech.

These two Kentish series seem to show us where and how to look for the evidence of these important historical changes in the landscape of south-eastern England.

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REFERENCES

Clapham, A. R., Tutin, T. G. and Warburg, E. F. (1952): Flora of the British Isles. — Cambridge.

Fox, C. (1943): The Personality of Britain. — Nat. Museum of Wales.

Godwin, H. (1943): Coastal peat beds of the British Isles and the North Sea. — J. Ecol. *31*, 199.

Godwin, H. (1956): The History of the British Flora. — Cambridge.

Godwin, H. and Andrew,R. (1951): A fungal fruit-body common in Postglacial peat deposits. — New Phytol. *50*, 179.

Godwin, H. and Willis, E. H. (1960): Cambridge Natural Radiocarbon Measurements II. — Am. J. Science. Radiocarbon Supplement. *2*, 62.

Greenfield, E. (1960): A Neolithic pit and other finds from Wingham, East Kent. — Archaeologia Cantiana, *74*, 58.

Piggott, S. (1955): Neolithic Cultures of the British Isles. — Cambridge.