W6
Alnus glutinosa-Urtica dioica woodland

Synonymy
Valley fen woods Farrow 1915 *p.p.*; *Betulo-Alnetum* Clapham in Tansley 1939; Woodwalton Birch wood Poore 1956*b p.p.*; Valley fen alderwoods Haslam 1965 *p.p.*; *Alnus-Salix* woodland XXi & XXii Meres Report 1980; *Alnus-Salix-Betula* woodland XXi Meres Report 1980; Fen Woodlands B, C & D Fitter *et al.* 1980; Alder stand types 7Aa & 7Ab Peterken 1981.

Constant species
Alnus glutinosa, *Urtica dioica*.

Physiognomy
The *Alnus glutinosa-Urtica dioica* woodland is a rather ill-defined community which brings together a variety of canopies dominated by *Alnus glutinosa*, *Salix* spp. and *Betula pubescens* beneath which the rich assemblages of swamp and fen herbs characteristic of many of our wetter woods are replaced by a species-poor, though quite distinctive, field layer. There is considerable floristic and physiognomic diversity among the woodland types included here and, at first sight, it is often the peculiarities of stands which impress the visitor more than their underlying similarities. Nonetheless, there are sound ecological reasons for both the general species-poverty of these woodlands and for what little they have in common and it seems best to treat them within a single, rather disparate, group.

Alnus glutinosa is by far the commonest tree throughout and it remains frequent in all but the driest stands. In the wetter woodlands included here, it is often an overwhelming dominant, forming an even-topped and usually closed canopy of well-grown, usually multi-stemmed trees. In one sub-community, it is replaced as the most abundant tree by *Salix fragilis*. In the drier types of woodland within the community, *Betula pubescens* becomes increasingly frequent and locally dominant and *Pinus sylvestris* is an important invader or planted canopy replacement. Other tree species are generally uncommon but *Populus nigra* var. *betulifolia* is a very distinctive associate in some stands and it can attain a grand stature here with its black bossed trunk and irregular branches arching downwards. This tree is probably native in southern England and, as on the Continent, this community perhaps provides its natural woodland locus. There is occasionally some *Acer pseudoplatanus* or *Fraxinus excelsior* and sometimes a little *Quercus robur*.

Mature woodlands of these types usually have a distinct, though generally open and often rather patchy, understorey. Except where the substrate is dry, *Salix cinerea* is the leading shrub with, on drier ground, *Sambucus nigra*. *Crataegus monogyna* is occasional throughout and there are sparse records for *Salix caprea*, *Ilex aquifolium*, *Corylus avellana*, *Viburnum opulus* and *Prunus spinosa*. Exceptionally, as at Wicken Fen (Godwin *et al.* 1974), this kind of woodland has developed beneath a canopy dominated by *Frangula alnus* and *Rhamnus catharticus*. Tree saplings are quite common with occasional young *A. pseudoplatanus*, *Alnus*, *Fraxinus* and *S. fragilis*.

The other group of woody species which can attain prominence in these woodlands are the osiers. *Salix viminalis* and, less commonly, *S. triandra* and *S. purpurea*, are occasionally found as shrubs or small trees in the understorey but it is sensible to include in this community scrubby vegetation in which these species dominate, usually with only scattered *Alnus*, over the kind of field layer typical here. Planted osier beds can be seen as but a more ordered and managed version of such vegetation and their major weeds are the characteristic herbs of the community.

What distinguishes the field layer of this community from the herbaceous component of its closest relatives, the *Salix-Betula-Phragmites* and *Alnus-Carex* woodlands, is the very poor representation here of bulkier swamp dominants and tall rich-fen dicotyledons. Species such as *Phragmites australis*, *Carex paniculata* and *C. acutiformis* are, at most, occasional in the *Alnus-*

Urtica woodland and they do not usually form extensive and vigorous patches. Dicotyledons such as *Lysimachia vulgaris*, *Lythrum salicaria*, *Valeriana officinalis*, *V. dioica* and even *Eupatorium cannabinum*, *Filipendula ulmaria* and *Angelica sylvestris*, are likewise rather uncommon, occurring usually as only sparse scattered individuals. And, where this community comes close in its floristic composition to the *Alnus-Fraxinus-Lysimachia* woodland, there is only very rarely the sort of ground cover of *Chrysosplenium oppositifolium* and *Caltha palustris* so characteristic there of trickling surface water.

On the positive side, the really typical herb here is *Urtica dioica*, the sole constant of the field layer throughout and often very prominent, sometimes in a virtually continuous cover, in other cases as conspicuous patches. One good measure of the general species-poverty here is that, when the luxuriant *Urtica* litter dies down quickly at the end of the growing season, there are very few remains of other perennial herbs to be seen. The vernal aspect of these woodlands, which generally lack such plants as *Mercurialis perennis*, *Hyacinthoides non-scripta*, *Ranunculus ficaria* or *Anemone nemorosa*, is thus often decidedly bare.

