

# Irish Native Woodlands: Their Present Condition

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The history of our natural woodlands has received the attention of several authors, of whom Forbes (1), Henry (2), Falkiner (3) and Hore (4) are most notable. These have dealt with the extent and location of the ancient woodland area and with the historical references to clearances and utilization for charcoal-making, stave-making, shipbuilding, etc. So far no general description of their composition, ecology and silviculture as gleaned from their scattered remnants has been published. Praeger (5, 6) has touched on the floristic as opposed to the ecological aspect. The intensive study of the Killarney woods by Turner and Watt (7) is by far the most important contribution, but is a gem that needs to be fitted into the setting of a more comprehensive but less detailed survey.

## Extent Before Clearance

Before examining the natural woodlands still extant, it is necessary to refer to the controversial question of their extent before the activities of man restricted their spread or reduced their area. It has been suggested that large areas of lowland were never covered with forest but always supported a gramineous vegetation. The evidence of ecology and pollen analysis is otherwise. An examination of the growth of turf bogs and of pollen extracted from them shows the comparative stability of our plant population and climate since Sub-Atlantic times (c.500 B.C.). Consequently those plants which now tend to form climax communities must, before man's interference, have dominated the scene. There is ample evidence in neglected or undergrazed pasture of the ability of tree species to invade and oust grass communities. Most of our grassland must now be regarded not as a climatic but as a biotic climax, i.e., a more or less stable plant community whose continued existence is dependent on the activity of man and his domesticated herbivores.

We may now outline the probable maximum extent of the primeval forest. All the lowlands with the exception of marsh and bog and those areas on the west coast where wind pressure is too great, supported deciduous summer forest. The area over which Atlantic winds prevented the development of woodland probably varied considerably in depth. In Kerry, Connemara and Donegal, where mountain masses provide shelter, forest occurred and may still be seen on their sheltered slopes right up to the coast, e.g., Mulroy Bay (Donegal). Even Clare Island supports a scrub vegetation (8). In Clare, however, the treeless zone must have extended far inland due to lack of shelter and scanty soil. Observations in this county (9) show the ability of heath to maintain itself even against hazel scrub where exposure is severe, and Henry (2) has remarked on the absence of all reference to woodland in the townland names of West Clare. East Clare, of course, still bears remnants of sessile oakwood.

Connemara and much of Donegal form a region in which the climax vegetation is "blanket bog," and woodland occurs as part of a xerosere or progression from dry rock or well-drained soil to peat formed under conditions of high rainfall (over 60 inches) and constantly high atmospheric humidity.

The extent to which forest climbed the mountains varied considerably. As we have seen, the tree limit is at sea level on parts of the west coast, but, a short distance inland, in the Killarney-Glengarriff area, still reaches 600-800 feet. This is considered the undisturbed

limit by Praeger (6), but Turner and Watt (7) regard it as artificially depressed. In large mountain masses and with increasing distance from the sea, the limits of all zones of vegetation are raised. In our largest mountain area, the Dublin-Wicklow massif, consequently, it is not surprising that the woodland limit, past and present, reaches its maximum. Although native woodland outside the shelter of gullies does not now occur above 1,000 ft., there is evidence of its recent existence to at least 1,200 ft. in the lee of the higher mountains. The 1841 Ordnance Survey 6" maps indicate open woodland above the 1,000 ft. contour in several localities, and I have found charcoal pits with oak and birch charcoal up to 1,200 ft. In many cases the woodland limit appeared to have been coterminous with the present limit of bracken dominance and reached the summit peat cap. It is possible that on more exposed westerly aspects a dry heath community intervened between the woodland zone of the lower slopes and the peat cap, the invasion of woody growth being inhibited by wind pressure.

On sheltered ground on the steep sides of Ben Bulbin (Sligo-Leitrim border) at Lugnafaughery, alder-birch scrub still occurs slightly above the 1,000 ft. contour. This is due to excellent shelter and the prevention of peat growth by constant addition of alkaline detritus to the soil from limestone cliffs. On siliceous soils in the same district at L. Gill, oakwood is replaced by blanket bog at 500 ft. elevation, e.g., Slish Wood on Killery mountain. Thus on fertile soil over basic rocks the tree limit is raised.

