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2.7.5 A study of the Bronze Age insect fauna

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INTRODUCTION

This section examines the insect remains from eleven samples retained during the excavation of site A. The samples are all from ditch fills from a variety of trenches that were dug during the 1993, 1994 and 1995 excavation seasons (§2.5.1). A total of fourteen samples were processed and examined, but three produced no insect remains and are therefore not discussed in detail. As the samples are from different trenches, the insect assemblage can be looked at in a number of different ways: the site assemblage as a whole; the phase 2 inner ditch, as most of the productive samples came from here; and comparisons, if they can be made, between the phase 2 and phase 3 ditches.

METHODOLOGY

The samples were taken on site for environmental purposes and were between four and ten litres in volume. Most of the samples were processed using the paraffin flotation method (Coope and Osborne 1968; improved upon by Kenward 1980 and Kenward *et al*. 1986). Paraffin helps to concentrate the recovery of insect remains by adhering to the waxy cuticle of the insect exoskeleton. This reduces the size of flots and aids the sorting process. Some samples, however, had been previously processed for plant remains using a combination of flotation and wet sieving (for methodology see §2.6.5) prior to the extraction of the remains. All flots were sorted in alcohol under a low-power binocular microscope and identified using a range of keys (Joy 1932; Tottenham 1954; Pearce 1957; Lindroth 1974; 1985; Friday 1988; Hansen 1987; Holmen 1987; Morris 1990) and the comparative collections of beetles at the Ulster Museum, Belfast (with the assistance of Robert Nash and Brian Nelson). The species/genera are listed in Table 2.7.5:1 in taxonomic order according to Kloet and Hincks (1977) and the checklist of Irish Coleoptera (R. Anderson, *et al*. 1997).

The productivity of the samples varied. Three samples did not produce any insect remains and are not included in any graphs or data; a further seven produced less than ten individuals. Many of the individuals recovered were very fragmented and identification beyond genus was not possible. It is not possible to make anything other than tentative suggestions regarding environmental conditions on the site on the basis of the remains recovered. The breakdown of the productive samples and their findings is presented in Table 2.7.5:2. The environmental implications of the findings are discussed subsequently.

In total, 181 individuals were identified, the majority of which came from four samples. The productivity of the various samples is represented in Fig. 2.7.5:1. The numbers of individuals per sample were too small to validate statistical analysis of the whole data set. Numbers should be between 500 and 1000 individuals in total for such analysis (Perry *et al*. 1985). However, the index of diversity was produced for samples with numbers of individuals over twenty (Fisher *et al*. 1943). This is a measure of the species richness of a sample and may help to identify the origin of each insect assemblage (Fig. 2.7.5:2 shows indices for selected samples). Rank order graphs (see Kenward 1978) were also produced to show the differences between selected samples (Fig. 2.7.5:3). Taxa in each assemblage are ranked according to abundance (from most to least abundant) and then a graph is produced to illustrate the composition of each sample. This helps to distinguish assemblages that are dominated by one particular taxon, because of particular environmental conditions, from those that have mixed origins.

Owing to the small numbers overall in the assemblage, extrapolation of environmental information from habitat requirements may be the most appropriate way to analyse this data set. In this way it is possible to see both the microenvironment of the two ditches (Fig. 2.7.5:4) and the wider environment of the site itself indicated in the assemblage.

Phase 2 ditch

Trench 6

F172—sample 177. Eight litres of the upper ditch fill of loose grey/brown silt was processed. It was found to have a low organic content and produced only one fragment of *Cercyon* poss. *impressus*.

F437—sample 215. Eight litres were processed. This fill was exposed beneath F172 and consisted of loose brown charcoal-rich silt. On processing it was found to have a low organic content and no evident modern contamination; however, it produced no insect remains.

F2081—sample 632a. Eight litres of this very dark greyish-brown silty sand fill were processed. The organic content was moderately high. While moderate numbers of insect remains were recovered, most were found to be undiagnostic body parts and the number of identifiable species was quite low. Three different species of the water beetle *Helophorus* were found, as well as two different Staphilinids (rove beetles), *Philonthus puella* and *Lathrobium terminatum*.

F2081—sample 632b. Four litres were processed by flotation/wet sieving for plant remains and then examined for insect remains. This sample originates from a different location to the above sample, which is why they are treated separately. This sample also produced a lot of very fragmented and unidentifiable remains, but two examples of *Cercyon* were found, as well as two different weevil species.

F2130—sample 639. Five litres of this sample were first processed for plant remains. F2130, below F2081 in the stratification, consisted of very dark brown humic silt. The organic content was small and subsequently only one example of *Helophorus* sp. was found.

Trench 8

F1554—sample 480. Ten litres were processed. Both this sample and 481 (below) come from this context, which was the middle fill of the phase 2 ditch in trench 8. It consisted of loose dark grey silty clay and had a low organic content and no modern contamination. Sample 480 contained very few insect fragments, with only two identifiable Hydrophilids (water beetles), *Helophorus brevipalpis* and *Heleophorus* sp.

F1554—sample 481. Four litres were processed of this sample, which, by contrast, was wetter than the above and its organic content was found to be higher. Consequently, it produced a rich variety of insect remains, including a number of Carabidae (ground beetles) species and various terrestrial Hydrophilids, including *Cercyon analis* and *Megasternum obscurum*. Also found were various Staphilinids, Scarabaeidae (dung beetles) and one example each of the plant feeders *Chrysolina* sp. (a Chrysomelidae or leaf beetle) and *Ceutorhynchus* poss. *assimilis* (a Curculionidae or weevil).

F1565—sample 508. Four litres were processed of this dark grey/black peaty silt, which was the basal fill of the phase 2 ditch in trench 8. A second sample 509 (below) was also processed from it. It was the richest sample in terms of insect remains, with good species diversity (Fig. 2.7.5:2). The largest numbers of individuals were from the water beetle (both terrestrial and aquatic) and rove beetle families, with some weevils and leaf beetle species represented also. A large number of mites were recovered (not identified), which are the prey of many ground beetle and rove beetle species.

F1565—sample 509. Four litres were processed and this also proved to be a rich sample, with a similar suite of insects represented. Again, the largest numbers of individuals were from the water beetle and rove beetle families.

Trench 11

F2161—sample 642. Eight litres were processed from the upper fill of dark brown loam in the phase 2 ditch in this trench. Only one fragment of the dung beetle *Aphodius* sp. was recovered and there were no other insect remains.