The commoner field-layer associates of the community as a whole are few but they form an ill-defined series running from the wetter to the drier habitats. Where the soils remain moist towards the surface (as in the Typical, *Salix fragilis* and *Salix viminalis/triandra* sub-communities), *Poa trivialis* and *Galium aparine* are frequent and sometimes abundant and there is often some *Solanum dulcamara* scrambling through the shrubs. It is in these kinds of *Alnus-Urtica* woodlands that such swamp and fen species as occur in the community are best represented with small clumps of *Phragmites*, *Carex acutiformis*, *Phalaris arundinacea* and *Epilobium hirsutum* scattered among usually dense *Urtica* with occasional *Filipendula ulmaria* and *Iris pseudacorus*. On drier substrates, by contrast (as in the *Sambucus* and *Betula* sub-communities), the importance of all these species fades and there is an increasing prominence of *Lonicera periclymenum*, *Dryopteris dilatata* and *Rubus fruticosus* agg. among an *Urtica* cover that can be much thinner and patchier.

Other herbs present throughout at low frequencies include *Arrhenatherum elatius*, *Heracleum sphondylium*, *Ranunculus repens*, *Cardamine flexuosa*, *Glechoma hederacea*, *Angelica sylvestris* and *Cirsium palustre*. Towards the south and west, *Oenanthe crocata* is a scarce but locally abundant associate and, especially in the industrial north, *Impatiens glandulifera* has become prominent in some stands. This considerable variety among the field layer is also often accompanied by a generally untidy and run-down appearance: wetter stands are often choked with brushwood and litter after the winter flood and can have interesting artefacts like fertiliser bags and dead fish. Drier woodlands frequently show signs of disturbance.

Bryophytes are very variable in their abundance but, because of the often low cover of smaller vascular species, they frequently appear conspicuous over the soil surface and herb stools, especially in winter and spring when they can provide the only splashes of green. The species are few: *Eurhynchium praelongum* is by far the commonest but *Brachythecium rutabulum* occurs occasionally throughout and there are also sparse records for *Plagiothecium denticulatum*, *Plagiomnium undulatum*, *Rhizomnium punctatum* and, over bark and on twiggy litter, *Mnium hornum* and *Lophocolea heterophylla*. Species such as *Calliergon cuspidatum*, *Pellia epiphylla* and Sphagna are very rare, in contrast to other kinds of wet woodland.

Sub-communities

Typical sub-community: Fen Woodlands B, C & D Fitter *et al.* 1980. *Alnus* is almost always the woody dominant here, often growing as tall, multi-stemmed trees and forming an even-topped and virtually closed canopy. *Fraxinus* is occasional and there are sparse records also for *Acer pseudoplatanus* and *Quercus robur*. Shrub cover is generally thin with scattered bushes of *Salix cinerea* being the only frequent feature. *Crataegus monogyna* occurs occasionally and there is sometimes a little *Sambucus*, *Corylus*, *Ilex*, *Salix viminalis* and *Viburnum opulus*. *Frangula alnus* and *Rhamnus catharticus* are also sometimes encountered and they dominate in woodland of this kind in Reserve A at Wicken (Godwin *et al.* 1974). Saplings are usually rather sparse with scattered young *Fraxinus* and *Alnus*.

In the field layer, *Urtica* is usually very abundant and there is often much *Galium aparine*. Where the cover of these plants is somewhat patchier, there can be extensive mats of *Poa trivialis* over the ground surface and, less frequently, creeping *Ranunculus repens* and *Glechoma hederacea*. *Arrhenatherum elatius* and *Heracleum sphondylium* are found occasionally on drier areas and there can be sparse, but locally prominent, clumps of *Epilobium hirsutum* and *Phalaris arundinacea*. *Solanum dulcamara* and, less commonly, *Humulus lupulus* are sometimes found sprawling and climbing over the shrubs.

Against this general background, the field layer here can show floristic peculiarities which reflect its development from the herbaceous component of different kinds of swamp and fen. Tall dicotyledons such as *Filipendula ulmaria*, *Angelica sylvestris*, *Eupatorium cannabinum* and *Lysimachia vulgaris* are generally scarce in this vegetation but they can show local prominence. Bulkier monocotyledons too, can persist patchily, along dykes or streams for example or in wetter pools. *Phragmites* is

the most frequent of these, though it is no more than occasional throughout, never attains more than moderate abundance and, even then, is generally found beneath gaps or along the margins of stands. *Carex acutiformis* and *C. paniculata* are less common though, being more shade-tolerant, tussocks of these sedges can remain prominent locally beneath intact canopies here. Where these species occur together in the same stand, it may be quite difficult to partition samples between the *Alnus-Urtica* woodland and either the *Salix-Betula-Phragmites* or *Alnus-Carex* woodlands, but, since both of these communities seem to be able to develop into *Alnus-Urtica* woodland, transitional stands should be expected (e.g. Godwin *et al.* 1974, Fitter *et al.* 1980).