#### Present Extent and Distribution

Of the vast extent of woodland which must have existed at the beginning of the Christian era, it is doubtful if 50,000 acres (or one-third per cent. of our land surface) still exists even in a semi-natural condition. A considerable area of shrub communities (principally hazel), in addition, survives on the limestone pavements of the West. Of the native woodland proper, practically all that survives occupies special habitats and not more than a few hundred acres is on normal, fertile, arable land. The largest part owes its survival to its position on steep rocky slopes incapable of cultivation. This is well seen from Arklow to Aghrim and Rathdrum, where the native vegetation has survived only on the steep sides of the river gorge. Extremely rocky soil, by making cultivation impossible and affording protection to tree seedlings, has helped also to preserve woodland. Small ungrazed islands and inaccessible hill terraces also provide sanctuary for native woodland. But more important than these topographical features in their preservation, has been their enclosure by estate owners to exclude stock. Up to about 1825 their value as coppice woods, estimated at £2 per acre per annum by Frazer (10), lead to more or less careful treatment and the exclusion of stock, but, with the sharp fall in value after the Napoleonic period, they were preserved mainly for game and amenity purposes (Nisbet, 11). Only estate owners could afford to enclose and to maintain the fences around woodland. On ordinary farmland on the shallow limestone soils of the West only poor hazel scrub with occasional ash is found, while under exactly similar soil conditions within demesne walls, ash- and ash-oakwood is well developed, e.g., Coole Park (Gort), Portumna, Ballykine Wood (Cong), and Clonbrock (Ballinasloe). The only remnants of native woodland on deep fertile soil in the central plain are also in demesnes, e.g., Lord de Vesci's at Abbeyleix. Historical data lead to the conclusion that the process of deforestation on the fertile plains was prolonged and steady. It must have been well advanced at the time of the Norman invasion, but was probably accelerated in the succeeding centuries and was probably fairly complete by the beginning of the 17th century. On the other hand, the considerable woods in the

wilder, mountainous regions do not appear to have much reduced until the introduction of charcoal burning for iron-smelting, and the export of pipe-staves, timber for shipbuilding, etc. The 17th and 18th centuries, when Ireland became the "home of timber adventurers," saw the rapid destruction of the forest that remained on hilly, broken, and infertile ground.

The largest compact areas of native woodland still extant are (1) in Central Wicklow, in the Vale of Clara and the neighbouring glens and valleys—Glendalough, Glenmalur, Avoca, Arklow to Aughrim, the Gold Mines Valley and between Rathdrum and Glenealy; (2) in Cork and Kerry around Killarney, Kenmare, Glengariff, Dunmanway, etc. A smaller area lies around Sligo—at Lough Gill, Collooney, Ballisodare and Glencar. Other notable areas are at Powerscourt Deerpark, Coolattin, Glencree Valley, and on the Slaney near Clonegal—all outliers of the Wicklow area; Portlaw, Slieve-na-muck Hills (Tipperary); Rockingham (Boyle); Virginia; the Rivers Nore and Barrow cuttings from a few miles below New Ross to Thomastown and Borris respectively; the Blackwater Valley, especially near Cappoquin (Glenshelane); Gort (Coole, Chevy Chase); Woodford district (Co. Galway); Pontoon (Mayo); Killoughim (Wexford); Abbeyleix; Ballykine (Cong); slopes by Lough Derevaragh; and islands in Lough Erne and many other lakes.

#### Recent Utilization and Its Effects on Ecological Character

A picture of recent utilization is best obtained from accounts by Young (12), Hayes (13), Wakefield (13), and authors of the R.D.S. County Surveys (1800-10) (10, 15).

