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Summary

Charred plant macrofossils (charcoal, fruits and seeds) were recovered from a sequence of Bronze Age deposits at Brean Down, Somerset.

The evidence from identification of charcoal from the buried soil suggests that ash-dominated woodland and some scrub existed before the settlement was established.

Wild and cultivated plants were recovered from the buried soil and a range of occupation deposits including floors and a hearth, but with the exception of the middle Bronze Age levels, were generally scarce. The cereals could have been grown locally or brought from some distance. Small numbers of arable weeds were identified but in the main the weeds reflect disturbed, nitrogen-enriched conditions and wet grassland.

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CHARRED PLANT MACROFOSSILS FROM BRONZE AGE DEPOSITS AT BREAN DOWN, SOMERSET, 1985-1986

by Vanessa Straker

INTRODUCTION

Brean Down, Somerset is a narrow promontory of carboniferous limestone extending into the Bristol Channel. It is a westerly extension of the Mendip hills and is today bounded by the Axe valley and extensive areas of low-lying estuarine alluvium.

The excavation of part of the sandcliff at Brean Down, Somerset took place over one main and several shorter seasons between 1985-1986 under the direction of Martin Bell (Department of Geography, St. Davids University College, Lampeter).

CHARCOAL FROM THE BURIED SOIL (UNIT 8A)

Charcoal was abundant in the basal palaeosol (described in Chapter 2) it was collected both during excavation and as a result of the bulk sieving.

A 20% (approximately) random sub-sample was selected for identification and the results are presented in Table 1. Weight was chosen as the most appropriate means of quantification although it is acknowledged that differential densities of wood species are not taken into account using this method. All the charcoal appeared to come from mature wood rather than twigs or small brush wood. Many of the fragments were very small and contribute largely to the 'unidentified' category. The number of metre squares in which the taxa were present is also recorded and reflects a generally similar picture to the weights.

Ash was the most common species (58%) followed by Pomoidae (6%). This group includes hawthorn, apple, pear, rowan and whitebeam, but in the present context hawthorn is perhaps the most likely candidate. Hazel, wild or bird cherry and blackthorn are present in smaller quantities and buckthorn and yew are found only as traces.

It is likely that the presence of the large quantities of charcoal in the buried soil relate to the clearing or burning off of the vegetation before the soil was cultivated and may therefore give us an idea of the vegetation prior to the settlement of the site.

The ash charcoal indicated that the wood was slow grown with very closely spaced annual rings, perhaps implying adverse growing conditions. Ash woods or ash mixed with hazel and other species are characteristic of limestone soils. Rackham (1980) notes that lime-ash woods are characteristic of ancient woods in the Mendips such as Cheddar Wood. Lime charcoal is very soft and rarely survives in archaeological deposits and is regarded as under represented in the archaeological record. It is possible then that lime may also have been a component of the vegetation on the Down.

There are two species of hawthorn which cannot be differentiated on the basis of their wood anatomy, but probably *Crataegus monogyna* which is readily dispersed by seed and is one of

the commonest trees to form secondary woodland is represented at Brean.

The wood of wild and bird cherry is difficult to differentiate between. Bird cherry has a longer history in post glacial Britain as wild cherry is not known until the fourth millennium (Rackham 1980). Wild cherry can grow large and has a patchy distribution in England now, most commonly in the south east. Bird cherry tends to be an underwood tree and is often regarded as a highland zone species, but its distribution was also probably more widespread formerly.

Blackthorn or sloe is a small tree which nowdays often forms secondary woodland or scrub. As a common hedgerow species it also tolerates woodland margins.

The large woodland trees (apart from ash) are only represented by traces of oak which can form woodland or secondary woodland on a variety of soil types.

Yew, one of only three native British conifers, can flourish in both woods and scrub and is often associated with limestone soils. Buckthorn is characteristic of scrub.

The presence of sloe, hawthorn and hazel is confirmed by the finding of a sloe stone, haw and hazelnut in the buried soil.

The National Trust (1982) Biological Survey shows that blackthorn, oak, buckthorn, hazel and hawthorn grow on the Down today and form woody scrub. Ash, the most common wood in the buried soil, is <u>not</u> present.

Assuming that the charcoal does not derive from wood brought to the site from some distance, it would appear that ash woods, possibly mixed with other species such as hazel, were present as well as some scrub characterised by *Prunus* spp., hawthorn, and other taxa such as buckthorn. Whether or not the ash woods represent the 'wildwood' or are a secondary woodland it is not possible to say from the charcoal alone.

OTHER PLANT MACROFOSSILS

During the excavation the sequence of Bronze Age deposits was extensively sampled for a variety of biological remains including plant macrofossils. Most of the bulk samples were processed by flotation on site after soaking in calgon. Samples remaining after the excavation were processed later in Bristol. The floats were poured off into a 250 micron sieve and residues collected on a 1mm nylon mesh. Both were sorted completely. The deposits were sampled by context (microfiche XX) which, in the case of some of the thick sand layers were subdivided into spits. In addition, two sample columns (of single metre squares) were collected which sampled the whole sequence; in some cases 'sterile' sand layers were only sampled as part of these columns. As the aim of the columns was to provide a control throughout the sequence rather than an assemblage for separate consideration, these will not be mentioned further other than to say that no plant remains were recovered from the presumed sterile sand layers (such as context 62). The assemblage will be discussed by amalgamating the information from the contexts (including those in the sample columns) into the relevant stratigraphic units; individual contexts will only be discussed where

the plant remains can add some detail to the interpretation of that context.

The aim of this work was to identify the crop plants and other plant taxa in the archaeological assemblage in order to try to establish:

a) What information the assemblages give on the use of plants in the different phases and where they could have come from.

b) How important (in general terms) cultivated plants were to the economy.

c) The nature of the vegetation on the Down during the Bronze Age. The vegetation on the Down today is largely of limestone grassland with patches of scrub, herb-rich meadow and coastal cliff communities. The identification of charcoal from the buried soil helps to establish the nature of prehistoric vegetation on the Down (see charcoal report).