***Salix fragilis* sub-community:** Valley fen woods Farrow 1915 *p.p.*; *Alnus-Salix* woodland XXi & XXii Meres Report 1980. *Alnus* remains frequent here but it generally occurs as scattered trees in a canopy dominated by *Salix fragilis*. This willow can grow up to form tall individuals but its widely-spreading branches make for broad, irregular crowns so the canopy is often rather uneven-topped and somewhat open. Other trees are rare but, beneath gaps and in younger stands, shrubs can be large enough to make stratification indistinct. Mature woodlands of this kind usually have a low understorey with a patchy distribution of shrubs and saplings over mosaics of drier and wetter ground, a common feature of the habitat here. *Salix cinerea* and *Sambucus nigra* are the commonest species, the former thickening up in moister places, the latter more prominent, sometimes with a little *Crataegus monogyna*, in drier parts. Saplings can be numerous with young *S. fragilis*, *Alnus*, *Fraxinus* and *Acer pseudoplatanus*. As the branches of the canopy *S. fragilis* grow heavy with age, they readily crack off at their junctions and large limbs may crash down in high winds or with snow. Sometimes, these take root and sprout afresh but often they die, leaving the understorey choked with decaying wood. Winter-flooding also frequently washes in river drift and *Solanum* and *Humulus* can add to the tangle, making the vegetation almost impenetrable.

Urtica is again very frequent here and often very luxuriant, especially over marginal levees or over patches of alluvium deposited among the heaps of brushwood litter and around the tree bases. Here, too, there can be dense sprawls of *Galium aparine* and patches (or, on levees, strips) of *Phalaris arundinacea* or *Epilobium hirsutum* with occasional tussocks of *Arrhenatherum elatius* and, in the driest areas, *Dryopteris dilatata*. Where the cover is not so thick, *Poa trivialis* and *Ranunculus repens* can spread over the soil surface, together with mats of *Eurhynchium praelongum* and *Brachythecium rutabulum*. *Mnium hornum* and *Lophocolea heterophylla* are sometimes conspicuous on the abundant decaying wood.

In wetter areas, these herbs and bryophytes become more sparse: there is occasionally some *Iris pseudacorus* and *Galium palustre* here but very often there are extensive bare stretches of sloppy mud.

***Salix viminalis/triandra* sub-community.** This kind of vegetation has not been systematically sampled but included here are stands in which osiers dominate over the kind of field layer typical of the *Alnus-Urtica* woodland. In semi-natural situations, *Salix viminalis* and *S. triandra* seem to be the commonest species with *S. purpurea* somewhat less frequent and diverse mixtures of these species and their hybrids, together with occasional *S. cinerea* and crosses with this sallow, typically form a thicket-like cover, low and often very dense. There is sometimes a little *Sambucus nigra* and *Crataegus monogyna* and emergent *Alnus* and *Fraxinus* can also be found. The major osiers here have long been a source of rods for basket weaving and plantings, frequently using selected varieties with picturesque names like 'Black Maul', 'Glibskins', 'Champion Rod' and 'Mottled Spaniards', are probably the original source of much of the taxonomic diversity seen in the wild and also the direct forbears of many, now neglected, stands.

The field layer in such situations is usually similar to that of the Typical and *Salix fragilis* sub-communities with an abundance of *Urtica* and *Galium aparine* and a ground carpet of *Poa trivialis*. *Solanum dulcamara* can be very prominent and, more occasionally, *Humulus lupulus* and *Calystegia sepium*. Bulky herbs like *Phragmites*, *Carex riparia*, *Epilobium hirsutum* and *Phalaris arundinacea* can also be patchily abundant and there may be scattered plants of *Filipendula ulmaria*, *Angelica sylvestris* and *Rumex* spp. Often, too, there is that characteristic untidiness produced by deposition of flood detritus and rubbish and by the dropping of alluvial material among the osier stools. Where these Salices are colonising sand and shingle islands, there can be much greater floristic heterogeneity too, with stretches of woody vegetation intermixed with varied inundation communities on still-shifting areas of substrate.

In planted, coppiced stands, control of herbaceous vegetation among the osiers is of paramount importance and the most troublesome weeds of the crop are *Urtica*, *Galium aparine*, *Calystegia sepium* and Rumices.

***Sambucus nigra* sub-community:** *Betulo-Alnetum* Clapham in Tansley 1939 *p.p.*; Woodwalton Birch wood Poore 1956*b p.p.*; *Alnus-Salix-Betula* woodland XXIi Meres Report 1980 *p.p.*; Alder stand type 7Ab Peterken 1981 *p.p. Alnus* is constant here and it is usually the dominant in a tall, more or less closed canopy, but *Betula pubescens* now becomes occasional and it can be

locally abundant. *Fraxinus*, *Acer pseudoplatanus*, *Salix fragilis* and *Quercus robur* occur more sparsely. There is often a distinct understorey, though the cover is variable. *Salix cinerea* is still frequent but it is not usually abundant and a much more obvious feature here is the common presence of scattered bushes of *Sambucus nigra*. *Crataegus monogyna* occurs occasionally and *Prunus spinosa* makes an infrequent appearance. *Corylus* and *Ilex* are rare and saplings, too, are rather uncommon with sparse records for young *Fraxinus*, *A. pseudoplatanus* and *B. pubescens*.