Phase 3 ditch

Trench 12

F4505—sample 849. Ten litres were processed of this localised fill in the southern edge of the ditch in trench 12. It produced some well-preserved insect remains, twenty identifiable individuals in all. These were almost exclusively species of the genus *Helophorus*, but some other taxa are represented.

F4513—samples 851 and 850. Ten litres were processed of the basal fill of the phase 3 ditch in trench 12. It consisted of light grey silty clay with occasional charcoal flecks and did not produce any insect remains.

Trench 14

F2807—sample 827. Five litres were processed. F2807 overlay the basal fill (F2901) of the phase 3 outer ditch in trench 14. It was loose brown sandy clay. It contained only two identifiable fragments of beetle, *Helophorus* sp. and *Cercyon* sp.

ANALYSIS

Introduction

Taking the site as a whole, a number of general habitat groupings are indicated (after Hall and Kenward 1990) (Fig. 2.7.5:3):

- **Oa** and **Ob**—outdoor taxa (ground beetles, plant feeders, some wood-dependent species);
- **Rf**—dung, rotting vegetation (some terrestrial water beetles, some rove beetles, dung beetles Scarabaeidae, other decomposer species);
- **Rd**—mouldy vegetation, sweet compost with possible synanthropic implications, i.e. the house fauna (some rove beetles, decomposer species, some wood-dependent species);
- **Rt**—generalist decomposers;
- **P**—phytophagous or plant feeding species (leaf beetles, some weevils);
- **L**—dead wood and timber (woodworm beetle, long-horn beetles, some weevils);
- **A**—aquatic, damp ground species (all water beetle groups).

Some overlap will occur between habitat groupings, but the general trends as set out below give a good indication of the environmental factors that would determine the presence of certain species.

Oa and ob—outdoor species

This group is made up largely of ground beetles and represents 8% of the overall assemblage (Fig. 2.7.5:4). In general, all ground beetles run close to the ground and are predators of mites and Collembola occurring in soil. However, *Trechus micros*, *Bembidion doris*, *Agonum* species in general and *Pterostichus diligens* prefer moist biotopes (Lindroth 1974). In particular, *T. micros* and *B. doris* occur mostly near fresh water, on banks of streams and ponds. *T. micros* is commonly found in crevices such as animal burrows and nests. *P. diligens* is often found near stagnant or running water, in ditches and near ponds. *Amara* sp. and *P. niger*, however, are more eurytrophic, being found in fields, meadows and grasslands. In general, the presence of ground species with a preference for waterside habitats would suggest the presence of water in the inner ditch, a conclusion that seems to be confirmed by the presence of aquatic species. Plant feeders and some wood species also belong to the outdoor group but are discussed separately below.

Rf—rotting vegetation/dung

A distinction can be made between those species that are almost exclusively dung feeders and those that exploit a variety of foul habitats. The distinction is important in the case of this site as the dung species may reflect the wider environment of the site, while other species may only reflect the rotting vegetation layer found at the bottom of the ditch, possibly from deliberate dumping of rubbish from the site. Terrestrial water beetles such as *Cercyon analis*, *C. impressus* and *Megasternum obscurum* exploit a variety of habitats, including dung, decaying/rotting vegetation and waterside debris. The predators *Platystethus arenarius*, *Anotylus sculpturatus* and *A. tetracarinatus* are found in such habitats and also on old bones and carrion. This is true also for *Philonthus* spp, *Atheta* spp and other Aleocharinae (a large sub-family within the rove beetles), while *Tachinus laticollis* is very often found on herbivore dung in meadows and fields. *Sericoderus lateralis* is found under rotting plant matter, while Donithorpe (1939) found it in fungi and on old bones.

The genus *Aphodius*, however, which tends to be exclusively dung feeding, makes up 9% of the overall Rf group and 10% of the inner ditch Rf assemblage.

Robinson (1991), in his study of the insect assemblage from Runnymede Bridge, noted that values of up to 10% for scarabaeoid dung beetles might indicate a largely pastoral landscape surrounding a site. This proportion could rise to 20% in samples from ditches of Iron Age enclosures used to corral stock, and could be as low as 6% from sites primarily engaged in arable agriculture. The *Aphodius* spp present may therefore reflect the surrounding landscape, but they may also be opportunistic individuals that exploited other dung sources, particularly dung dumped into the ditch from the site itself. Girling (1989) also noted that *Aphodius* are good fliers and are attracted to light. Reflections of light at night in pools of water can cause them to dive towards this light and drown. This often explains their presence in wells, for example (Girling 1989; Coope and Osborne 1968).

Rd—drier decomposing matter or sweet compost

This habitat group formed a very small percentage of the phase 2 ditch fill and none were found in the phase 3 ditch. Although only one example of *Mycetaea hirta* was found, it is an interesting species as it is nearly always synanthropic, i.e. associated with humans and human settlements. It is common in hay refuse, particularly in barns, sheds and storehouses. In an archaeological context it is usually associated with discarded hay and refuse from indoor settings such as houses and animal enclosures, being found in urban medieval sites such as Christchurch Place, Dublin (Coope 1981), and Thomas Street (Reilly 1997b), York (Kenward *et al.* 1978) and Waterford (Reilly 1994). Buckland *et al.* (1992), Kenward (1985) and Kenward and Allison (1994) have researched the origins of the urban insect fauna and identified differences in 'indoor and outdoor' assemblages on habitation sites. *M. hirta* features strongly in indoor assemblages, often termed house fauna. Its natural habitat was probably originally mouldy litter on forest floors, before it migrated into human-created niches that mimicked its natural habitat. *Crytophagus* sp. was also recovered in this sample, and species of the genus *Cryptophagus* are common indoor indicators in medieval contexts. The numbers found here were negligible, however, with only four taxa found that could be classified as true house fauna indicators. Assuming that many of these species began their association with human habitation as early as the Bronze Age, it seems unlikely that much of the discarded material in the ditch came directly from inside human habitation structures. However, this issue will be discussed further.