The traditional method of exploitation of English oakwoods, hazel coppice with oak standards, does not appear to have been widely practised in Ireland. The term "standard" does not occur in the literature, but "reserves" were sometimes left—although coppices were usually felled "smack smooth." The reason why coppice with standards was not in vogue is clear when the woods are examined. This type in England occurs on clay soils of only slightly acid or neutral reaction. On such soils, hazel is vigorous and under open canopy readily forms a continuous undergrowth. The Irish woods of the last three centuries, on the other hand, were mostly on light, siliceous soils of moderate to high acidity, and hazel was consequently less abundant while holly was often the dominant shrub. Where reserves were left, oak, not hazel, formed the coppice. One example of this system is given by Frazer in 1801 (10); 60 reserves per acre were left at the first coppicing at 30 years. At 60 years only 20 reserves remained, and at 90 years only a few remained for the final felling at 120 years. He remarks that the growth from 90 to 120 years showed little improvement. This practice appears to have been confined to the woods of Earl Fitzwilliam and of Symes at Ballyarthur. Tighe (15) also refers to reserves at Woodstock (Inistioge). That the practice was seldom followed is shown by Hayes (13) deploring "the absurd opinion that wherever a wood was felled, it was useless, if not detrimental, to leave a single reserve." The scarcity of large timber is also shown by the high prices then obtaining for big trees. Indeed large timber appears to have been generally confined to deerparks—the show places of estates. Many complaints were also voiced between 1770 and 1810 that, after felling, the woods were not "copsed," i.e., fenced against stock.

Coppicing was carried out every 20 to 40 years, and very little thinning appears to have been practised. This lack of thinning resulted in a crop of whips, none of which was suitable for a standard.

Hayes (13) gives the uses of coppice wood as: tan-bark, fencing, building, ploughs, handles, swings, rustic work, stakes, lady's shoe

heels, chairs, firewood, charcoal. Felling was done by axe, as saws were considered injurious to coppice. He discusses the method of bark-stripping and advocates stripping as low as possible provided the roots are not laid bare. Felling, too, must be low, leaving no stub above ground so that the young shoots will grow straight up from the root.

Coppice continued to pay well, until prices for timber and bark fell after the Napoleonic wars. From about 1820 onwards oak coppice became uneconomic and many of the coppices were allowed to develop into high wood. The only treatment they received then was an occasional thinning until in most cases only one shoot per stool remained at 80 to 100 years. It is this last development that has given certain peculiarities to the oakwoods of to-day. Under constant coppicing on short rotations, the woods responded so that the stools were spaced at 8-12 ft. apart—much closer than in highwood. Consequently the stems are now tall and clean of branches, often for 40 to 50 feet, and the crowns are disproportionately restricted. This, combined with poor soil, has resulted in narrow annual rings and small girth for age, so that the woods have a deceptive appearance of youth. Actually, most of these woods are over 90 years old, and many exceed 120 years. There is also a typical irregularity of the butts—best seen in the cross-section provided by felling—due to coppice origin. Frequently, too, a cluster of weak sprouts or suckers arises from ground level. These peculiarities are most evident in younger woods and especially in those on poor soil, e.g., those with *Vaccinium* undergrowth. The most obvious peculiarity, of course, is the double or triple stems which occasionally remain even in old crops. In their even-aged character, too, these woods differ from virgin forest.

When hardwood coppice became uneconomic, many owners interplanted the coppice stools with Scots Pine and larch. The former was generally allowed to remain to form part of the high wood, but most of the larch was removed as thinnings. Examples of woodland so treated were studied and show the remarkable recuperative powers of oak coppice, little trace of the effects of the exotics being seen within 15-20 years of their removal.

The present emergency has again brought the treatment of oak coppices to the fore. After a long period of neglect, they have now become the scenes of activity as sources of firewood, charcoal, and commercial timber. The problem of the best silvicultural treatment has arisen and the answer must vary according to the local conditions. Broadly speaking, the woods may be classified into three types: (i) those on fertile sites ideal for the production of oak timber; (ii) those on intermediate sites on which growth is slow and on which a proportion of commercial timber can be produced but only on uneconomically long rotations, and (iii) "scrub" woods properly so called on poor or exposed sites which are incapable of producing commercial timber. On the fertile type normal thinnings in immature woods, and regeneration fellings—or more extensive fellings with provision for the artificial regeneration of oak—in the case of mature woods appears to be the appropriate treatment. On the intermediate types where the trees have not reached commercial timber dimensions, it appears advisable to retain at least a proportion of the more promising stems subject to opening up the crop sufficiently to allow the healthy development of the particular conifers which are the most economic crop for this type. Thus on dry *Vaccinium* ground the over-stand should admit sufficient light for the growth of the intolerant Scots Pine, while on the moister *Luzula* type a heavier over-stand could be left with a view to underplanting spruces, *Tsuga Albertiana*, *Abies Grandis* and beech. On the "scrub" type only sufficient over-



stand should be left to provide the ideal shelter and moisture requirements of the conifers which are to replace the oak. In this case frequent shelterbelts on the convex contours and at right angles to the prevailing wind are advisable.