In the field layer, both *Urtica* and *Galium aparine* remain frequent but they are not so consistently prominent here as in the Typical and *Salix fragilis* sub-communities and the first impression given by the vegetation is generally the abundance of *Rubus fruticosus* agg. which can form a thick underscrub with some trailing *Lonicera periclymenum* and occasional crowns of *Dryopteris dilatata*. *D. filix-mas*, generally speaking a rare species in the *Alnus-Urtica* woodland, also becomes frequent here and there is sometimes a little *D. borreri*. Another quite frequent preferential is *Hedera helix* which can form an extensive ground carpet beneath the herbs. Then, there are sparse records for *Rumex obtusifolius*, *Silene dioica*, *Cardamine flexuosa*, *Heracleum sphondylium*, *Glechoma hederacea*, *Holcus mollis*, *Ranunculus ficaria* and *Hyacinthoides non-scripta*. Where there is a little base-enrichment on the margins of small streams winding through this kind of woodland, such plants as *Geum urbanum*, *Circaea lutetiana* and *Mercurialis perennis* can be found but extensive vernal dominance by *Mercurialis*, *Hyacinthoides* or *Ranunculus ficaria* does not occur here, in contrast to similar kinds of field layers in the *Quercus-Pteridium-Rubus* and *Fraxinus-Acer-Mercurialis* woodlands. Some stands, though, are characterised by a local abundance of *Allium ursinum* in spring and early summer, which is then replaced as the field-layer dominant in mid- and late summer by *Petasites hybridus*, the umbrella-like leaves of which can reach an enormous size here.

***Betula pubescens* sub-community:** *Betulo-Alnetum* Clapham in Tansley 1939 *p.p.*; Alder stand type 7Aa Peterken 1981 *p.p. Alnus* is here reduced to an occasional canopy component and, even when it does occur, it is often subordinate in cover to *Betula pubescens* which rises to constancy. *Pinus sylvestris* is a frequent invader of these drier woodlands and pine plantations which have replaced cleared *Alnus* woodland on alluvial flats are best included here on the basis of their field-layer characteristics. Clearings are also occasionally colonised by *Acer pseudoplatanus* but only rarely is there any *Fraxinus* or *Quercus robur*. Shrubs, too, are rather few in number and *Salix cinerea* is conspicuously absent here: usually, there are just a few scattered bushes of *Sambucus* and *Crataegus monogyna* and scarce *Salix caprea*. Saplings are few and mostly of *A. pseudoplatanus*.

In the field layer, the tendency towards a reduction in the prominence of such species as *Galium aparine* and *Poa trivialis* continues here. Even *Urtica* is rather less common and, though it can still be patchily abundant, its cover is usually less extensive and luxuriant than in the other sub-communities. There are also no very frequent preferential herbs here, though *Epilobium angustifolium* and *Holcus lanatus* are good occasional markers of the disturbance that woodlands of this kind often suffer. The most obvious feature of the field layer is thus the underscrub of *Rubus* and *Lonicera* with scattered *Dryopteris dilatata* that is typical of drier *Alnus-Urtica* woodlands in general.

Habitat

This community is first and foremost a woodland of eutrophic moist soils. It is especially characteristic of sites where there is (or has been) substantial deposition of allochthonous mineral matter, as on alluvial terraces in more mature stretches of river valleys but it can occur, too, in open-water transitions and on flood-plain mires where strongly-enriched waters flood fen peats. In such situations, the *Alnus-Urtica* woodland can develop as a primary forest cover in natural hydrarch successions and persist for some time as the substrates become elevated and dry out somewhat. But it can also develop secondarily where there is eutrophication of substrates under other kinds of wet woodland and then it can even be found on disturbed and enriched acid peats in some basin mires.

It is this general tendency towards enrichment of soils that are becoming, at least patchily, dry towards the surface in summer that is marked here by the prominence of such species as *Sambucus nigra*, *Urtica dioica* and *Galium aparine*. Generally speaking, the substrates remain moist enough for *Alnus* and various Salices to maintain their prominence in the canopy of most of these woodlands but the trend towards terrestrialisation is marked in the community, among both the woody species and the herbs, by the beginnings of a move towards the flora of mixed deciduous woodland.

Where naturally eutrophic mineral soils are developing by the deposition of rich particulate matter in the slacker reaches of rivers and on flood plains, the Typical and *Salix fragilis* sub-communities are characteristic. Both these kinds of *Alnus-Urtica* woodland (the latter exclusively, though more locally) occur on raw aluvium on levees, small terraces on river bends and uncultivated flood plains. They can also be found around abandoned meanders and silting lakes and as a fringe to artificial water-bodies like ornamental pools and old mill-ponds. The native status of *S. fragilis* is, in fact, disputed (e.g. Meikle 1984) and it has certainly been widely planted in or close to such habitats, but there is no doubt that, like

Alnus, it is very much at home in these situations and, once established, can quickly come to dominate.

