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Autor(en): **Doyle, J.**

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## Irish floristics since the I. P. E. of 1949

By J. DOYLE, Dublin

The many Irish friends which WERNER LUDI made during the memorable I. P. E. of 1949 being anxious to join personally in a sincere expression of congratulation to him on the occasion of his 70th birthday, this short article is essentially a co-operative tribute. It comes in the first place from D. A. WEBB and G. F. MITCHELL of Trinity College, Dublin; J. HESLOP-HARRISON of Queen's University, Belfast; A. FARRINGTON of the Royal Irish Academy; M. J. GORMAN and HELEN O'REILLY of University College, Dublin; and the writer, who acted as editor. All, as well as the many others who met him in 1949, wish to extend to Dr. LUDI their heartiest felicitations.

It was felt that the most suitable form which the tribute could take would be to gather together in one place, with brief summaries, the principal contributions to Irish floristics since the I. P. E. of 1949. The stimulus of that meeting probably inspired much of the work and to that extend Dr. Ludi, at least indirectly, can be considered responsible for it.

At the outset it must be recorded, with deep regret, that Irish botany suffered an irreparable loss by the death in 1953, at the age of 88, of ROBERT LLOYD PRAEGER. In spite of his advanced years he worked to the very end (PRAEGER, 1949; 1950 a, b; 1951 a, b), the most notable of these later contributions being the tentative check list of hybrids in the Irish flora and his broad survey of the whole field of Irish Natural History and its problems. His memory is sure of perpetuation in Ireland as he bequeathed his estate to the Royal Irish Academy for the encouragement of work in Field Natural History, the fund being administered by a special Praeger Committee set up by the Academy. In a special memorial number of the *Irish Naturalists' Journal* (11, [6], 1954) there will be found an appreciation of his life and work mainly compiled by A. FARRINGTON.

The contributions to be referred to in this article may be grouped under (1) floristics in general, including autecology, (2) phytosociology and (3) glacial and quaternary studies. Obviously with regard to papers dealing with field work this is merely a subdivision of convenience.

### 1. FLORISTICS IN GENERAL

(A). Some of the more critical taxa have come under review. Thus, continuing and extending work already initiated (WEBB, 1948) on the saxifrages, WEBB (1950 a, b) has given a taxonomic revision of the Sec-

tion *Dactyloides* with special reference to the species of N. W. Europe. The taxonomy of the section is difficult and confused and that of the species represented in the British Isles is particularly obscure. The difficulties arise, he suggests, from four main causes: (a) the great plasticity of most of the forms; (b) the fact that environmental plasticity is paralleled and overlapped by hereditary variation; (c) interbreeding within a wide range of biotypes; and (d) the discontinuous and largely relict distribution. Against this background the species and numerous forms in the British Isles, including thus the Irish ones, have been separately considered, from an autecological as well as a taxonomic aspect, to bring them into relation with the continental plants. WEBB (1950 c, 1951 a) has also considered the taxonomy of the saxifrages of the Section *Robertsonia* with special references to the hybrid populations now known to occur in many areas in Ireland. A discussion is given of the relationship between hybridization and variation in the group. It is claimed that no clear line can be drawn and that the concept of the «pure» species is a meaningless one. These saxifrage studies are being extended with the aim of monographing all the European species of the genus.

Work on the distribution and variation of Irish orchids has been continued by HESLOP HARRISON (1950, 1953 b, 1954, 1955, 1956 a, 1956 b, 1957). *Dactylorchis incarnata* subsp. *cruenta* (Müll.) Vermln. (= *Orchis cruenta* Müll.) was added to the Irish flora in the year of the 9th I. P. E.; it has proved to have a limited distribution in the neighbourhood of calcareous lakes in Mayo, Galway, and Clare, but it is still unknown from Gt. Britain. The identity of Pugsley's «*Orchis traunsteinerioides*» with *Dactylorchis traunsteineri* (Saut.) Vermln. has been demonstrated and further data on its distribution obtained. A number of localities in England and Wales is now known for the species which seems to have a remarkably widespread but scattered distribution, due possibly to its requirement for a somewhat specialised type of fen habitat. It is interesting that it is often associated with a group of relict species, including occasionally the moss *Camptothecium nitens* formerly thought to be extinct in Ireland. It seems probable that the association of which all form a part was formerly much more common in Ireland before the extensive elimination of fen by the growth of ombrogenous bog.