The present is an opportune time to consider the preservation quite untouched of carefully selected examples of every type of native woodlands now extant. These would be of considerable interest to the botanist as a harbourage for entirely natural vegetation, to the soil scientist as a locus for undisturbed soil profiles, and to the forester as a control in assessing the effects of exotics on soil fertility.

### The Components of Our Natural Woodland: Tree Species

**Oak.**—The oak is easily the most important native species. The sessile variety, at least, extends from our southern shores to the north of Donegal and reaches altitudes of 1,125 ft. in Kerry (16) and 1,480 ft. in Derry (17). Both the sessile and pedunculate species occur in native woodland. Tansley (9) quotes Henry as stating that no specimens of pedunculate oak were received from native woods. This statement dates from 1908 (18, Vol. II), and Henry's view had altered by 1913 (18, Vol. VI) when he referred to the native pedunculate oakwood at Abbeyleix.

It is now impossible to map precisely the distribution of the two oaks. Pedunculate is generally considered the tree of the plains, of deep, fertile, non-acid soils, while sessile inhabits the shallow, siliceous soils of the hill-slopes. This differentiation of habitats appears, in general, to hold good here. Sessile oakwood is certainly the only type developed on the siliceous mountains of Cork, Kerry, Waterford, Tipperary, Clare, Connemara, Donegal, Dublin, Wicklow and Wexford. How far into the lowlands it extended, or where the pedunculate replaced it, is not so clear, due to the almost complete disappearance of recognisably native woods in the fertile plains and to the preference for the pedunculate species in plantations.

Native pedunculate woods still occur at Abbeyleix, Coole (Gort), Clonbrock (Ballinasloe), and a few other places, and are undoubtedly to be regarded as relics of the oak-ash woods which must once have been the principal feature of the limestone plain. In the valley of the Nore below Thomastown, and of the Barrow below Graigueanamanagh, both oaks occur in varying proportions in the areas recorded as native woodland in the 14th (19) and in the 18th centuries (12). No records of extensive oak planting are known for these areas, and the conclusion that both species are native appears justified. The district would appear to be one which lay between the zones of dominance of the two species and in which neither had gained complete supremacy. In the Sligo area, too, on the limestones around Lough Gill and in Glencar, these mixed woods occur, and their origin may be similarly accounted for. On the siliceous rocks in the Sligo area sessile oak alone occurs. On the whole, the sessile species appears to be the more vigorous and to spread beyond what are considered its normal soil types in the West. For instance, at Ballykine (Cong) sessile oak is found on limestone pavement in a district in which only pedunculate occurs in planted woods. This probably represents an extension of the *Quercetum sessiliflorae* of the nearby Connemara region into the pedunculate oak-ash woodland area of the central plain. Sessile oak also occurs on limestone near Killarney.

**Birches.**—The birches are amongst our hardiest trees, and are recorded up to 1,700 ft. (17). Like the oak, there are two segregates, *Betula alba* L. (Silver Birch) and *Betula pubescens* Ehrh., the common variety. *Betula alba* is regarded by Praeger as "typical" of the

limestone country, while the other accompanies the sessile oak in hill country. The Silver Birch, although "typical," is often quite rare in the central plain, *Betula pubescens* being much more frequent. Occasionally, as in the Rathdrum-Glendalough-Glenmalur area, on the Slaney below Enniscorthy, on the Barrow at St. Mullins, and in the Aughrim Valley, *Betula alba* occurs on siliceous soils where only *Betula pubescens* is expected. With a species the individuals of which are short-lived and which reproduces so freely from seed, planting is certain to have obscured the natural soil preferences. The silver birch is, of course, preferred for ornamental planting. Where both species occur together, hybrids are frequent.