In riverside woodlands of this kind, the substrate can be repeatedly enriched with fresh alluvium for many years and, nowadays, fertiliser run-off and the discharge of sewage effluent rich in nitrates and orthophosphates adds further plentiful supplies of major nutrients. In this kind of habitat, the ground may be submerged for weeks on end in the winter floods and hollows can remain very wet throughout the summer, so that a swampy structure develops. But, with the increasing deposition of silt, the ground surface becomes dry enough for *Urtica* to play its prominent role in the field layer.

The *Alnus* sub-community can also occur over fen peats which are inundated by nutrient-rich waters, either in naturally eutrophic river systems like some of the Broadland valleys or, again, where there has been artificial enrichment. But it can be found, too, more deeply within flood-plain mires where the peats have begun to dry out and become surface-oxidised with the release of a flush of nutrients. This is a natural process attendant upon the gradual elevation of the fen surface but there is no doubt that it can be accentuated by physical disturbance. However such eutrophication occurs, gradual drying and enrichment are marked here by the characteristic waning of the fen dominants and the prominence of *Urtica* and other more eutrophic herbs.

The *Sambucus* and *Betula* sub-communities are usually found in drier situations than the Typical and *Salix fragilis* sub-communities and are commonest on brown alluvial soils or alluvial gleys on old river terraces, infilled pools and over peats in flood-plain and basin mires well removed from the influence of flooding waters. The *Sambucus* sub-community is perhaps characteristic of more eutrophic and slightly more base-rich situations than is the *Betula* sub-community but, in both cases, the increasing surface dryness is marked by the almost total absence of fen plants, the waning of the dominance of *Urtica* in the field layer and the development of a herbaceous element that is characteristic of more species-poor mixed deciduous woodlands. Accessible stands of these woodlands are often disturbed by various kinds of human activity (including the dumping of rubbish and use as shooting coverts) and, where they occur within sites that are being cleared for afforestation, the soils are dry and rich enough to support a good growth of conifers like *Pinus sylvestris*. In other cases, vegetation of the *Betula* sub-community has developed in semi-ornamental plantings on heavier gleyed soils or by the natural invasion of land disturbed by major construction work and opencast restoration.

In this range of habitats characteristic of the *Alnus-Urtica* woodland, the *Salix viminalis/triandra* sub-community is typically found in wetter situations like those preferred by the Typical and *Salix fragilis* sub-communities. Sometimes, these are obviously natural, as where osiers have colonised river islands or fresh alluvium deposited along the slacker margins of moving waters, where repeated flooding maintains eutrophic conditions encouraging prolific canopy growth and, in areas of less dense shade, a luxuriant field layer. Even here, however, the osiers may ultimately originate from planted stock upstream: the native status of both *S. viminalis* and *S. triandra* is regarded as questionable and their widespread distributions are thought to have been much influenced by man (e.g. Meikle 1984). Other stands occur in situations which suggest a more obviously artificial provenance, around streams and in wetter fields near farms and settlements, where osiers were probably widely planted to supply local need.

Extensive commercial osier beds are now few in number and very local, though, in some areas, as around West Sedgemoor in Somerset, they still make a distinctive contribution to the landscape. Here, osiers grow extremely well on moist alluvial clays and silts over peat in a mild climate with fairly frost-free winters and warm summers. Traditionally, osier beds or 'holts' are spring-planted with close rows of 'sets', 30 cm lengths of first or second year shoots left with the top 10 cm protruding. The first crop of 'rods' from the one or two buds left exposed on the sets are usually of poor quality, crooked and often branched but, with repeated annual cutting, the crop builds in quality and quantity so that up to 20 rods can be obtained from each stool, giving yields of 800 000 or 15 tonnes ha^{-1}. Coppicing for 'buffs' (rods peeled after boiling) begins as the leaves start to fall in October to November with 'browns' (rods used with bark left on) being cut somewhat later; 'whites' (peeled, unboiled rods) are harvested either in March when renewed growth allows easy stripping of the bark or are produced from winter-cut rods which have been allowed to stand for some months in water (Troup 1966, Coate & Son undated).

Even with extensive preparation involving ploughing and harrowing and the application of residual herbicides, weed growth in the humid conditions of osier beds is often prolific and the close spacing of the rods usually necessitates repeated hand-hoeing. Sheep are sometimes turned into the crop in September to eat off any remaining herbs and there can be a further period of cattle-grazing in March and April to remove early shoots that may be damaged by frosts. With good tending, filling of blanks by new sets and fertilising where there is no winter-flooding with silt-laden waters, an osier bed can crop well for 25 years or more.