Rt—generalist decomposers

The largest proportion of the assemblage from the phase 2 inner ditch samples came from this group (Fig. 2.7.5:4). These species are generalist or opportunistic decomposers, occurring both in foul, dry indoor and outdoor locations. A number of the species found here indicate a less foul decaying vegetation layer, possibly a hay residue dumped from a yard area or compost midden within the enclosure. Most of these species feed on the fungi that grow on decaying vegetation or prey on mites and other invertebrates that live in this environment. *Acrotrichis atomaria* occurs in straw heaps. *Stenus clavicornis* occurs in fungus in damp situations and in refuse dumps. *Choleva* sp. occurs in a variety of habitats, including dead leaves, grass tussocks and haystack litter, as well as rabbit, mice and mole burrows. *Phyllodrepa floralis* occurs in flowering shrubs, tree fungi, haystack refuse and compost heaps, as do *Quedius tristis* and *Q. fuliginosus*, while *Lathrobium terminatum*, *Tachyporus chrysomelinus* and *Tachyporus hypnorum* occur in ground litter, grass tussocks and fungi, feeding on aphids, Collembola and dipterous (fly) larvae.

P—phytophagus species

This is one of the smallest groups, comprising only 5% of the total phase 2 ditch assemblage, and there were none in the phase 3 ditch. The terrestrial Hydrophilidae *Helophorus nubilus* occurs in old grassland, while its larvae attack winter wheat, ryegrass and clover leys. *Donacia* poss. *cinerea* occurs in aquatic or semi-aquatic habitats from lakes to ditches. It feeds on various wetland species, including reeds (*Phragmites*), sedge (*Carex*), reed-mace (*Typha*) and bur-reed (*Sparganium*). It is possible that if water was standing in the ditch for long enough some wetland plant species from nearby lakes, rivers or marshland could have invaded, but it is more likely that this was a casualty from a nearby stand of such plant species, possibly even from dead reeds or sedge used in flooring material and subsequently dumped in the ditch. The lack of any plant feeding species in the phase 3 ditch would seem to indicate that the ditches were kept relatively free of growing plants.

Chrysolina sp. feeds on a number of different plant species, including plantain (*Plantago* spp), which grows in a variety of habitats, including disturbed and trampled ground and other grassy areas. It also feeds on toad-flax (*Linaria vulgaria*), which is common in hedgerows and banks. *Phaedon tumidulus* has various hosts, including cow parsley (*Anthriscus sylvestris*), hog-weed (*Heracleum spondylium*) and ground elder (*Aegopodium podagraria*). These are all plant species of hedgerows, wood borders and grasslands.

Ceutorhynchus poss. *assimilis* is common on charlock (*Sinapis arvensis*), a serious weed of arable land. It also attacks members of the cabbage family (Crucifereae), especially cabbage and turnips. Other *Ceutorhynchus* spp attack a wide variety of wayside and cultivated weed species, including waterside species.

Apion spp feed on a huge variety of herbaceous plants. The *Protapion* group within the *Apion* tribe occurs on many species of grassland, disturbed ground and field margin plants such as clover (*Trifolium*) and members of the dock (Polygonaceae) family, including knotgrass (*Polygonum aviculare*), redshank (*P. persicaria*) and bindweed (*P. convoluvus*).

Strophosoma sp. is difficult to categorise as the identification is based solely on a fragment of elytra. Some *Strophosoma* spp occur in shrubs, with their larvae feeding at the roots of docks and other herbaceous plants in grasslands, hedge banks and meadows. However, other *Strophosoma* are dead wood feeders and can therefore be included in the next group. Although the plant feeding group is small, it ties in, to some extent, with information in the other groupings and reflects the wider environment of the site as well as the immediate ditch environment. Some of the species would have fed on plants growing on the banks of the ditch, while other plants would be represented in the surrounding fields. Alternatively, they may be casualties from the harvesting of crops (*H. nubilus, C.* poss. *assimilis*) or in bedding material subsequently dumped into the ditch (*Apion* sp., *D.* poss. *cinerea*, *Strophosoma* sp.), which would partly explain their extremely fragmented nature. Secondary deposited or reworked material tends to be more fragmented and harder to identify than material from primary deposition.

L—dead wood/timber

The number of species representing these habitats is small, less than 5% of the overall individuals present in the phase 2 ditch. Only one possible woodland indicator, *Strophosoma* sp., occurs in the phase 3 ditch assemblage, despite the fact that waterlogged wood fragments and artefacts were found in the most productive samples from the same phase 2 ditch fills (F1554 and F1565; §2.7.6). *Grynobius planus* and other woodworm beetles, particularly *Anobium punctatum*, attack dead wood and structural timbers and are often synanthropic. Indeed, both are considered part of the house fauna, as discussed above. One unidentifiable Cerambycidae, or long-horn beetle, was found; they generally attack dead wood in the natural environment, including dead tree stumps, fallen trees and logs. This is true also of some *Strophosoma* species, as discussed already, and *Rhyncolus* species in general, found in the phase 2 ditch (not identified to species). Their host trees can include alder, ash, beech, birch and oak and, in the case of the *Rhyncolus* group, coniferous trees also.

As the numbers of wood-dependent taxa are very small and extremely fragmentary, they are most likely to have originated in dumped material, with most of the above tree species being employed on site for structural and other purposes. It is safe to assume that stands of most of these tree species would have occurred close to the site. It is not possible, however, with such small numbers of the more synanthropic species, to judge the levels of infestation by woodworm beetles (and other pests) of the structural timbers of the site.

A—aquatic species

This group is made up of true water beetle species that actually spend most of their adult life in water. They make up 31% of the total beetles present, 26% of the individuals from the phase 2 ditch samples and 73% of those present in the phase 3 ditch (Fig. 2.7.5:4). The high proportion of aquatic species indicates that both ditches were waterlogged for long periods of time. The *Helophorus* genus is difficult to identify to species but at least five different species are present, of which all, except *H. nubilus*, are pond species, particularly silt or detritus ponds (Friday 1988). *Hydroporus planus* is found in lowland pools, often in temporary ditch or plough-rill pools (*ibid*.). Both *Noterus* sp. and *Laccophilus minutus* are commonly found in stagnant water, ponds and ditches. All of the Hydraenidae present are common to stagnant or running water locations. *Limnebius nitidus* is commonly found in the mud at the edge of ponds and streams or among moss in trickling water. *L. truncatellus* has been taken from ditches in Orkney and other locations (Sadler 1992). *Hydraena riparia* is also commonly found in ditches. Many of the species occupy temporary water bodies, exactly the sort of aquatic habitat present in both ditches at Chancellorsland site A.