Only *Betula pubescens* forms pure woodland (5, 6). It once formed a zone of climax woodland above the oaks, but no trace of this now remains although its increasing prominence in oakwood at high altitudes is well marked. Birch is the only important seral tree of heathy oakwoods. After coppicing, numerous seedlings establish themselves, and it is not unusual for the birch to occupy a larger area than the oak stool-shoots in a young coppice. The proportion of birch in the canopy steadily decreases and, in situations in which oak reaches 70 ft. or more in height, is negligible at 120 years wherever the oak stools are themselves sufficiently close to form a closed canopy. Dead and dying birches are frequent in oakwoods over 100 years old.

Pure birch societies within oakwoods may be due to the "filling up" of a depleted wood, but an apparently stable birch society usually occupies wet peaty hollows with a field layer dominated by *Molinia*. These wet birch societies usually consist of *Betula pubescens* even where the drier surrounding ground is occupied by *Betula alba*.

**Ash.**—Owing to the highly calcareous nature of about two-thirds of our soils, and to our high rainfall, ash is extremely vigorous and widespread. It is recorded up to 1,800 ft. (17). It is the constant associate of oak on the deeper limestone soils giving ash-oak woods and seral ash woods. On shallow limestone soils it may be the dominant tree, and on limestone pavements it is frequent, although unable to attain dominance, in the hazel scrub. In the sessile oakwoods it forms local societies in wet fertile ground, and also wherever the prevailing *luzula* and *vaccinium* undergrowth gives way to more exacting species such as Lesser Celandine, Wild Strawberry, Sanicle, Ground Ivy, Woodruff, Yellow Pimpernel and Garlic. Tansley (9) remarks that ash becomes general in our wet western woods.

**Elm.**—The commonest elm here is Wych Elm—*Ulmus glabra* Huds. or *U. Montana* Stokes. This is the only species of importance in native woodland. It is a frequent tree in ash and oak-ash woods on all limestone soils, and regenerates adequately from seed. On the western shallow limestone soils, it and ash are often the only hedgerow trees. In the siliceous oakwoods it is confined to the better soil types, on which ash is also frequent. Wakefield (14) mentions the use of elm bark as a dye in Wicklow, and this would suggest that it is native to that county.

Irish floristic botanists underestimate the range of this species. Cybele Hibernica (17) allows its nativity in only two northern districts out of the twelve into which the country is divided. Scully (16) does not admit its nativity in Kerry. Praeger (20) adds native stations on the River Barrow and in Galway. The picture of a restricted distribution with wide gaps thus obtained is misleading, and appears to be due to an ignoring of the evidence afforded by areas of native woodland in which planted trees also occur. The fact that elm exhibits well-defined soil preferences in these woods both in the East, South and West, and regenerates adequately, is sufficient

proof of its native status in these areas. This is a more rigorous test than that of floristic botanists (i.e., its occurrence in thoroughly wild situations), because it demonstrates its ability to survive in face of its primeval competitors.

**Alder.**—Alder pollen is very prominent in our peat deposits, and the species (*Alnus glutinosa* Gaertn.) must have occupied a large area before the drainage and clearance of river meadows and swamps. Both its water and mineral requirements are high. It is recorded up to 1,050 ft. (17). On acid peats it is short lived and height growth is poor. Where *Molinia* or poorer communities form the ground vegetation of wet land, birch replaces alder, the latter being usually associated with rush species (*Juncus communis* and *J. articulatus*).

**Poplars; Willows.**—Although several poplar and willow species of tree dimensions are thought to be native, only the Aspen (*Populus tremula* L.) now plays a part in native woods, and even it is comparatively rare. Its principal situation appears to be on cliffs—especially of limestone—and on the shores of turloughs and lakes in limestone country. In siliceous oakwood it is very rare, a few trees being noted at Annamoe and Clara (Co. Wicklow), and at Woodford (Co. Galway). Its inability to stand competition due to its high light demands and limited height growth is responsible for its disappearance from enclosed woodland. Its role is as a "pioneer" species on open ground.

**Rowan.**—The Rowan (*Sorbus aucuparia*) is rarely absent from any type of woodland, but is hardly gregarious and does not form pure woods, even of scrub type. It is frequent in seral birchwoods and in birch-ash woods (21) in the West, and maintains itself in the canopy in scrub oakwoods near the altitudinal limit. It is our hardiest tree species, being recorded up to 2,300 ft. (17). When exposed moorland is enclosed, isolated individuals appear, the parent trees often being at a considerable distance. It is said to have been the sacred tree of the Druids.