The plant macrofossils extracted from the bulk samples are listed in Table 3. Despite the fact that some mineralised coprolites were found on the site (chapter 21), no mineralised fruits or seeds were observed, all the plant remains are preserved by means of carbonisation. The concentration of plant remains is generally low, the greatest quantity being recovered from Unit 5b, the main middle Bronze Age occupation horizon. More samples were processed from this unit than the others (1995 litres) which accounts in part for the greater number of macrofossils, but substantial quantities were also processed from Unit 4 (1020 litres), which contained far fewer plant remains. Relatively few samples were collected from Unit 6α relating only to contexts 156 and 163, but the concentration was similar to Unit 5b, as shown at the end of Table 3. Plant remains from Units other than 5b and 6α, are very sparse (see Fig 1), but this probably relates to the nature of the contexts examined; the relatively rich huts and associated hearths and floors were recovered only within Units 5b and 6α.

Cultivated plants

These consist of wheat (*Triticum* spp.), Barley (*Hordeum* sp(p)), celtic bean (*Vicia faba*) and possibly Oats (*Avena* sp.). Figure 1 shows the importance of cultivated plants in the assemblages from the units as a whole and Figure 2 gives a breakdown of the cultivated plants in more detail. From Figure 1 it is clear that cultivated plants do not occur in large numbers and are found in greatest concentration in Units 4, 5b and 6α.

Wild plants

The wild plants identified are also listed in Table 3. In order to facilitate discussion these taxa have been assigned to habitat groups, wherever possible, to see whether major differences in the nature of the plants reaching the settlement can be distinguished between the different phases. Plants respond to a variety of ecological stimuli and as a result many will grow in more than one strict habitat type. Therefore it was not possible to assign every plant to a group and many have been assigned to the 'V' (various) category. These groups are shown in Figure 1 and the data for Units 6α, 5b and 4 is expanded in the form of pie diagrams presented in

Figure 3, 4 and 5. Lists of the plants in each group can be found in Table 4.

The Down at Brean is an SSSI and owned by the National Trust. Owing to its important flora, certain recent modern biological studies have been carried out. Shimwell mentions the grassland flora on the Down in his paper on the phytogeography and phytosociology of limestone grasslands which have been classified according to the Zürich-Montpellier School of phytosociology and the system of vegetation classification for central and north-west Europe described by Lohmeyer *et al.* (1962, quoted in Shimwell 1971). The grassland belongs to the Class Festuco-Brometea Br-Bl. & R.Tx.1943. This a dry anthropogenic base-rich grassland and includes most of the grasslands on calcareous soils in central and Western Europe. The grassland also belongs to the Sub-alliance Xerobromion, of which Brean Down is the centre of the Somerset distribution. Narrowing the description down still further, the Association Poterio-Koeleterium Vallesianae is found at Brean and is now confined to the steeper slopes between 30m and 60m feet and includes rare species such as *Helianthemum appeninum*, white rock rose (Shimwell, 1971). Although this grassland association may have been more widespread in the past, the charred seeds from the Bronze Age deposits do not include species which today would be considered typical of the Association or the sub-allaince Xerobromion. Whether this is the result of differential preservation or because this type of grassland was not well developed during the Bronze Age, is open to question.

The National Trust kindly made available the results of its biological survey carried out in 1982.

The Survey groups plants generally into scrub communities with bramble and bracken, grassland and crags and maritime communities, the last primarily on sea cliffs. The nearby saltmarsh was not included in the study but its history has been discussed by Page (1982). Although saltmarsh may well have existed in the vicinity of the Down during the Bronze Age the small area of existing salt marsh described by Page may not be of very great antiquity.

The taxa identified from the Bronze Age deposits at Brean and also noted in the modern National Trust survey are marked on Table 4. While the National Trust survey found some of these plants in the same habitats as those suggested for the the archaeological material, a few, such as *Malva sylvestris* and *Arrhenatherum elatius*, are found in other habitats as indicated on Table 4. This emphasises the importance of looking at communities of plants rather than considering them individually in too much detail. In a modern study, it is much easier to study communities than it is in the archaeological record where the preservation of species is selective and the key species allowing classification into phytosociological groups may not, as could be the case at Brean, be preserved.

Unit 8a

Very few plant remains were recovered from the palaesol, the earliest deposits investigated in this study. They comprise a single wheat grain and fragments of hazelnut, sloe and hawthorn which could have been collected locally if scrub vegetation was present on the Down at the time, or could have been derived from clearance by burning. No herbaceous weed taxa were identified.

Unit 7

A single fragment of hawthorn accompanied by a single wheat grain were the only plant remains from the Beaker occupation horizon.

Unit 6b

This deposit consisted of colluvium eroded in part from the Beaker palaeosol and the few plant remains, consisting of hazelnut fragments, emmer glume bases, a grain of barley and a single weed seed could have derived either from Unit 8a or the cultivation episode responsible for colluviation.

Unit 6a

Plant remains were scarce in context 61, but a greater range of plants was recorded than in the previous units. Barley (a single grain), two grains of wheat, various weed seeds including fat hen (*Chenopodium album*), grasses (Gramineae), henbane (*Hyoscyamus niger*), clover (*Trifolium* sp.), ribwort plantain (*Plantago lanceolata*) and a few characteristic of damp or wet conditions such as rushes (*Juncus* sp(p)) and great spearwort (*Ranunculus lingua*). Most of the weeds are characteristic of disturbed conditions and grassland though fat hen and possibly ribwort plantain may also be arable weeds.

Unit 6α

In unit 6α two contexts are represented, 156 which relates to the collapse and abandonment of Structure 57 and 163 which is a possible floor layer associated with the same structure.

Context 163 contains a few cereals and a wider range of weed seeds than in context 156; however, the weeds which include small nettle *(Urtica urens)*, sorrel *(Rumex)* sp., and clover (*Trifolium cf. dubium*) could relate more to disturbed ground and grassland than to full arable conditions. A number of scrub or hedgerow taxa such as Rose, *Prunus* and hazel (*Corylus avellana*) are also present as well as the charred bladder of a species of seaweed. In general, although small,the assemblage is fairly typical of a domestic situation with cultivated and collected edible taxa among the burnt refuse.