Zonation and succession

The *Alnus-Urtica* woodland is now rarely found as part of extensive zonations on alluvial soils because so many flood-plains have been extensively reclaimed for agriculture. Most often, the *Salix fragilis* and Typical sub-

communities survive as small, isolated stands within active loops of slack lowland rivers or around abandoned but still wet pools. They sometimes pass directly to open water or are fringed by a belt of eutrophic herbaceous vegetation, such as the *Phragmites-Urtica* fen, or *Phalaris* fen over silt, or by a zone of inundation vegetation over less stable alluvium or river shingle. Landward boundaries are often abrupt, with a sharp transition to improved pasture or arable but more neglected fringes may have a belt of *Urtica* or *Epilobium hirsutum* or rank *Arrhenatheretum*; in other cases, a boundary ditch occurs with swamp vegetation. In narrower valleys, where small alluvial terraces abut directly on to surrounding slopes, stands of the *Salix fragilis* or Typical sub-communities can pass sharply to some kind of mixed deciduous woodland. Where slope-flushes run down on to the flats, the *Alnus-Fraxinus-Lysimachia* woodland may form a transitional zone between. On older drier terraces in this kind of situation, the *Sambucus* or *Betula* sub-communities occur on the stabilised alluvium, and there seems little doubt that these kinds of *Alnus-Urtica* woodland are a natural seral development from the wetter sub-communities on gradually accumulating mineral material. The succession might be expected to progress to *Quercus-Pteridium-Rubus* woodland with the gradual invasion of *Quercus* spp., *Pteridium aquilinum* and herbs like *Anemone nemorosa* and *Ranunculus ficaria*.

In valley mires and flood-plain mires, the wetter kinds of *Alnus-Urtica* woodland are sometimes found in zonations close to open water with stands of *Salix-Betula-Phragmites* or *Alnus-Carex* woodlands or the *Salix-Carex* woodland, but typically they mark areas of alluvial deposition behind which peat is accumulating, rather than forming an integral part of a single hydrarch succession. This is well seen alongside the Black Beck in Esthwaite North Fen (Pearsall 1918, Tansley 1939, Pigott & Wilson 1978). More usually on extensive peats, the *Alnus-Urtica* woodland occurs more deeply within the fen system forming complexes with other woodlands and herbaceous communities and here it seems to represent a secondary development attendant upon late eutrophication of the habitat. This may happen naturally where deep fen peats dry out superficially and become oxidised with a release of nutrients, but in many cases it has probably been assisted by draining, the surface disturbance of peat-digging and inwash of fertiliser run-off: complex histories of this kind seem to lie behind the development of the community in sites like Woodwalton (Poore 1956*b*), Reserve A at Wicken (Godwin *et al.* 1974) and Askham Bog (Fitter *et al.* 1980). In such situations, the usual precursor of the *Alnus-Urtica* woodland seems to be the *Salix-Betula-Phragmites* woodland which may progress fairly rapidly to the Typical or *Sambucus* sub-communities and then perhaps the *Betula* sub-community. In less base-rich situations, as in some basin mires, the *Betula* sub-community may develop more directly from the *Betula-Molinia* woodland on grossly-disturbed acid peats.

Distribution

The *Alnus-Urtica* woodland is a widespread but local community throughout the lowlands, its occurrence reflecting the distribution of active alluvial deposition on more mature rivers and the remnants of undrained flood-plains and eutrophicated mires.

Affinities

Although this is rather a cumbersome community, it provides a convenient location for a variety of woodland types which show general similarities in floristics and environmental relationships. Previously, these have been recognised in British descriptions only as locally-developed, enriched fragments of other carr communities but, if stands were not so isolated, we would probably acknowledge these woodlands as part of an important seral sequence on our more nutrient-rich flood plains. Phytosociologically, they clearly belong to the Salicion albae alliance in the Salicetea purpureae, colonising scrubs and woodlands in which a variety of willows play a prominent part. Associations like the *Saliceto-Populetum* (R.Tx. 1931) Meijer-Drees 1936 (Oberdorfer 1953, 1957) have a similar suite of herbs to the *Alnus-Urtica* woodland, show a corresponding variety of woody dominants and incorporate the same trend to drier mixed deciduous woodlands as seen here. Some authorities (e.g. Westhoff & den Held 1969) have divided this compendious community into smaller units, separating off the osier scrubs (e.g. *Salicetum triandrae* Malcuit 1929, *Salicetum triandro-viminalis* (Libbert 1931) R.Tx. 1951) from the woodlands dominated by larger willows (e.g. *Salicetum albo-fragilis* (Soo 1934) R.Tx. (1948) 1955) and further sampling might justify such a demarcation in Britain.

Floristic table W6

	a	b
Alnus glutinosa	V (7–10)	IV (4–8)
Acer pseudoplatanus	I (3–4)	
Quercus robur	I (4)	
Fraxinus excelsior	II (3–5)	
Salix fragilis		V (6–10)
Betula pubescens		
Pinus sylvestris		
Salix cinerea	III (4–8)	III (2–3)
Sambucus nigra	I (3–5)	III (1–4)
Crataegus monogyna	II (1–5)	II (3–4)
Acer pseudoplatanus sapling		II (1)
Alnus glutinosa sapling	I (1–3)	II (2)
Fraxinus excelsior sapling	I (3–5)	I (3)
Salix caprea		I (2)
Salix viminalis	I (4–7)	
Ilex aquifolium	I (2)	
Corylus avellana	I (3)	
Viburnum opulus	I (3)	
Betula pubescens sapling		I (1)
Salix fragilis sapling		II (6)
Prunus spinosa		
Urtica dioica	V (2–9)	V (2–5)
Poa trivialis	III (3–7)	III (1–4)
Galium aparine	IV (3–7)	III (2–5)
Solanum dulcamara	II (1–4)	III (1–8)
Lonicera periclymenum		
Dryopteris dilatata	I (1–4)	II (1)
Rubus fruticosus agg.	I (8)	I (1)