Detailed studies, which are continuing, have also been made on the distribution and reproduction biology of the Irish Nymphaeaceae, included in part of a broader survey of the family in the British Isles as a whole (Y. HESLOP-HARRISON 1955 a, b). *Nymphaea occidentalis* (Osten.) Moss, segregated as a result of observations made on the 1st I. P. E. in 1909, has proved to be based upon small-flowered individuals in isolated colonies otherwise referable to *N. alba*.

Among other such studies reference can be made to BAKER's (1954) notes on the *Limonium binervosum* complex in W. and N. Ireland (but see also the note by WEBB, 1956 b) and those of BOATMAN (1956) on the status of *Mercurialis perennis* in Ireland.

(B). The interesting Lusitanian and American elements in the Irish flora have naturally continued to attract attention. WEBB (1954 a) has given some comments on the autecology and distribution of the four interesting Irish heaths — *Erica vagans*, the enigmatical *E. stuartii*, *E. Meditteranea*, and *E. mackaiana*. Reasons are given for not accepting, at least till further investigations have been made, the hybrid nature of *E. stuartii*, and also for considering *E. vagans*, on the basis of its habitat, as a native, probably relict, species. Many additional observations on local distribution and habitat are given for *E. meditteranea* while *E. mackaiana* is the subject of a further special study (WEBB, 1955 a). This has helped to establish its taxonomic status, to explain its relation to other species and to account for the fact that it is sterile in Ireland though fertile in Spain.

SEALY and WEBB (1950) have summarized available knowledge of the distribution and biology of *Arbutus Unedo* in Ireland.

HESLOP-HARRISON and his school have also maintained their interest in the classical phytogeographical problems of Ireland. Attention has been focussed on the N. American and Lusitanian elements as the Forbes-Darwin view of the arctic-alpine elements being essentially a relict of the late-glacial flora has been confirmed by palynological research to a degree which practically precludes further argument. STAPP's view of the Lusitanian plants of the Irish flora as merely extreme examples of a general «southern» element has been simplified (HESLOP-HARRISON, 1953 a) and the case argued that this element is simply the remains of the group of plants which affected a rapid entry into Ireland from Lusitanian refuges, during the first period of the post-glacial climatic improvement, along a coastal migration tract more continuous than that of today because of the lower sea-levels of the period. Detailed local distributional studies have been made upon some of the Lusitanian Ericaceae in Ireland (GAY, 1957) and work on the autecology and reproductive biology of *Pinguicula grandiflora* and *P. lusitanica* is in progress.

The possibility that the Irish — N. American plants, mostly aquatic or lake margin species, are post-glacial immigrants, bird-transported from Canada via Greenland, has been put forward (HESLOP-HARRISON, 1953 a). The Greenland White-fronted Goose, which breeds in Greenland and winters mostly in Ireland, is suggested as a possible carrier. In view however of the occurrence of *Eriocaulon* in interglacial deposits recently described from Ireland (vide under Section 3) this suggestion may need revision. However *Spiranthes romanzoffiana* is one



of the crucial members of the Irish. — N. American group and current studies on its pollination and fertility may shed light upon a number of curious features in its Irish distribution.