In contrast, in context 156 cereals are very scarce and a number of the weeds are characteristic of wet or damp conditions: notably spikerush (*Eleocharis palustris/uniglumis*), sedges (*Carex* spp.), rushes (Juncus sp(p)), blinks (*Montia* sp.) and water chickweed (*Myosoton aquaticum*). There is also a very large number of charred grass seeds. In this situation the assemblage could be reflecting the burning of animal dung from animals pastured on damp grassland and stalled in an abandoned hut, or burning of roofing or flooring material or a combination of the two. It might reasonably be assumed that originally the roof/floor covering would have consisted of mainly straw and/or the stems of rushes and sedges, with associated arable weeds or plants of damp conditions collected inadvertently. Once the bulk of the material had burnt away, the sort of collection outlined above might remain.

Unit 5b

In Unit 5b, cereals are better represented in the form of grains of wheat and barley, glume bases of wheat and a few celtic beans (*Vicia faba*). Although the wheat that can be identified to species level, principally on the basis of the morphology of the glume bases is mostly emmer (*T. dicoccum*), spelt is recorded, but only as a single glume base. However, this is of interest as it does not occur in the earlier deposits at Brean where there is the opportunity to look at a series of deposits spanning the whole of the Bronze Age. In Unit 5b it would appear that barley and wheat are present in roughly equal quantities, if the number of wheat glume

bases is taken as roughly indicative of the number of wheat grains originally present and assuming that the chaff was not present only as a source of tinder.

Where preservation was good enough it was possible to identify some of the barley to the hulled form, the type most commonly found in Bronze Age deposits. No naked barley was observed.

The only oats (*Avena* sp.) present was in Unit 5b and owing to the lack of the floret base it was not possible to say whether it was wild or cultivated.

The few celtic beans (*Vicia faba*) that were identified came from Unit 5b. Pulses are not commonly recorded from prehistoric sites and may well be under-represented in the archaeological record as they do not require exposure to heat to facilitate dehusking which is necessary for hulled cereals such as emmer and spelt. Pulses are therefore less likely to become burnt accidentally. If they were commonly used, pulses could have contributed a valuable source of protein to the diet.

In context 53, the general occupation horizon comprising Unit 5b, a range of cultivated and wild species is present and is broadly comparable to context 163 in unit 6α (above), the weeds primarily coming from grassland and disturbed ground.

A similar though more extensive assemblage comes from the floor of structure 59 (context 60), though more plants of wet ground such as rushes and sedges are also present, again possibly relating to burnt roofing or flooring material or even burnt dung. Beneath this layer, a similar range of plants was represented, perhaps relating to an earlier floor layer.

The floor of the other hut (context 93, Structure 95) was generally similar containing some wheat chaff and grain, barley, plants of disturbed places and grassland and a lot of rushes.

Two layers which contained burnt material were interpreted on site as possible hearth clear-out debris (contexts 77 and 130 outside Structure 95). Some charred plant macrofossils were preserved in both layers though both also contained much fine charcoal. In context 77, cereal grain, principally barley, was accompanied by a cereal culm node and probable arable weeds such as fat hen and plants of disturbed or waste places such as henbane. This plant, which occurs in several contexts in Unit 5b as well as in Unit 6a, is characteristic of disturbed, sandy conditions but is not found growing on the Down today. The other layer contained only 4 cereals and comprised mostly rushes and grasses. Neither deposit could be considered as obvious crop processing waste though dry grasses, rushes and straw (evidenced by the culm node) would be useful for starting fires.

Bottema (1984) studied the charred seed contents of modern fireplaces in rural parts of Northern Syria. He concluded that the charred seeds derived from the local seed rain, food burnt during cooking, gathered vegetable fuel, dung used as fuel and extant vegetation burned under the fireplace and of these dung, in this case of sheep, appeared to have been the major source. He connected this directly with the scarcity or absence of wood as fuel. Although the sources suggested above could have supplied the seeds which became charred in the Brean hearth deposits, it is usually thought that the burning of dung was more likely in drier, less wooded climates. Wood charcoal is certainly common in the archaeological deposits and even if the primary woodland had been cleared, scrub regeneration and driftwood available at Brean could presumably have provided fuel for domestic fires and those required for evaporation of salt water.

Bottema's study was on fireplaces in the open and therefore one might expect more from the extant vegetation and local seed rain sources, but at Brean, roofing, flooring or even the burning of peat for fuel could add to the possible sources of seeds in the hearth. The closest source of peat would have been the accumulation on the present beach if it was exposed at the time. This did contain the seeds of rushes (*Juncus* and *Scirpus/Schoenoplectus*) but none of the other taxa identified in the peat appeared on the site and the rush seeds found charred in the occupation deposits could derive from other sources (see above). However the use of peat for fuel is definitely known from a Roman briquetage mound a few miles away at East Huntspill where the charred remains of raised bog species were identified (Caseldine in Leech *et al.* 1983).

Unit 4

There are very few cereals in Unit 4. Wheat is represented only by a single glume base of spelt wheat. Barley is similarly scarce, represented only by a grain and an internode and celtic beans and oats are not recorded at all. Considering the amount of pottery and bone found in Unit 4, the extreme scarcity of the remains of edible plants is surprising. The weed flora is small, though possible weeds of cultivation such as the twining black bindweed (*Bilderdykia convolvulus*) are present with a scatter of edible scrub/woodland resources including hazel, sloe and hawthorn.

Plant impressions in briquetage

Impressions of plant material were noted in many of the fragments and larger pieces of briquetage, however for the most part it was not possible to identify these with any precision. The exception was a single fragment (60416, context 66) which contained charred plant remains, rather than impressions of plant material. Among pieces of stem and possible chaff fragments which were not readily identifiable further, there was one glume base. Although it is not completely visible it is tentatively identified to Emmer wheat *Triticum* cf. *dicoccum* on the basis of the nature of the venation and keels. Emmer is also present in the carbonised assemblage from the Bronze Age Units.

DISCUSSION

The results from several recent excavations show that spelt wheat is now known to have been established in the British Bronze Age, though what its status was in relation to emmer is not yet clear. Spelt is recorded at Potterne in Wiltshire (Straker 1987), Black Patch in Sussex (Hinton 1984), Runneymede Bridge (Greig pers. comm.) and West Row Mildenhall (Murphy 1983, Martin and Murphy 1988) at a similar date to its appearance at Brean. It then becomes very common in Iron Age and Roman deposits.