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d	e	6
IV (4–10)	II (4–7)	IV (4–10)
I (2–3)	II (4–5)	I (2–5)
I (3)	I (1)	I (1–4)
I (3–5)	I (4)	I (3–5)
I (4–8)		II (4–10)
II (4–7)	V (5–9)	II (4–9)
	III (3–9)	I (3–9)
III (1–9)		III (1–9)
IV (2–5)	II (3–5)	III (1–5)
II (2–6)	II (3)	II (1–6)
I (1–4)	II (3–4)	I (1–4)
I (1–4)	I (3)	I (1–4)
I (1–3)	I (3)	I (1–5)
I (5)	I (2–6)	I (2–6)
I (5)	I (7)	I (4–7)
I (2–3)	I (1–3)	I (1–3)
I (2–5)		I (2–5)
	I (4)	I (3–4)
	I (3)	I (1–3)
		I (6)
II (3–9)		I (3–9)
IV (1–9)	III (3–9)	IV (1–9)
II (3–9)	I (2–4)	II (1–9)
III (2–6)		III (2–7)
I (1)	I (3)	II (1–8)
II (2–5)	III (1–8)	II (1–8)
II (1–7)	III (2–6)	II (1–7)
V (1–9)	IV (1–8)	III (1–9)

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Floristic table W6 *(cont.)*

	a	b
Filipendula ulmaria	II (3–6)	I (4)
Phragmites australis	II (3–5)	
Carex acutiformis	II (3–6)	
Equisetum palustre	II (3–5)	
Phalaris arundinacea	I (3–4)	III (4–7)
Galium palustre	I (3)	III (1–3)
Lophocolea heterophylla	I (2)	II (1–3)
Iris pseudacorus	I (3–4)	II (4–5)
Epilobium hirsutum	I (4–6)	II (1–6)
Dryopteris filix-mas	I (4)	
Hedera helix		
Rumex obtusifolius	I (4)	I (1)
Silene dioica	I (2–4)	I (4)
Circaea lutetiana	I (1)	
Geum urbanum	I (2)	
Allium ursinum		
Petasites hybridus		
Ranunculus ficaria		
Dryopteris borreri		
Epilobium angustifolium		I (1)
Holcus lanatus		I (2)
Eurhynchium praelongum	III (2–5)	III (1–3)
Brachythecium rutabulum	II (1–4)	I (2)
Cardamine flexuosa	I (1)	II (2–3)
Ranunculus repens	II (3–7)	II (2–3)
Arrhenatherum elatius	II (4–5)	II (2–3)
Heracleum sphondylium	II (2–5)	I (2)
Glechoma hederacea	II (2–4)	
Angelica sylvestris	I (2)	I (2)
Plagiothecium denticulatum	I (1–3)	I (1)

d	e	6
I (6)	I (3)	I (3–6)
		I (3–5)
		I (3–6)
		I (3–5)
I (3–4)	I (5–6)	I (3–7)
	I (3)	I (1–3)
I (3)		I (1–3)
I (4)		I (3–5)
		I (1–6)
III (1–6)	I (2–5)	II (1–6)
III (3–7)	I (4–8)	I (3–8)
II (1–3)	I (3)	I (1–4)
II (2–5)	I (3)	I (2–5)
II (2–6)	I (1–3)	I (1–6)
II (3–4)		I (2–4)
II (2–6)		I (2–6)
II (5–8)		I (5–8)
I (1–5)		I (1–5)
I (1–7)		I (1–7)
I (3–5)	II (1–4)	I (1–5)
I (1–8)	II (3–6)	I (1–8)
IV (2–9)	III (2–5)	III (1–9)
II (2–6)	II (3–6)	II (1–6)
II (1–4)	I (3)	I (1–4)
I (3–4)	I (4–10)	I (2–10)
I (4)	I (2–5)	I (2–5)
II (1–4)		I (1–5)
II (2–8)	I (4–6)	I (2–8)
I (2–6)	I (2–4)	I (2–6)
I (2–4)	I (3)	I (1–4)