Notable species

Sericoderus lateralis

Found in decaying plant refuse, this species has not been found in any archaeological context in Britain prior to the Roman period, e.g. second-century AD Alcester, Warwickshire (Osborne 1971); the General Accident Insurance site in York, dated to the mid-second to fourth centuries AD (Hall and Kenward 1990); the Skeldergate site, York, dated to the fourth century AD (Hall *et al.* 1980); and Chicester, Sussex, dated to AD 375 (Girling 1989). Therefore the recovery of this species at Chancellorsland site A is the earliest dated context in either Ireland or Britain. It is probable that the paucity of early habitation sites that have been examined for insect remains in either Britain or Ireland is the main reason why this species has not been recovered before.

Rhyncolus sp.

The Cossinae group of weevils, particularly the *Rhyncolus* genus, is largely absent from the Irish list of Coleoptera (Anderson *et al.* 1997). This is due to the fact that many of the species in this tribe are associated with primary woodland and have disappeared as a result of widespread forest clearance. However, with increasing numbers of wetland sites, in particular, being sampled for insect remains, it is clear that many members of this group of weevils, particularly *Rhyncolus chloropus*, were once widespread throughout Ireland in the Neolithic, Bronze Age and even into the medieval period (Reilly 1997a; 1997c; 1999; 2000a; 2000b). The finding of these beetles in archaeological contexts gives a rare glimpse into the once rich and diverse primary woodland that existed in Ireland throughout much of the prehistoric period.

ENVIRONMENTAL IMPLICATIONS

In many ways the insect assemblage recovered at Chancellorsland site A resembles that of an urban Viking–medieval site, with an emphasis on the decomposing groups, small numbers of ground beetles, plant feeders and dead wood species. The most striking difference is the large representation of true aquatic species. The build-up of organic layers in the base of the phase 2 inner ditch could conceivably have originated in two ways. Firstly, the ditch appears to have been subject to some degree of waterlogging from the start, and the natural accumulation of dead leaves, grasses and other plants could have produced the community of insects observed. However, the fact that no corresponding variety of species occurred in the phase 3 outer ditch samples would seem to discount this. The outer ditch was obviously subject to the same waterlogging, attested to by the large number of *Helophorus* spp. The high proportion of decomposers does not occur, however. Secondly, the phase 2 inner ditch would appear to have had a rapid build-up of rich organic material, which, coupled with waterlogging, provided the right conditions for the preservation of the suite of insects found.

However, this set of circumstances does not hold true for the whole phase 2 ditch. Even within trench 8, sample 480 (F1554) produced only two species, while sample 481 from the same feature produced 29 taxa. The dumping may have been confined, therefore, to a very specific area. The results from trench 6, excavated across the phase 2 ditch (Fig. 2.5.1:1), illustrate this point more clearly. Five samples were looked at but only thirteen individuals were produced between them. Most were confined to the aquatic group, which would indicate that although most of the phase 2 ditch was subject to some degree of flooding the build-up of organic material was confined to specific areas within it. The single sample from trench 11 (sample 642) only produced one specimen, although this was an upper layer. It is possible, of course, that unexcavated areas of the phase 2 ditch might have produced similar results to trench 8. From the results of the phase 3 ditch it is obvious that both ditches were waterlogged at various times, and other areas of the ditches used for dumping would probably combine to give the same results.

Comparisons with other sites are difficult as so little work has been carried out in Ireland on sites of this nature or age. The preliminary results from Deer Park Farms, Co. Antrim (Kenward and Allison 1994), an eighth-century AD habitation site, show some overlap with the decomposers and the synanthropic species found at Chancellorsland site A. Many sites, either from this period or of similar construction but of Iron Age date, have been looked at in Britain. Some of these would be of a specialist nature, such as Meare Lake, Somerset (Girling 1979), in a wetland environment at the edge of a lake, or Runnymede Bridge (Robinson 1991), where late Bronze Age samples were taken from riverine deposits close to the site and would therefore include a whole suite of insects not likely to occur at Chancellorsland. The same is true for Osborne's (1988) River Avon study, where samples were taken from organic beds exposed in the bank of the river.

Tattershall Thorpe, an Iron Age double-ditched defended enclosure in Lincolnshire (Chowne *et al.* 1986), provides one of the closest comparisons, with samples taken from the organic build-up at the base of the ditches producing a very similar suite of insects. Almost 50% of all the species that occurred at Chancellorsland occur at Tattershall Thorpe, with an even higher overlap at genus level. This site, however, was constructed in a low-lying river floodplain and was therefore subject to more frequent and severe flooding. This caused peat layers to form at the base of both ditches. However, the combination of true aquatic species and decaying vegetation species provides a good comparison for the conditions needed to produce the result from Chancellorsland site A. Many synanthropic species were found in the inner ditch samples, including *Anobium* sp., *Lathridius* spp, *Cryptophagus* spp and others. The presence of high numbers of scarabaeoid dung beetles is attributed to the dominant pastoral landscape around the site, while high numbers of other foul species are attributed in part to dumping from the site itself. Other domestic finds were higher from the inner ditch than from the outer ditch, which compares favourably with Chancellorsland, providing another clue to the origin of the organic layers in the phase 2 ditch.

Another useful comparison comes from a Roman well at the Cattlemarket site, Chichester (Girling 1989). This well was located within the habitation area and produced a similar range of species relating directly to the surrounding occupation area. While the well would not have been used for deliberate dumping until long after it had gone out of use, a gradual build-up of material either blowing or falling into it would produce the same result, especially as there was no archaeological evidence for a permanent lid. Almost 50% of the species occurring at Chancellorsland site A also occurred at Chichester, with a similar high value for true aquatics and decomposers from various habitats.

Other sites that showed some overlap included the Iron Age Thames Valley sites of Farmoor and Mingies Ditch (Robinson 1979; 1981), Fisherwick, Staffordshire (Osborne 1979), and the late Bronze Age well site at Wilsford, Wiltshire (Osborne 1969).

The closest possible comparison in Ireland is with the assemblage recovered from a large sample (10–11kg) from the ditch of Haughey's Fort (dated to *c.* 1100 BC) (R. Anderson 1989). Here a total of 181 individual specimens from 85 beetle species were recovered. The sample was taken from the lowest fill of the ditch. This compares well to the combined results of samples from the phase 2 ditch at Chancellorsland site A, where 159 individuals from 74 beetle species were recovered (the total for both ditches was 181 individuals from 76 species). The index of diversity for the Haughey's Fort assemblage was 63, compared to 54 for the combined phase 2 ditch samples at Chancellorsland. The phase 3 ditch here had an index of only 12. Studies of indices of diversity of modern natural habitats produce values of between 13 and 46, rising to 60–70 for archaeological deposits with a rich mixture of indoor and outdoor deposits (Kenward 1978). The values, therefore, of the phase 2 ditch at Chancellorsland site A and the ditch at Haughey's Fort compare well with archaeological floor/midden deposits elsewhere. The phase 3 ditch, however, has a value similar to a natural outdoor assemblage and clearly does not have the same admixture of origins as the phase 2 ditch.