Emmer, barley (usually but not exclusively the hulled form) and rye (known only from Runneymede) are also known from Bronze Age sites. Pulses are scarce but do occur on several East Anglian sites (Fingringhoe; Springfield Lyons, Chelmsford; and Lofts Farm, Heybridge, Murphy pers. comm.) and Rowden in Dorset (Carruthers, pers. comm.). Celtic beans have also been recorded at Black Patch (Hinton in Drewett 1984) and at various sites in East Anglia (Murphy pers. comm.), though *not* at Potterne.

Tubers of the onion couch (*Arrhenatherum elatius*) have been found on Bronze Age and earlier sites (Straker 1987) and could derive

from arable, abandoned arable or grassland situations. The tubers were uncommon at Brean (a fragment only in Unit 4) and could have been used to start fires. They are also edible (Jones 1978).

The question of whether the cereals represent crops that were growing locally is difficult to resolve. The 'celtic fields' on the top of the Down have not been dated, and could be of Bronze Age origin despit traditionally assumed to be of an Iron Age date. Other small areas could also have been suitable for small scale cultivation. Indeed, the southern slope of the Down was used as allotments in the last century (Knight 1902). However, cereals are very scarce in the archaeological deposits. If one takes one aspect of the model proposed by Jones (for Iron Age communities in the Thames valley), at sites where crops were grown more trace of grains charred by accident might expect to be found in domestic deposits such as those excavated at Brean, than at sites where they were not produced and were therefore more precious. The arable weed flora is restricted at Brean even in the main middle Bronze Age occupation horizon, and this also makes it difficult to isolate phytosociological groupings and suggest where the crops were grown.

Some of the weeds (such as fat hen, sheep's sorrell, shepherd's purse (*Capsella bursa-pastoris*), chickweed (*Stellaria media*) and cleavers (*Galium aparine*) can be found as arable weeds and are characteristic of the Class Stellarietea, which generally characterises all British arable communities (Silverside, 1977). Clover (*Trifolium dubium*), sheeps' sorrell and blinks (*Montia* sp.) are more particularly associated with the Alliance Spergulo-Oxalidion, which is characteristic of root crops, spring- sown cereals and also nitrogenous disturbed land. Although sheep's sorrell was identified and this is often characteristic of acid arable land, it can be found at present in pockets of sand accumulated in hollows in the surface of the limestone on the top of the Down.

Unfortunately, recent phytosociological studies are of little help in trying to understand the assemblage of charred seeds and in the main it is likely that the weeds reflect disturbed, nitrogen enriched conditions likely in the vicinity of settlements with a wet grassland with stands of sedges and rushes growing in it in the vicinity. There may be small numbers of weeds of cultivated land which arrived at the settlement with cereals. The cereals could either have been grown locally in very small quantities or brought to the site (also in small quantities) from some distance away.

However, despite the evidence from the soil micromorphological studies for cultivation (Macphail pers. comm.) the charred plant remains do not unequivocally support the suggestion that crops were grown locally.

Other than a few seeds of sea blite (*Suaeda maritima*), there is little evidence for salt marsh although it is possible that some of the rushes (*Juncus* sp(p)) could be salt marsh species such as *J. gerardii*. Unfortunately the effect of charring on such fragile seeds means that identification cannot be taken to species level.

Although edible woodland food sources such as hazelnuts and sloes are present, they are in very small amounts which is surprising for hazel in particular is very common on Neolithic and many Bronze Age sites (Moffett *et al*, in press). If hazel had been growing commonly at Brean, far more nut shell fragments would be expected in the occupation deposits.

Generally, the assemblages at Brean support the suggestion that arable intensification did not take place until the late Bronze Age

when large areas were exploited to support higher population levels in the Iron Age (Moffett *et al.* in press). This intensification is not seen in the area excavated so far at Brean, but the paucity of crop plants and arable indicators may relate to the nature of activities carried out on the site.

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TABLE 1: BREAN DOWN : CHARCOAL FROM THE BURIED SOIL (Unit 8a)
(weight in gm)

TAXON		4/11	10/13	11/13	13/13 squares	13/14	60517	6171	TOTAL	% weight	present in sq.
Fraxinus excelsior	Ash	.02	.4	.42	4.98	.26	1.79	2.61	10.48	53.8	7/7
Pomoidae	Hawthorn group		.02	.36	.16	.39	.06	.27	1.26	6.5	6/7
Corylus avellana	Hazel		.33	.17	.07	.14	.01	.02	.74	3.8	6/7
Prunus cf. avium/padus	Wild/bird cherry		.03		.08		.05	.28	.44	2.3	4/7
Prunus cf. spinosa	Blackthorn		.09	.12	.13				.34	1.7	3/7
Quercus sp.	Oak				.3			.07	.37	1.9	2/7
Rhamnus cathartica	Purging buckthorn	.07				.13			.2	1	2/7
Taxus baccata	Yew				.05				.05	.3	1.7
unidentified			1.5	1.57	1.32	.01	.78	.41	5.59	28.7	6/7
TOTALS		.09	2.37	2.64	7.09	.93	2.69	3.66	19.47	100	

TABLE 2: Contexts sieved for charred plant macrofossils.

UNIT 4	UNIT 5a	UNIT 5b	UNIT 5d	UNIT 6α	UNIT 6a	UNIT 6b	UNIT 7	UNIT 8a
16	19#	52#	153#	156	61	66	62*#	63
		53		163			188	127
		60						
		77						
		79						
		91#						
		92						
		93						
		103						
		112						
		113						
		115#						
		128#						
		130						