(C). Apart from these more specialized studies there have been recorded, since the I. P. E. of 1949, a number of plants new to Ireland as well as some interesting extensions of range, within the country, of plants of local or limited distribution. In this connection attention should be drawn to a recent check-list by WEBB (1952 a). This list, *Irish Plant Records*, is an attempt to correct and supplement to date the information given in Druce's well-known *Comital Flora of the British Isles* on the distribution of the vascular plants in Ireland. It embodies (a) those data given by PRAEGER in *The Botanist in Ireland* (1934) which were additional to those in his *Irish Topographical Botany* (1906), (b) data given in two further supplements published in 1939 and 1946, and (c) records which appeared in print subsequent to the latter date. Plants in this check-list are not included here.

### *Plants new to Ireland*

*Hypericum canadense* L., an addition to the American element, has been reported from the shores of Lough Mask in W. Ireland (WEBB, 1957 a). Not recorded from Britain it is however known for two stations in Europe.

*Pedicularis sylvatica* subsp. *hibernica*, first recorded by WEBB (1954 b) and later more fully described (WEBB 1956 a), occurs locally along the whole West of Ireland from W. Cork to W. Donegal, with outlying stations in the bogs and moorlands of Clare, Sligo and Fermanagh. In Britain it has been recorded only in a single locality in the Outer Hebrides.

*Scheuchzeria palustris* L., now in Britain only in Rannock Moor in Scotland, has been recorded (MOORE 1952) occurring very locally in a raised bog in Co. Offaly.

*Epipactis phyllanthos* G. E. Smith. This critical autogamous orchid, whose presence in the dunes of Co. Wicklow in E. Ireland had been suspected for some time, has been definitely recorded there (WEBB 1953; cf. SIPKES 1954) and also recently (MOON 1958) from Co. Derry.

*Epilobium linnaeoides* Hook. f., naturalized on roadside banks at Leenane, Co. Galway (GORDON, 1954), is a New Zealand alien of some interest in view of the sensationally successful naturalization of the closely related *E. pedunculare* Cunn. which now covers large areas in the Kerry mountains and is frequent elsewhere.

Two other points might be referred to in this connection. The status of *Gymnadenia conopsea* (L.) R. Br. var. *densiflora* (Wahl.) Reichb. as

a distinct taxon is uncertain but pending a decision it is claimed (MEIKLE, 1950) to be relatively widespread in Ireland. Again, WEBB, in his recent check-list (1952 a) says of *Carex flava* L. agg. that «the Irish records are still confused and incomplete». More recently DAVIES (1953) has attempted a partial analysis of this complex and records, among other data, the definite occurrence of *C. serotina* Mérat in two Irish vice-counties. The occurrence in Britain of two forms of *C. lepidocarpa* Tausch is also claimed, one of which, *C. lepidocarpa* Tausch subsp. *lepidocarpa* is recorded for five Irish vice-counties.

As there are still areas in Ireland which have not been intensely examined further additions to the flora are to be expected.

### *Extensions of range*

Minor extensions of range and new vice-county records are regularly being listed for many plants but here only the more interesting extensions are noted.

*Ramischia secunda* (L.) Garcke, previously known only from three northern counties, has been recorded (MOORE, 1954 a) for the same mid-land bog in Co. Offaly in which *Scheuchzeria* was found.

*Sium latifolium*, hitherto only known from the basins of the Shannon and the Erne, occurs (WEBB 1956 c) well to the S. E. on the River Boyne near Bective, Co. Meath.

*Limosella aquatica*, hitherto only known locally in Clare and Sth. Galway, occurs in quantity (CARROTHERS et alia 1958) much further to the N. E. in Co. Fermanagh.

*Epilobium roseum*, essentially a N. E. plant, has been found (WEBB 1958) on railway sidings and waste ground in Co. Limerick (probably transported by human agency).

*Neotinea intacta* and *Sesleria caerulea*, two characteristic western species, are now known to occur (WEBB 1957 d) some considerable distance eastward of their known range.

*Trichomanes speciosum* Willd. has been found (KERTLAND 1952) in Co. Antrim in the extreme N. E. of the country.