The rank order curve produced for the Haughey's Fort assemblage (see R. Anderson 1989) also compares well to the rank order curve produced for three of the phase 2 ditch samples (Fig. 2.7.5:3). The curves are relatively flat, providing further evidence of the mixed nature of the assemblage, with very few species occurring in even moderate abundance. The curve for the sample from the phase 3 ditch is markedly steeper owing to the dominance of one or two water beetle species and the paucity of all other species.

On both sites the most frequently occurring genus was *Aphodius*. It was difficult to take these specimens beyond genus as they were very fragmented. The same was true for many of the *Aphodius* specimens from Haughey's Fort (R. Anderson 1989). It was suggested that the large numbers of *Aphodius* spp at Haughey's Fort were probably the result of domestic animals trampling the edge of the ditch. However, it was also clear that the ditch was used as a repository for substantial amounts of rotting vegetable matter, possibly bedding or haystack refuse and household refuse. Similar conclusions are suggested for the assemblage from the phase 2 ditch at Chancellorsland. Given that there was very little evidence from the phase 3 ditch of anything other than water beetles, however, it seems most likely that most of the dung beetles in the inner ditch came from the settlement site rather than from the surrounding pastureland beyond the outer ditch.

CONCLUSIONS

The assemblage overall was quite small, and any conclusions drawn are necessarily tentative. Few insect assemblages from this period or site type in Ireland are available for direct comparison, although comparisons with the ditch fill at Haughey's Fort have proved very useful. However, the actual type of settlement and activity at Chancellorsland site A and Haughey's Fort differs in emphasis and scale. Comparisons with sites in Britain, while useful, are not always helpful as the range of beetles present in Ireland is much smaller than in Britain and not enough is known about extinctions of species from Ireland since the Neolithic. A number of interesting results have been shown, however, and it is hoped that they can aid the overall understanding of the site environment.

The assemblage from the phase 2 inner ditch confirms that some waterlogging took place and that the majority of the insects present probably originated from yard/bedding refuse thrown into the ditch. The area today is quite wet, and during excavation the ditches filled with groundwater during wet periods (§2.5.1). Furthermore, a small pond exists beside the enclosure, which may have been larger during the Bronze Age (Pl. 2.4:1).

The indoor element of the assemblage was small and would seem to indicate that the assemblage did not originate directly from house-floor layers. Much of the identification work on the signature group of beetles known as house fauna has been carried out on Viking–medieval settlement sites, however, and it is possible that many of the species associated with this group had not yet invaded human-created niches in the middle Bronze Age.

Other species within the ditch assemblage may have invaded from surrounding pastureland and woodland. The dung beetles and plant feeders, in particular, hint at the wider environment of the site, but not enough examples were present to say definitively how they originated in the samples. Their fragmented nature hints at secondary deposition, however. The phase 3 outer ditch shows the same variety of pond and pond-side species but not the varied decomposer population, which would suggest that a corresponding build-up of organic material did not occur. Some rubbish in the form of dumped household waste was recovered, however, during excavation of the outer ditch (§2.5.1).

Results from the excavations clearly show that the phase 2 inner ditch, especially within the area of trench 6, was used for the dumping of domestic waste. Finds included animal bone, worked bone, human bone and pottery, and this ties in well with the results from the insect assemblage (§2.5.1).

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Table 2.7.5:1—*Genus/species list for eleven samples (taxonomic order according to Kloet and Hincks 1977) (T = trench). Ecological codes for Coleoptera: oa or ob—outdoor; rd—drier organic matter; rf—foul organic matter; rt—eurytopic decomposers; l—woodland insects; h—house fauna; w/d—aquatics/damp ground; p—plant-associated beetles.*

Sample no.	**480**	**481**	**508**	**509**	**177**	**632a**	**632b**	**639**	**642**	**827**	**849**	
Habitat		**T8**					**T6**		**T11**	**T14**	**T12**	
	Phase 2 inner ditch				**Phase3 ditch**							
Carabidae												
Trechus micros (Herbst.)	-	-	1	-	-	-	-	-	-	-	-	oa
Bembidion doris (Panzer)	-	-	1	-	-	-	-	-	-	-	-	oa
Bembidion sp.	-	-	-	-	-	-	-	-	-	-	1	oa
Pterostichus niger (Sch.)	-	1	-	-	-	-	-	-	-	-	-	oa
P. nigrita (Pay.)	-	1	-	-	-	-	-	-	-	-	-	oa
P. diligens (Sturm)	-	1	-	-	-	-	-	-	-	-	-	oa
Agonum cf. *fuliginosum* (Panz.)	-	-	2	-	-	-	-	-	-	-	-	oa
Agonum sp.	-	1	1	1	-	-	-	-	-	-	-	oa
Amara sp.	-	-	-	2	-	-	-	-	-	-	-	oa
Amara/Harpalus spp	-	-	2	-	-	-	-	-	-	-	-	oa
Noteridae												
Noterus clavicornis/crassicornis	-	-	1	-	-	-	-	-	-	-	-	a
Laccophilus minutus (Linn.)	-	-	-	1	-	-	-	-	-	-	-	a
Dysticidae												
Hydroporus palustris (Linn.)	-	-	1	-	-	-	-	-	-	-	-	a
H. planus (Fab.)	-	-	1	-	-	-	-	-	-	-	-	a
Hydrophilidae												
Helophorus cf. *aequalis* Thom.	-	-	3	-	-	-	-	-	-	-	-	a
H. arvernicus Mulsant	-	-	-	-	-	1	-	-	-	-	2	a
H. brevipalpis Bedel	1	-	6	3	-	1	-	-	-	-	4	a
H. arvernicus/brevipalpis	-	-	-	-	-	-	-	-	-	-	4	a
H. grandis Illiger	-	-	-	1	-	-	-	-	-	-	-	a
H. minutus Fab.	-	-	-	-	-	1	-	-	-	-	4	a
H. nubilus Fab.	-	1	-	-	-	-	-	-	-	-	1	a