SOILS PITS:
SP2 - 38#
43#
SP3 - 86#

- no plant macrofossils present
* - column sample only

TABLE 3: BREAN DOWN : CARBONIZED PLANT REMAINS

TAXON	COMMON NAME	HABITAT PREFERENCE	UNITS 4	5b	6	6a	6b	7	8a
Avena sp.	Oats	C	0	1	0	0	0	0	0
cf. Avena sp.	cf. Oats	C	0	1	0	0	0	0	0
Avena/Bromus	Oats/Bromus	C	0	1	0	0	0	0	0
Hordeum sp.	Barley	C	1	45	6	1	1	0	0
Hordeum sp. hulled			0	5	0	0	0	0	0
Hordeum sp. hulled, straight		C	0	4	0	0	0	0	0
Hordeum sp. hulled, twisted		C	0	1	0	0	0	0	0
Hordeum sp. straight		C	0	2	0	0	0	0	0
Hordeum sp. twisted		C	0	1	2	0	0	0	0
Hordeum sp. internode		C	1	0	0	0	0	0	0
T. monococcum/dicoccum glume base	einkorn/emmer	C	0	1	0	0	0	0	0
T. monococcum/dicoccum/spelta glume bases		C	0	4	0	0	0	0	0
Triticum cf. dicoccum grain	emmer	C	0	2	1	0	0	0	0
Triticum dicoccum glume bases		C	0	14	0	0	2	0	0
T. dicoccum/spelta grain	emmer/spelt	C	0	7	2	0	0	0	0
T. dicoccum/spelta glume base		C	0	6	0	0	1	0	0
T. cf. spelta grain	spelt	C	0	1	0	0	0	0	0
? T. spelta glume base		C	0	1	0	0	0	0	0
T. spelta glume base		C	1	1	0	0	0	0	0
Triticum sp. grain	wheat	C	0	15	5	2	0	1	1
Triticum sp. tail grain		C	0	1	0	0	0	0	0
Triticum sp. glume base		C	0	44	0	0	0	0	0
Triticum/Hordeum grain	wheat/barley	C	0	2	0	0	0	0	0
Cereal indet.		C	f	21	5	f	1	0	0
Cereal culm node		C	0	0	1	0	0	0	0
Cereal culm base		C	1	0	0	0	0	0	0
Other taxa									
CARYOPHYLLACEAE									
cf. Arenaria sp.	cf. Sandwort	Da,c,bare ground	0	1	0	0	0	0	0
Caryophyllaceae indet.			0	4	3	0	0	0	0
cf. Moehringia trinerva (L.) Clairv.	Three-nerved sandwort	W, well drained soils	0	5	1	0	0	0	0
Myosoton aquaticum (L.) Moench	Water chickweed	M,damp, W	0	2	1	0	0	0	0
Stellaria media agg.	Chickweed	Da,V	0	1	0	0	0	0	0
CHENOPODIACEAE									
Chenopodium rubrum L./glaucum L.	Red/Glaucous goosefoot	D,Da,s	1	2	1	0	0	0	0
gen. et sp. indet.			0	48	1	0	0	0	0
Chenopodium cf. album L.	Fat hen	D,Da	0	13	1	1	0	0	0

TABLE 3 CONT.

			4	5b	6K	6a	6b	7	8a
Chenopodium sp(p).	Fat hen etc.	V	0	11	8	0	0	0	0
Suaeda maritima (L.) Dum.	Herbaceous seablite	S,s	0	5	0	0	0	0	0
Chenopodiaceae/Caryophyllaceae			1	11	0	0	0	0	0
COMPOSITAE									
Senecio cf. aquaticus Hill	Marsh ragwort	M	0	0	1	0	0	0	0
CORYLACEAE									
Corylus avellana L. fragments	Hazel	W	f	0	f	0	f	0	f
CRUCIFERAE									
Brassica/Sinapis	Rape/turnip/mustard etc	V,(Brassica esp.s,Sinapis esp.c	0	0	1	0	0	0	0
Capsella bursa-pastoris (L.) Medic.	Shepherd's purse	D,Da	0	3	2	0	0	0	0
gen. et sp. indet. (small)			0	9	0	0	0	0	0
CYPERACEAE									
Carex sp (p).	Sedge(s)	V,d	0	22	3	0	0	0	0
Eleocharis palustris/uniglumis	Spikerush	M,pond margins	0	0	1	0	0	0	0
cf. Scirpus maritimus L.	Sea club-rush	shallow water esp.s	0	1	0	0	0	0	0
gen. et sp. indet.	Sedges	V,d	1	1	0	0	0	0	0
GRAMINEAE									
Arrhenatherum elatius var. bulbosum (Will	Onion couch	Da,G	1	0	0	0	0	0	0
Bromus sp.	Brome	D,Da,G	0	3	0	0	0	0	0
gen. et sp. indet.	Grasses	V,G	1	165	160	2	1	0	1
Gramineae/cereal culm node			0	3	1	0	0	0	0
Gramineae culm node			0	1	0	0	0	0	0
JUNCACEAE									
Juncus sp.(p)	Rush(es)	H,M	0	340	4	3	0	0	0
LABIATAE									
Lycopus europaeus L.	Gypsywort	M,river banks	2	0	0	0	0	0	0
Mentha sp.	Mint	V	0	0	1	0	0	0	0
LEGUMINOSAE									
gen. et sp. indet.		V	2	1	0	0	0	0	0
Trifolium sp.	Clover	G	0	14	0	2	0	0	0
Trifolium cf. dubium Sibth.	Lesser yellow trefoil	G	0	1	0	0	0	0	0
Trifolium cf. pratense L.	Red clover	G	0	1	0	0	0	0	0
Vicia faba L. var minor	Field (celtic) bean	C	0	3	0	0	0	0	0
Vicia/Lathyrus sp.	Vetch/tare	D,Da,V	2	3	1	1	0	0	0
MALVACEAE									
cf. Malva sylvestris L.	Common mallow	D	0	0	1	0	0	0	0
ONAGRACEAE									
cf. Epilobium sp.	Willowherb	V	0	1	0	0	0	0	0
PAPAVERACEAE									
Papaver cf. dubium L.	Long-headed poppy	Da	0	1	0	0	0	0	0
PLANTAGINACEAE									
Plantago lanceolata L.	Ribwort plantain	G	0	3	0	1	0	0	0
Plantago major L.	Great plantain	D,Da	0	1	0	0	0	0	0
POLYGONACEAE									

TABLE 3 CONT.