**Yew.**—The abundance of this species in the past is testified by the many place-names compounded with the tree's Irish names, "iubhar" and "eo." Now most of its native stations are in the South and West. It was once very abundant in Kerry, until iron smelting was introduced (22). It is still a constituent of the Kerry sessile oakwoods, and is occasional to frequent in similar woods at Woodford (Co. Galway). In siliceous oakwood in Wicklow it is rare and of local occurrence—near Glenealy, Rathdrum and Laragh—but appears to be derived from planted parents. Hayes (13), however, mentions its survival ("certainly indigenous") "in the mountainous districts of Wicklow." It still occurs in some quantity on cliffs over the Upper Lake, Glendalough, and as isolated bushes in Glenmalure.

Yew occurs also in native hazel scrub at Dysart (near Maryborough), and all over the limestone pavements of the West, in scrub, ash-wood and ash-oak wood. Yew woods occur on limestone pavement at Killarney, and the part yew plays in ashwood is well illustrated at Garryland, Gort. This wood is on shallow calcareous drift over limestone with occasional dry knolls bare of drift. Ash and oak (pedunculate) do not thrive on the knolls, reaching a maximum height of only 30–35 feet. Yew appears to be rapidly forming pure societies on the knolls, replacing ash and oak which cannot regenerate under its shade. Yews of mature, sapling, and seedling ages were noted, the oldest trees being on the crowns of the knolls and immature trees invading the ash and oak on the slopes. In these situations the yew equalled the replaced species in height growth, but remained only

occasional and sub-dominant (or in the shrub layer) throughout the remainder of the wood.

**Sorbus Aria (agg).**—The whitebeams are (with the exception of *Arbutus*) our rarest native trees. Nevertheless four segregate species have been distinguished (23), *S. porrigens* Hedl. being the prevailing type. The whitebeam is least rare on limestone or basalt, occurring in scrub on cliffs, pavements, or shallow soils, e.g., Ross Island (Kerry); shores of Lough Derg, near Porturnna; cliffs over Lough Gill; Cong (Mayo); Garryland (Gort). On limestone cliffs it is often associated with aspen and yew. On siliceous strata it is very rare, but has been noted in scrub on the Barrow (near Poulmounty), near Rathdrum, and between Woodenbridge and Aughrim.

**Arbutus.**—*Arbutus unedo* has a very restricted Irish distribution, being confined to an area within a 25-mile radius of Glengarriff and to the shores and cliffs at Lough Gill in Sligo. It is essentially a Mediterranean plant, and its presence in the West is the most striking indication of the mild oceanic climate. It reaches a height of 40 ft. here, much taller than is usual on the Mediterranean. It is a "pioneer" in succession towards woodland, colonising acid humus in rock clefts and being unable, apparently, to establish itself in woodland or even dwarf shrub communities (9).

The more widespread extension of *Arbutus* in ancient times is shown by the place-names in Kerry and Cork of which "cahney" (caithne), and, in the West from Clare to Mayo, of which "quin" (cuinche), form a part.

**Cherries.**—The bird cherry, *Prunus padus* L., is so rare that it may be considered an indicator of native woodland. It occurs in the Devil's Glen (Wicklow); at Lough Gill; Woodford; Chevy Chase, near Gort; Clonbrock; Glenstall (Co. Limerick); and Knock Drin (Westmeath).

The gean, *Prunus avium* L., however, is the only cherry of tree dimensions in native woods. It is most frequent and vigorous in our eastern sessile oakwoods, generally on the more fertile soils with ash and elm. It attains a height of up to 90 ft. and, when in flower or in autumn colours, is very beautiful. Its range may have been extended by planting. It appears to be native also in woods on limestone in the West.

### Naturalised Introductions

Beech, sycamore and Scots pine are so much a part of our landscape that few realise their alien status.