Helophorus spp	1	1	-	-	-	-	-	1	-	1	-	a
Cercyon analis (Payk.)	-	2	3	3	-	-	-	-	-	-	-	rt
C. impressus (Sturm)	-	1	1	2	1	-	-	-	-	-	-	rf
Cercyon spp	-	-	2	-	-	-	2	-	-	1	-	rt
Megasternum obscurum Marsh.	-	4	2	1	-	-	-	-	-	-	-	rt
Cryptopleurum minutum (Fab.)	-	-	-	1	-	-	-	-	-	-	-	rf
Enochrus poss. *testaceus* (Fab.)	-	-	-	1	-	-	1	-	-	-	-	a
Hydraenidae												
Ochthebius minimus (Fab.)	-	1	-	3	-	-	-	-	-	-	-	a
Ochthebius sp.	-	-	1	-	-	-	-	-	-	-	-	a
Hydraena riparia Kug.	-	-	6	1	-	-	-	-	-	-	-	a
Limnebius nitidus (Marsham)	-	-	-	1	-	-	-	-	-	-	-	a
L. truncatellus (Thunberg)	-	-	1	-	-	-	-	-	-	-	-	a
Ptilidae												
Acrotrichis atomaria (DeGeer)	-	-	-	1	-	-	-	-	-	-	-	rt
Leiodidae												
Choleva sp.	-	-	-	-	-	-	-	-	-	-	1	rf
Staphylinidae												
Lesteva sp.	-	-	1	-	-	-	-	-	-	-	-	a
Phyllodrepa floralis (Payk.)	-	-	1	-	-	-	-	-	-	-	-	rt
Platystethus arenarius (Four.)	-	-	1	-	-	-	-	-	-	-	1	rf
Anotylus sculpturatus (Graven.)	-	-	1	1	-	-	-	-	-	-	-	rt
A. tetracarinatus (Block)	-	-	1	1	-	-	-	-	-	-	-	rt
Anotylus spp	-	-	3	-	-	-	-	-	-	-	-	rt
Stenus clavicornis (Scopoli)	-	-	-	1	-	-	-	-	-	-	-	rt
S. similis ? (Herbst)	-	-	-	1	-	-	-	-	-	-	-	rt
Stenus spp	-	1	2	2	-	-	-	-	-	-	-	rt
Lathrobium terminatum G.	-	-	-	-	-	1	-	-	-	-	-	rt
Lathrobium sp.	-	1	1	-	-	-	-	-	-	-	-	rt
Gyrohypnus/Xantholinus sp.	-	-	-	2	-	-	-	-	-	-	-	rt
Philonthus puella? von Nord.	-	-	-	-	-	2	-	-	-	-	-	rf
Quedius fuliginosus (Graven.)	-	1	1	-	-	-	-	-	-	-	-	rt
Q. tristis (Graven.)	-	1	-	-	-	-	-	-	-	-	-	rt
Quedius sp.	-	1	1	-	-	-	-	-	-	-	-	rt
Quedius/Philonthus sp.	-	-	1	-	-	-	-	-	-	-	1	rt
Tachyporus hypnorum (Fabr.)	-	1	-	-	-	-	-	-	-	-	-	rf
T. pusillus Graven.	-	-	1	-	-	-	-	-	-	-	-	rf
Tachyporus sp.	-	-	-	1	-	-	-	-	-	-	-	rt
Tachinus laticollis Graven.	-	1	-	1	-	-	-	-	-	-	-	rf
Aleochara sp.	-	-	1	-	-	-	-	-	-	-	-	rt
Aleocharinae gen. et sp. indet.	-	-	5	2	-	-	-	-	-	-	-	rt

Scarabaeidae												
Aphodius sp.	-	4	5	6	-	-	-	-	1	-	-	rf
Anobidae												
Grynobius planus (Fab.)	-	1	-	-	-	-	-	-	-	-	-	l
Anobidae gen. et sp. indet.	-	-	1	1	-	-	-	-	-	-	-	l
Cryptophagidae												
Cryptophagus sp.	-	-	-	1	-	-	-	-	-	-	-	rd
Corylophidae												
Sericoderus lateralis (Gyll.)	-	1	1	1	-	-	-	-	-	-	-	rf
Endomychidae												
Mycetaea hirta (Marsh.)	-	-	-	1	-	-	-	-	-	-	-	rd
Cerambycidae												
Gen. et sp. indet.	-	-	-	-	-	-	1	-	-	-	-	l
Chrysomelidae												
Donacia sp.	-	-	1	-	-	-	-	-	-	-	-	p
Chrysolina sp.	-	1	1	-	-	-	-	-	-	-	-	p
Phaedon tumidulus (Gemar)	-	-	-	1	-	-	-	-	-	-	-	p
Apionidae												
Apion (*Protapion*) sp.	-	-	1	-	-	-	-	-	-	-	-	p
Curculionidae												
Strophosoma sp.	-	-	1	-	-	-	-	-	-	-	1	p/l
Rhyncolus sp.	-	-	1	-	-	-	1	-	-	-	-	l
Ceutorhynchus poss. *assimilis* (Payk.)	-	1	-	-	-	-	-	-	-	-	-	p
Ceutorhynchus sp.	-	-	-	-	-	-	1	-	-	-	-	p
Total no. individuals	**2**	**29**	**68**	**45**	**1**	**6**	**6**	**1**	**1**	**2**	**20**	

Table 2.7.5:2—*Habitat statistics, site A.*

Sample no.	**480**	**481**	**508**	**509**	**177**	**632a**	**632b**	**639**	**642**	**827**	**849**
Habitat	**Phase 2 inner ditch**				**Outer ditch**						
		T8					**T6**		**T11**	**T14**	**T12**
Sample vol. (l)	10	4	4	4	8	8	4	5	8	5	10
No. of individuals	2	29	68	45	1	6	6	1	1	2	20
No. of taxa	2	22	41	29	1	5	5	1	1	2	10
Index of diversity (a)	n/a	29	44	36	n/a	n/a	n/a	n/a	n/a	n/a	9
% oa + ob	0	24.1	19.1	11	0	0	0	0	0	0	10
RT (rd+rt+rf)	0	19	34	29	0	3	2	0	1	1	3
% rd (incl. ‘h’)	0	0	0	4.4	0	0	0	0	0	0	0
% rt	0	38	36.8	35.5	0	16.6	33.3	0	0	50	5
% rf	0	27.6	13.2	24.4	100	33.3	0	0	100	0	10
% l	0	3.4	4.4	2.2	0	0	33.3	0	0	0	5
% p	0	7	4.4	2.2	0	0	16.6	0	0	0	0
% a	100	10.3	29.4	22.2	0	50	16.6	100	0	50	70