*Rumex maritimus*, a very rare and sporadic plant in Ireland has been recorded (WEBB 1955 c) from Co. Roscommon. This represents a wide range extension but the record has another special interest. The plant appeared in reasonable quantity on land exposed by the lowering of the level of a lake (L. Gara). This is thus quite a new recent station for the plant demonstrating its remarkable power of appearing from seed which has been long dormant (even for centuries?).

*Dryopteris borrieri* Newm. The distribution in Ireland of this recently established taxon has been (PUGH 1953) at least partially mapped.

### *Extensions of habitat*

Some cases have been recorded of plants, normally associated with rather restricted habitats, occurring in habitats apparently very different.

Thus *Eriophorum latifolium* has been found (WEBB 1950 d) at the estuary of the Boyne well established on a brackish marsh. *Cochlearia danica* occurs (WEBB, 1957 e) on old roof tops at Macroom, Co. Cork, more than 20 miles from the sea. *Rumex acetosella* has been found (WEBB, 1957 e) at Louth, and apparently thriving, on a bridge built of limestone and ordinary mortar, a most unexpected location. Even more unexpected is the occurrence of *Orchis morio*, not in the grassy turf of calcareous gravels, but on the blanket bog of W. Connemara (WEBB 1957 c).

Such occurrences, which might indeed prove to be relatively common if actively sought for, raise obvious problems which demand in each case investigation of a rigid experimental nature. Unfortunately at the moment little more can be done than to keep such localities under careful observation.

(D). Finally a few general references seem worth inclusion.

An new county Flora, that of Co. Wicklow, has been published (BRUNKER, 1950, 1955) and a revision of Colgan's Flora of Co. Dublin, first published in 1904, is well advanced.

A new survey of Irish vegetation has been given by WEBB (1957 b). As this was written in connection with the meeting in Dublin in 1957 of the British Association for the Advancement of Science it is essentially a comparison of the flora of Ireland with that of Britain for British botanists, perhaps visiting Ireland for the first time, but it makes an interesting supplement to the more general survey of the Irish Flora given by him in the account of the I. P. E. of 1949 (WEBB 1952 b).

The Botanical Society of the British Isles, having initiated a scheme for an atlas of distribution maps for all species of the British Flora, HESLOP-HARRISON and WEBB have undertaken the organization of the extension of the scheme to Ireland and considerable advance has already been made. As the grid established for maps in Britain could not be directly extended to cover all Ireland a special Irish grid has been suggested by WEBB (1955 b).

## 2. PHYTOSOCIOLOGY

HESLOP-HARRISON (1951) in an article on Irish vegetational problems refers to the question of the classification of Irish plant communities.

While necessarily recognising the importance of the analyses made of plant communities on the continent, and the classifications there established, he points out, in view of the special nature of the Irish climate and the probable history of its flora, that these classifications cannot be rigidly applied to Ireland. It would appear that Irish botanists may have to develop their own scheme of phytosociological classification against a background of the continental systems but Irish work has not yet advanced to a stage that would permit generalizations to be attempted.

At any rate, among recent studies, Irish bogs, as is to be expected, have received most attention. BOATMAN (1957) has made a short comparative study of certain limited areas of two different types of blanket bog in the Galway-Mayo peninsula of W. Ireland. Attention is given not only to the constituents of the communities but also to edaphic conditions including estimations of pH, exchangeable mineral content and total exchange capacity from various depths. The reasons for the abundance of *Schoenus nigricans* in certain parts of these areas are discussed as well as the general problem of the distribution of the plant in its British areas.