			4	5b	6c	6a	6b	7	8a
Polygonum lapathifolium/nodosum	Persicaria	Da,B,d	0	1	0	0	0	0	0
Rumex acetosella agg.	Sheep's sorrell	Da,G.H.(acid pref.)	0	1	0	0	0	0	0
Rumex sp(p).	Sorrell	V	0	7	3	0	0	0	0
gen. et sp. indet.			2	0	1	0	0	0	0
PORTULACCEAE									
cf. Montia sp.	Blinks	D,Da	0	1	3	1	0	0	0
RANUNCULACEAE									
Ranunculus lingua L.	Great spearwort	M	0	0	0	1	0	0	0
ROSEACEAE									
Crataegus sp.	Hawthorn	W	1	1	1	0	0	1	1
Potentilla cf. reptans L.	Creeping cinquefoil	D,G	0	1	0	0	0	0	0
cf. Prunus sp. (stone fragment)		W	0	0	1	0	0	0	0
Prunus spinosa L.	Sloe	W	f	0	f	0	0	0	f
Rosa sp.	Rose	W	0	0	1	0	0	0	0
Roseaceae thorn		W	0	0	0	1	0	0	0
RUBIACEAE									
Galium aparine L.	Cleavers	D,Da	0	1	0	0	0	0	0
Galium sp.	Goosefoot	V	0	3	1	0	0	0	0
cf. Sherardia arvensis L.	Field madder	D,Da,G	0	2	0	0	0	0	0
SCROPHULARIACEAE									
Euphrasia sp./Odontites verna (Bell.) Dum.	Eyebright/red bartsia	Da,G	0	3	1	0	0	0	0
SOLANACEAE									
cf. Atropa belladonna L.	cf. Deadly nightshade	W,c	0	1	0	0	0	0	0
Hyoscyamus niger L.	Henbane	D,sandy,esp.s	0	7	0	2	1	0	0
UMBELLIFERAE									
gen. et sp. indet.			0	0	0	1	0	0	0
URTICACEAE									
cf.Urtica urens L.	Small nettle	D,Da,	0	1	1	0	0	0	0
VIOLACEAE									
Viola cf. tricolor L.	Wild pansy	D,Da,G	0	1	0	0	0	0	0
cf. Viola sp.			0	0	0	0	0	0	1
POLYPODIACEAE									
cf. Pteridium aquilinium (L.) Kuhn	Bracken	W,H,acid pref.	0	1	0	0	0	0	0
cf. Sea weed fragment			0	0	1	0	0	0	0
Unidentified seeds			44	117	28	5	1	1	4
Unidentified A (?Primulaceae)			1	3	1	0	0	0	0
Unidentified stem fragments etc.			1	1	2	0	0	0	1
TOTAL			72	1016	259	24	9	3	9
No. samples			86	88	22	12	9	1	45
No. litres			1020	1995	540	120	90	10	450
seeds/10 litres			.7	5.1	4.79	2	1	3	.2

Key: B - bankside; C - cultivated; D - disturbed; Da - disturbed incl. cultivated; G - grassland; H - heathland; M - marshes, fens, ditches; S - saltmarsh; W - woods, hedges, scrub; V varied; c - prefers calcareous soils; d - damp conditions; s - coastal

TABLE 4: Taxa from Table 1 assigned to groups as shown in Figures 1 and 3-5.

C	W	G	M	D
Avena sp.	cf. Atropa belladonna*S	Arrhenatherum elatius*S	Carex sp(p)*GC,M	Bilderdykia convolvulus
Hordeum sp.	Corylus avellana*S	Euphrasia*S/Odontites	cf. Montia sp.	C. ficifolium
Triticum spp.	Crataegus sp.*S	Gramineae	Cyperaceae	C.rubrum/glaucum
Vicia faba	Prunus spinosa*S	Plantago lanceolata*GC	Eleocharis palustris/uniglumis	Capsella bursa-pastoris
	Prunus sp.	Trifolium cf. pratense*GC	Juncus sp(p)	cf. Arenaria sp.
	Rosa sp.	Trifolium cf. dubium	Lycopus europaeus	Chenopodium album
		Trifolium sp.	Myosoton aquaticum	Galium aparine*NS
			Ranunculus lingua	Hyoscyamus niger
			Scirpus maritimus	Malva sylvestris*GC
			Senecio cf. aquaticus	Papaver cf. dubium
			Suaeda maritima	Plantago major*NS
				Polygonum aviculare agg
				Urtica urens

V	IND
Avena/Bromus	unidentified seeds
Brassica/Sinapis (B.nigra*GC)	
Bromus sp.*GC	
Carypohyllaceae	
Chenopodiaceae	
Chenopodiaceae/Caryophyllaceae	
Chenopodium sp(p)	
Cruciferae	
Galium sp.	
Leguminosae	
Mentha sp.	
P. lapathifolium/nodosum	
Polygonaceae	
Potentilla cf.reptans*GC	
Pteridium aquilinium*S	
Rumex acetosella agg.*GC	
Rumex sp(p).	
S. arvensis/R. peregrina	
Stellaria media agg.	
Umbelliferae	
Vicia/Lathyrus*NS	
Viola sp.	

Key : as for Table 3, with the exception that D and Da are here amalgamated as D.
C - includes all entries of genus Triticum and Hordeum.
National Trust Survey: *GC- grassland and crags; *S- scrub; *M- maritime communities; *NS- not specified.