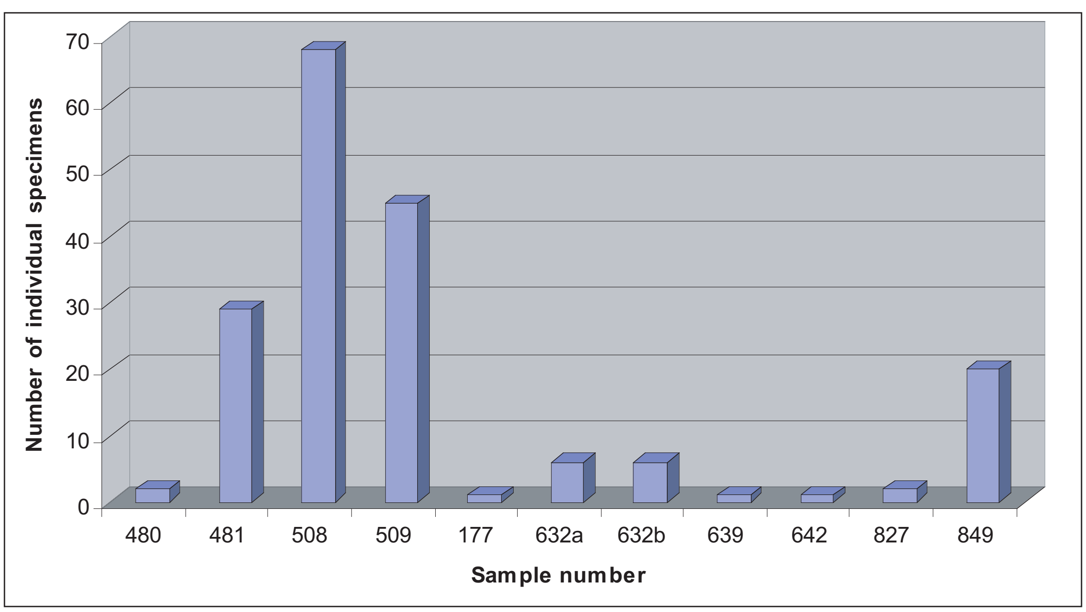


Fig. 2.7.5:1—*Graph showing the number of insect specimens recovered from each sample.*

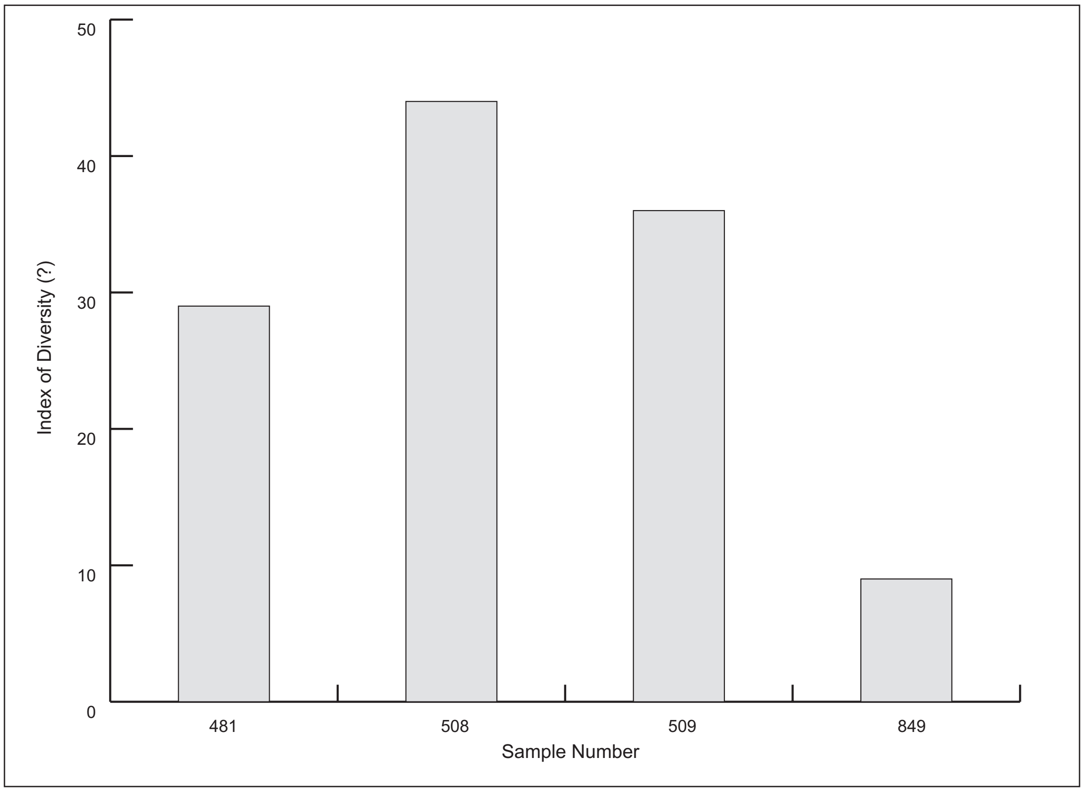
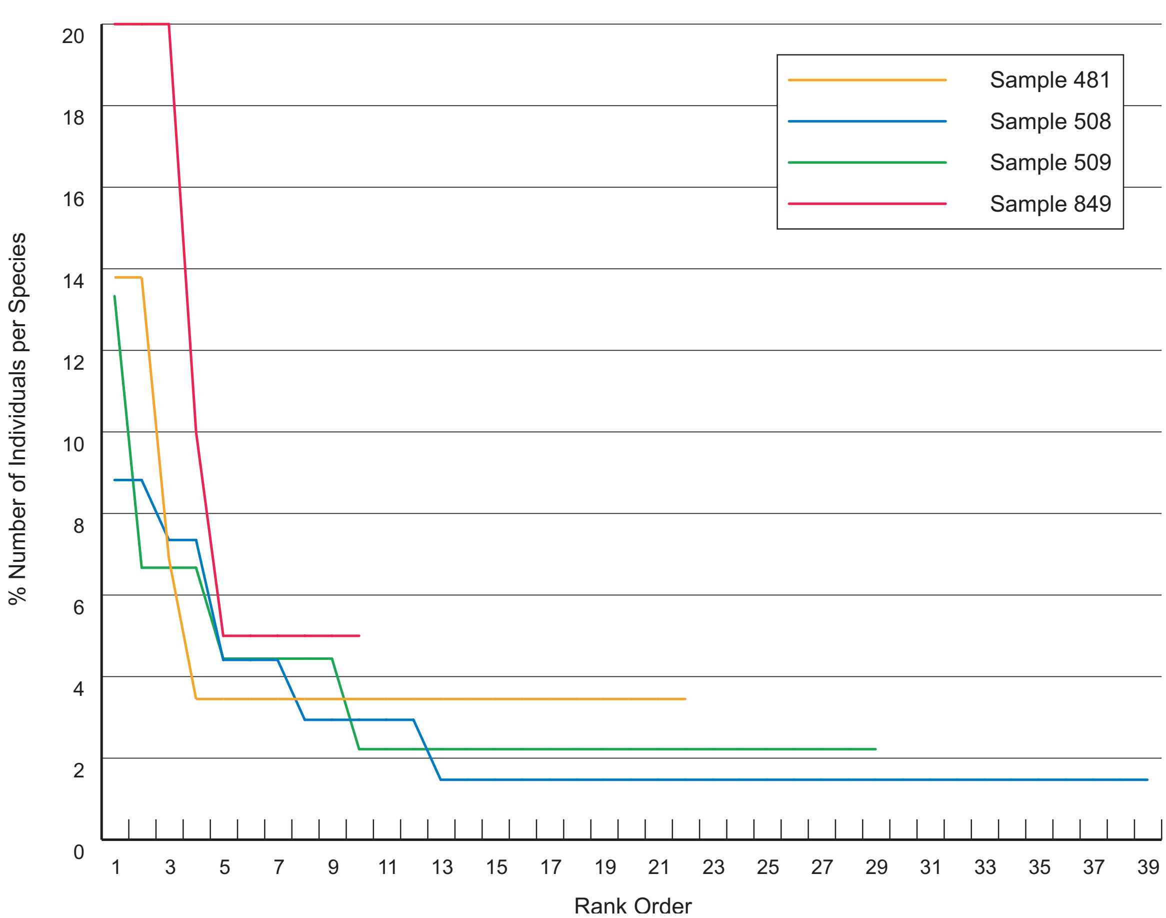