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Cirsium palustre	I (3)	I (1)
Oenanthe crocata	I (6)	I (4)
Taraxacum officinale agg.	I (2)	I (4)
Lysimachia vulgaris	I (1–3)	I (2)
Mercurialis perennis	I (4–5)	
Plagiomnium undulatum	I (1)	
Geranium robertianum	I (3)	
Stellaria media	I (3)	
Galium uliginosum	I (4)	
Dactylis glomerata	I (3)	
Digitalis purpurea		I (1)
Holcus mollis		I (3)
Rumex sanguineus	I (1–2)	
Eupatorium cannabinum	I (3–5)	
Impatiens glandulifera	I (2–6)	
Humulus lupulus	I (4–5)	
Chrysosplenium oppositifolium	I (4–7)	
Mentha aquatica	I (4–5)	
Stachys sylvatica	I (3)	
Equisetum arvense	I (4)	
Caltha palustris	I (2–4)	I (4)
Carex paniculata	I (3–6)	
Deschampsia cespitosa	I (1)	
Epilobium montanum		I (1)
Epilobium palustre		I (1)
Veronica montana		I (1)
Rumex crispus		I (2)
Carex riparia		I (7)
Athyrium filix-femina		
Agrostis stolonifera		
Ranunculus acris		
Rubus idaeus		
Hyacinthoides non-scripta		
Plagiomnium affine		

I (2)	I (2–3)	I (1–3)
I (4–5)		I (4–6)
I (2)		I (2–4)
I (3)		I (1–3)
I (4–5)	I (3)	I (3–5)
I (2–6)	I (1–3)	I (1–6)
I (2–4)	I (2–3)	I (2–4)
I (2–4)	I (3–5)	I (2–5)
I (3)	I (4)	I (3–4)
I (3)	I (3)	I (3)
I (2–3)	I (2)	I (1–3)
I (4–5)	I (3)	I (3–5)
I (1–4)		I (1–4)
I (3)		I (3–5)
I (3–8)		I (3–8)
I (3)		I (3–5)
I (4)		I (4–7)
I (3)		I (3–5)
I (4)		I (3–4)
I (3)		I (3–4)
		I (2–4)
	I (4)	I (3–6)
	I (5–7)	I (1–7)
I (1–3)		I (1–3)
I (4)		I (1–4)
I (3)		I (1–3)
I (3)		I (2–3)
I (4)		I (4–7)
I (1–5)	I (1–3)	I (1–5)
I (4)	I (2–4)	I (2–4)
I (3)	I (2)	I (2–3)
I (2–3)	I (3)	I (2–3)
I (4–9)	I (4)	I (4–9)
I (2–3)	I (3)	I (2–3)

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Floristic table W6 *(cont.)*

	a	b
Number of samples	17	6
Number of species/sample	12 (4–23)	21 (15–23)
Tree height (m)	11 (7–15)	12 (8–18)
Tree cover (%)	92 (70–100)	76 (50–100)
Shrub height (m)	4 (2–5)	4 (2–5)
Shrub cover (%)	5 (0–30)	20 (0–35)
Herb height (cm)	75 (40–125)	97 (35–150)
Herb cover (%)	95 (60–100)	91 (70–100)
Ground height (mm)	3 (1–20)	5
Ground cover (%)	8 (0–75)	4 (0–20)
Altitude (m)	45 (4–140)	63 (30–115)

a Typical sub-community
b *Salix fragilis* sub-community
c *Salix viminalis/triandra* sub-community (not tabled)
d *Sambucus nigra* sub-community
e *Betula pubescens* sub-community
6 *Alnus glutinosa-Urtica dioica* woodland (total)

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d	e	6
20	15	58
21 (10–40)	16 (10–25)	17 (4–40)
14 (6–22)	13 (8–20)	13 (6–22)
92 (80–100)	84 (25–100)	88 (25–100)
3 (1–4)	3 (2–6)	3 (1–6)
19 (0–100)	24 (10–70)	11 (0–100)
66 (20–120)	77 (50–150)	75 (20–150)
92 (60–100)	92 (60–100)	93 (60–100)
12 (10–20)	25 (20–30)	12 (1–30)
39 (1–100)	24 (5–40)	22 (0–100)
56 (8–160)	89 (25–121)	62 (4–160)

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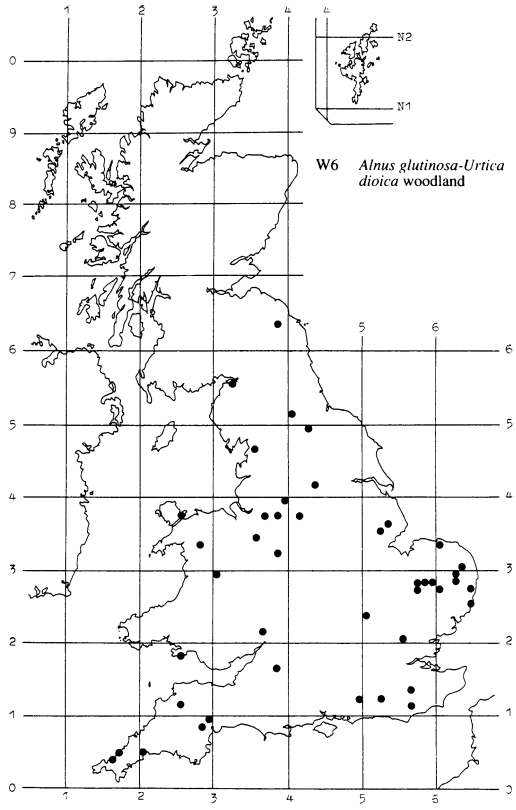

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