**Beech.**—The beech, *Fagus sylvatica* L., was probably introduced about the end of the 17th century (24). It is native in South-East England and in the Chilterns, and may once have extended into Wales (25). Why it failed to penetrate to Ireland is not clear. Possibly the cutting-off of Ireland from Britain by the formation of the Irish Sea formed a barrier to its advance. An explanation in support of which there is considerable evidence is that in our moist climate beech leaf-fall eventually forms a mat of raw humus which effectively prevents its own regeneration. A particularly good example of this phenomenon is seen on Church Island, Lough Gill, where the raw humus surface is coterminous with a beechwood. The raw humus is formed in this case on a calcareous soil—a type on which a peaty surface seldom develops.

On the other hand, the beech, in Eastern Ireland at least, is easily the most aggressive exotic, and is the only non-native tree which invades and replaces native climax oakwood under undisturbed conditions. Numerous examples are available of all stages of this succession. The complete extinction of oak over areas of an acre or



more may be seen at Shelton Abbey (where beech is said to have been first planted in this country). Three generations of beech occur and the species is still advancing. A gradual diminution in the proportion of beech to oak is noticed as we recede from the focus, i.e., the Lawn from which it spread.

**Sycamore.**—Sycamore (*Acer Pseudo-Platanus L.*) is recorded here since 1632 (24). The public are very familiar with its abundant and free regenerative powers, which are most marked on disturbed ground, e.g., gardens, cut-over woods. When the more rigorous test, ability to invade natural woodland unaided, is applied, however, it is much inferior to beech. Regeneration under deep shade suffers severely from the Tar-Spot fungus, *Rhytisma acerinum*, and its height growth is often less than that of its native competitors.

**Scots Pine.**—This erstwhile native has been re-introduced for several centuries, and we cannot now indicate with certainty any individuals of the native race. Examples of regeneration are frequent on the margins of lowland bogs and on Calluna-heath and drying Calluna moor. One good example of its regeneration with oak and birch was observed in an opening in a native wood at Curraghmore, Co. Waterford. On the slag-heaps of the copper and sulphur mines at Avoca, Scots pine is the first plant colonist, being followed by Calluna.

This article gives only an outline of the past extent, recent sylviculture, and present composition in regard to tree species of Irish native woodland. Space does not permit any classification of vegetational types, description of soil profiles, or discussion of regeneration and succession.

#### References

1. Forbes, A. C., Proc. R.I.A., V. 41, C. 3 (1933).
2. Henry, A., Woods and Trees of Ireland, Co. Louth Arch. Jn. (1914).
3. Falkiner, C. L., The Forest Question Considered Historically (1903).
4. Hore, H. F., Woods and Fastnesses of Ancient Ireland, Ulst. Jn. Arch., VI.
5. Praeger, R. L., Irish Topographical Botany.
6. Praeger, R. L., The Botanist in Ireland.
7. Turner, J. S.; Watt, A. S., The Oakwoods of Killarney, Jn. Ecol., 27 (1939).
8. Forbes, A. C., Proc. R.I.A., 31, i, 9, Tree Growth (1914).
9. Tansley, A. G., The British Islands and Their Vegetation (1939).
10. Frazer, R., Statistical Survey of Wicklow (1801).
11. Nisbet, J., Departmental Committee on Irish Forestry; Report (1908).
12. Young, A., Tours in Ireland (1780).
13. Hayes, S., On Planting (1794).
14. Wakefield, W., Ireland, Statistical and Historical (1812).
15. Tighe, W., Survey of Kilkenny (1802).
16. Scully, R. W., Flora of County Kerry.
17. More, A. G., Cybele Hibernica (1898).
18. Henry, A. Elwes, Trees of Great Britain and Ireland (1908-14).
19. Proc. R.I.A., 37, C., Unpublished Letters of Richard II in Ireland.
20. Praeger, R. L., Proc. R.I.A., 41, C., A Contribution to the Flora of Ireland (1933).
21. Anderson, M. L., The Natural Woodland of Britain and Ireland (1932).
22. Smith, C., Ancient and Present State of the County Kerry (1756).
23. Praeger, R. L., I.N.J. 5, p. 50, The Sorbus Aria Group in Ireland (1934).
24. FitzPatrick, H. M., Trees of Ireland, Native and Introduced (1933).
25. Hyde, H. A., Welsh Timber Trees (1935).