Fig. 2.7.5:2—*Graph of index of diversity in selected ditch samples.*

(Below) ***Fig.2.7.5:3***—*Rank order graph of selected samples.*



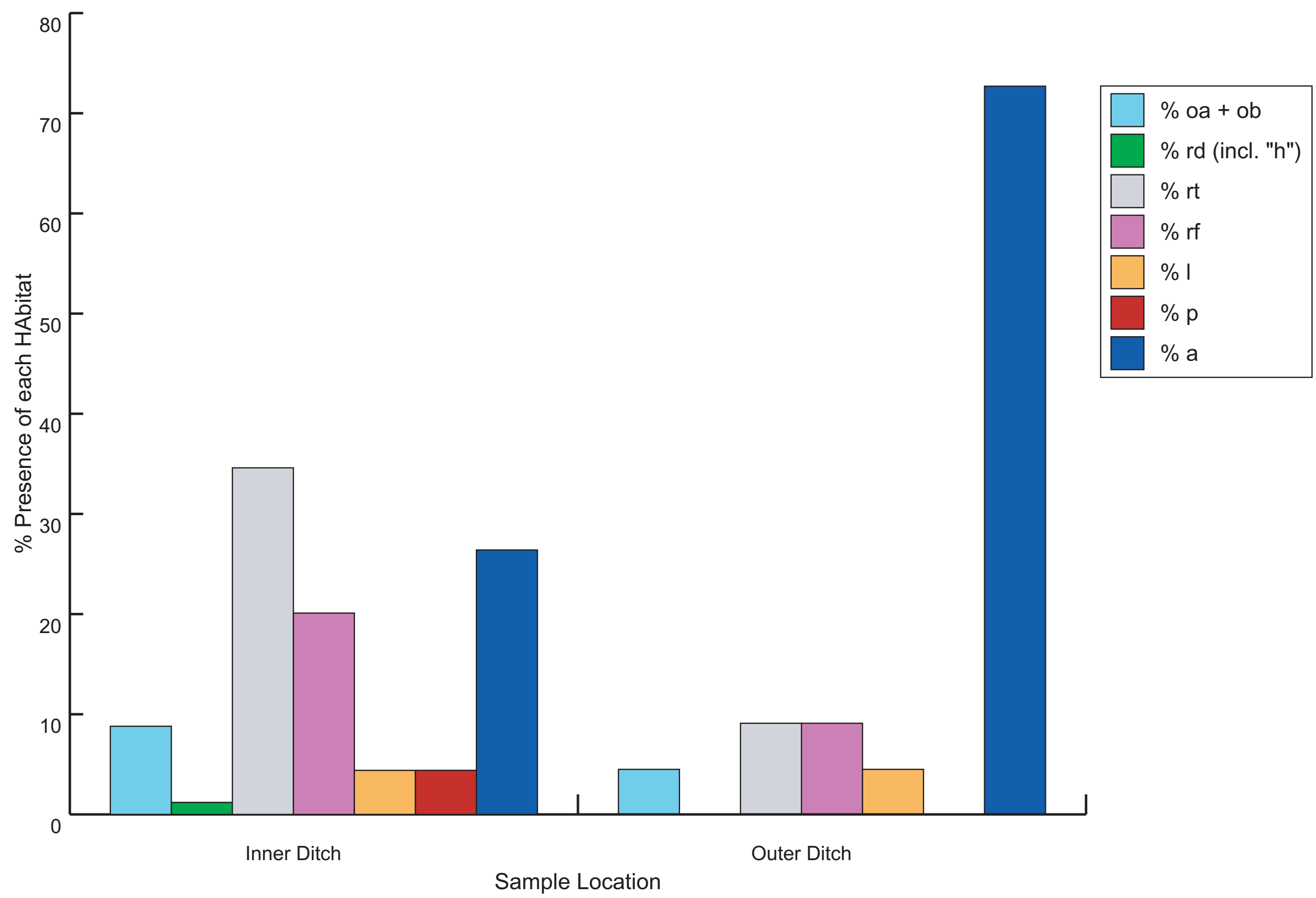


Fig. 2.7.5:4—*Habitat data for combined ditch samples.*