HABITAT GROUPS/UNIT

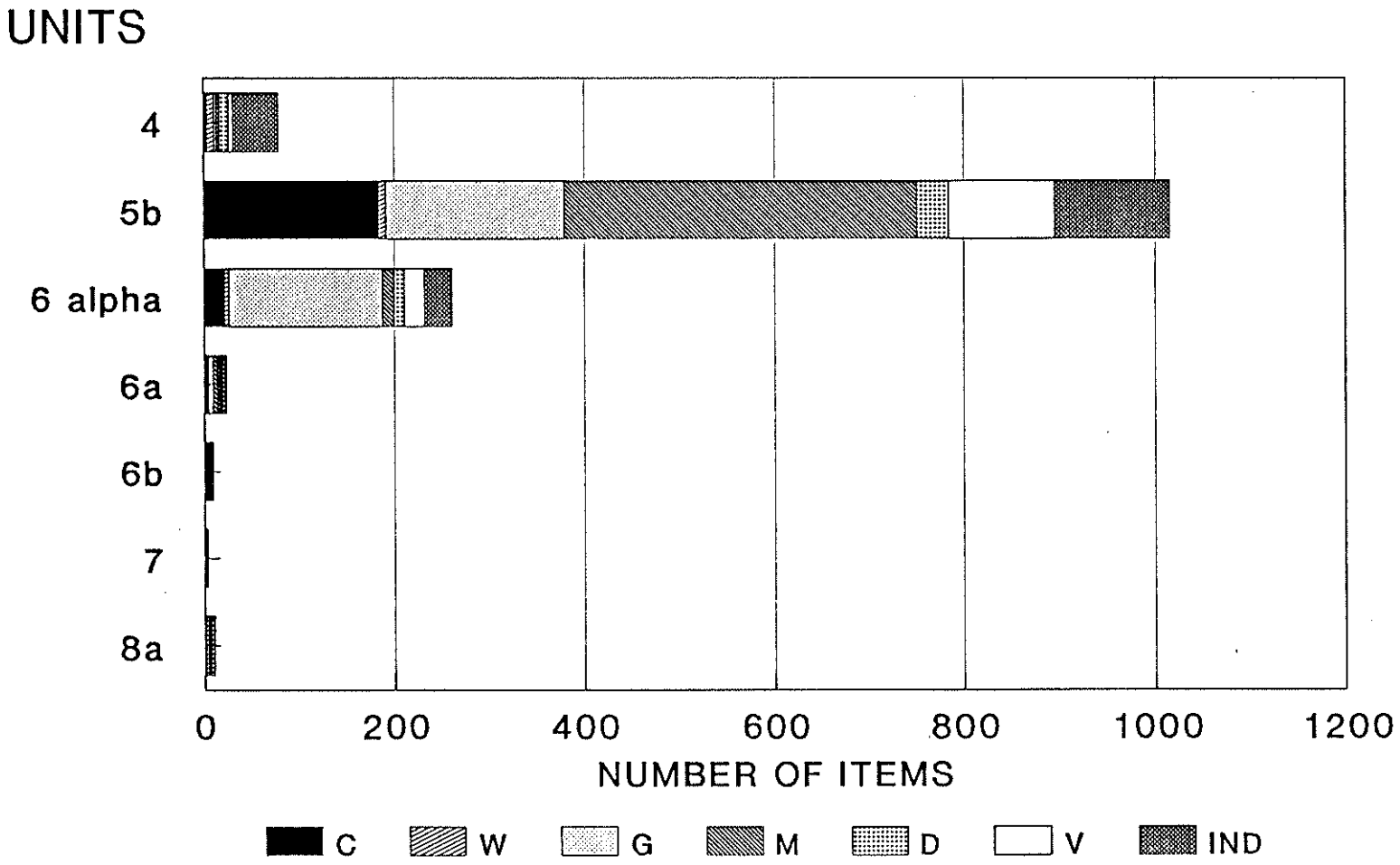

FIGURE 1

CULTIVATED PLANTS

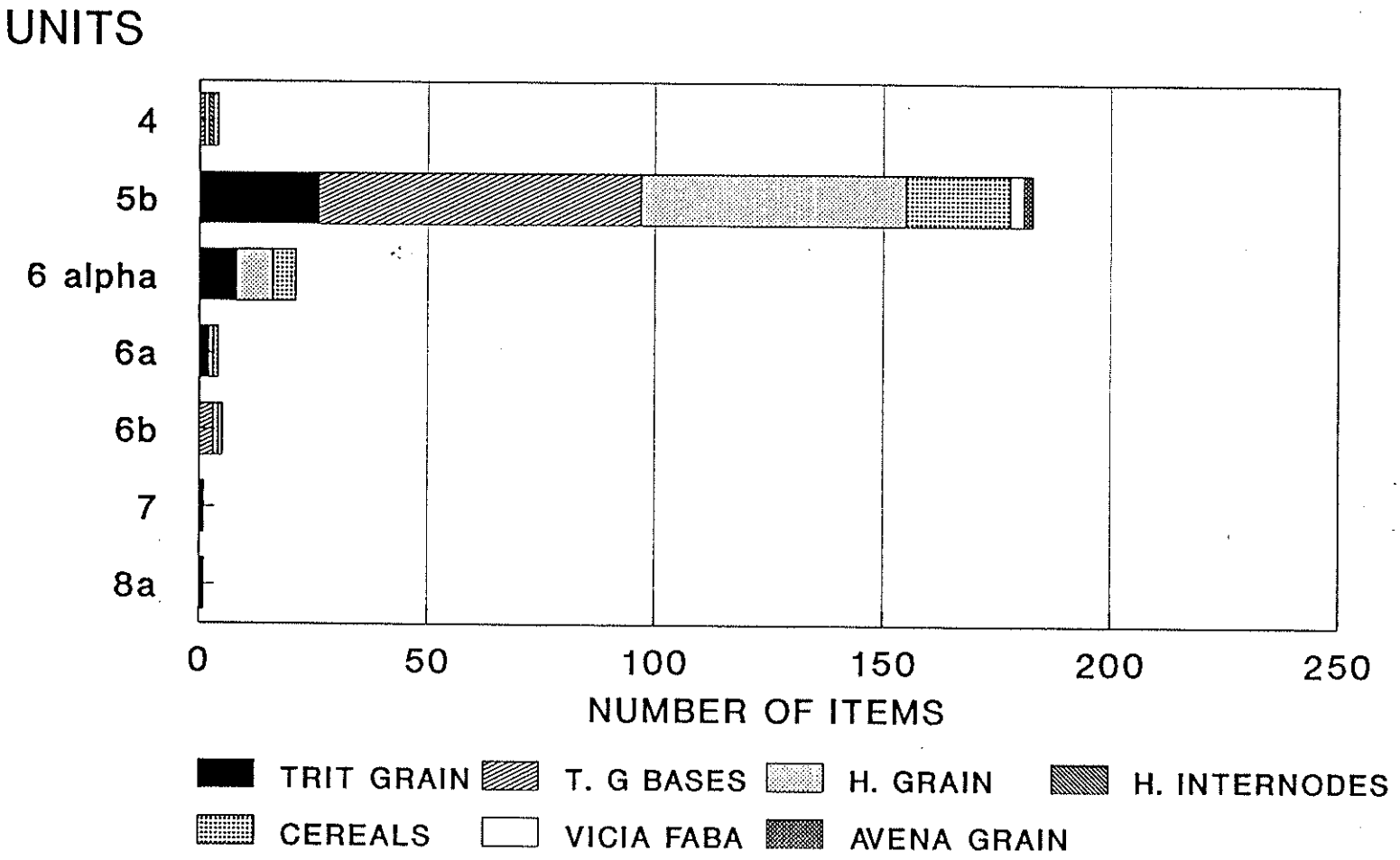

FIGURE 2

HABITAT GROUPS
UNIT 4

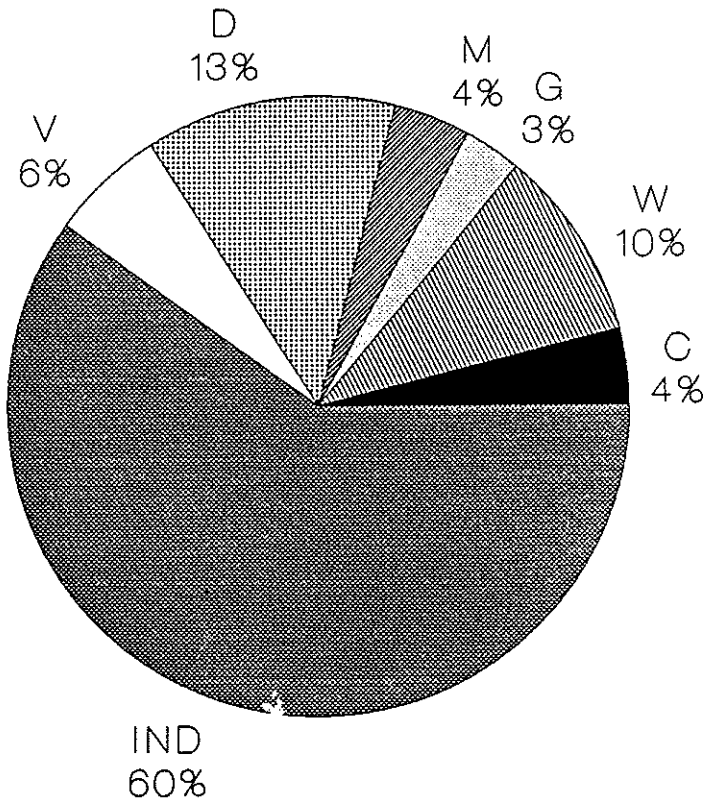

FIGURE 3

HABITAT GROUPS
UNIT 5b

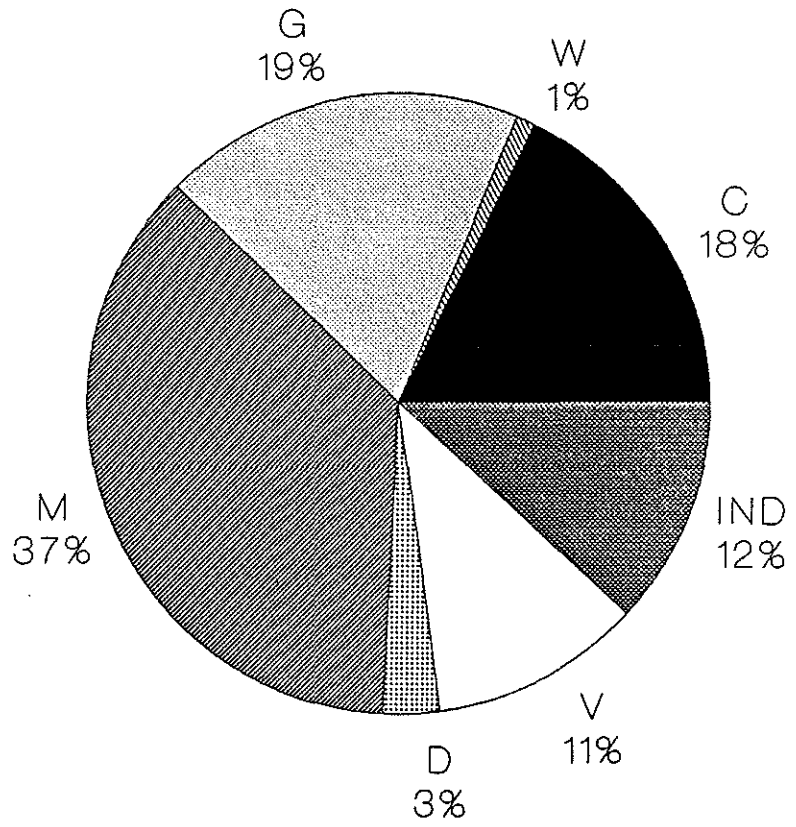

FIGURE 4

HABITAT GROUPS
6 alpha

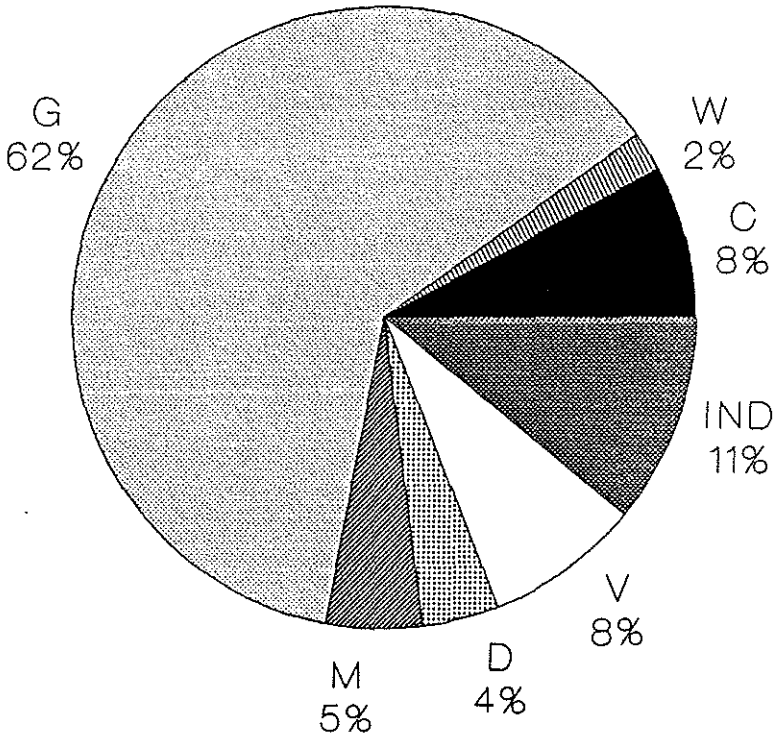

FIGURE 5