An early landmark in Irish ecology was the paper by PETHYBRIDGE and PRAEGER in 1905 on the vegetation of the hill country south of Dublin. MOORE (1958) has resurveyed this area from the points of view of (a) changes, after 50 years, in the relative areas occupied by the respective communities or in their constitution and (b) analyses of these mountain bog areas in the light of 50 years of ecological research. In general, with the exception of the *Rhacomitrium*-community, remarkably little change in area or constitution seems to have occurred. The analyses of the communities, following with some modification methods of the type advocated by POORE, now permit however some ten *noda* to be recognized, the old *Callunetum* for instance showing at least four distinct *noda*. The problem of seral climaxes is also discussed. Mention should also be made, although its immediate application to ecological analysis is not yet clear, of MOORE's (1954 b) other observations on the occurrence, frequency and distribution with depth of the fungi in the peat in a number of sites in the same blanket bog district, a type of work new to Ireland. MOORE (1955) has also reported on those areas of which *Scheuchzeria* is a constituent in the raised bog, Pollagh Bog, in Co. Offaly. The site shows many differences from the only British station at Rannock Moor in Scotland, and much of the area, in which the principal *Sphagnum* is *S. cuspidatum*, is claimed to show a distinctly continental rather than a British facies. MOORE (1956) also suggests that the small sub-community of which *Ramischia rotunda* is a constituent on the same bog is possibly unique in the British Isles and

is again continental in nature. A much wider survey of the central raised bogs is still in progress.

An interesting regeneration complex dominated by *Sphagnum imbricatum* has been identified in an intact raised bog in Co. Tyrone (MORRISON, 1958). The complex occurs only under very wet surface conditions. As *S. imbricatum* is so prevalent in the sub-fossil state in many Irish raised bogs it is possible that such a *S. imbricatum* regeneration complex should be assigned a definite position in the natural succession of raised bog communities preceding the less well developed complex dominated by sphagna of the Acutifolia Group (KING and MORRISON, 1956). If so this Tyrone bog would be an interesting relict stage maintained over a long period due to special conditions.

General survey work is also in progress in the north of Ireland on peatland vegetation connected with afforestation projects. Using, like MOORE, the phytosociological methods of POORE *noda* can be recognized which exhibit remarkably constant physiognomy. Preliminary analyses strongly suggest that they occur on peat of characteristic nutrient status.

It might appear therefore, with a continuance of such work, that the near future should be expected to provide a juster analysis of Irish bog and peat communities. Unfortunately the exploitation of Irish bogs is every year becoming more intense. Steps are being taken however to secure at least some representative areas of both raised and blanket bog as permanent nature reserves for scientific study.

Observations are available on areas other than bog. The I. P. E. in 1949 paid a short visit to the Gearagh, an area of wet woodland on the Lee near Macroom, Co. Cork, an area which aroused some interest (BRAUN-BLANQUET and TUXEN, 1952, LUDI, 1952). As the area was due for complete flooding under a hydro-electric scheme a survey was made (O'REILLY 1955) which unfortunately could only be a very rapid one. The survey seemed to establish a definite correspondence with the continental «Auenwald» type so far undescribed for the British Isles. As the area is now under water the following points from the survey seem worth recording here. (1) At the Gearagh the *Osmunda - Salicetum atrocinerea* seemed to be rather the result of felling of the tree cover than a sequence in the *Blechno - Quercetum*. (2) The sub-ass. of *Allium ursinum* and the sub-ass. of *Deschampsia caespitosa* (in the *Corylo - Fraxinetum*), the latter only recorded from the Gearagh, are not as widespread as BRAUN-BLANQUET and TUXEN (1952) seem to suggest. This was particularly so for the sub-ass. of *Deschampsia* whose status thus remains doubtful. (3) the *Blechno - Quercetum* was probably originally widespread prior to recent marked human interference which included felling and some grazing. The loss of so interesting an area is to be regretted.



O'REILLY and PANTIN (1957) have also initiated work on Irish salt marshes, a type of community which had been singularly neglected in Ireland. A comprehensive account of such communities in Co. Dublin has been given. Even in so restricted an area at least two marsh types could be distinguished, one apparently corresponding, at least in general features, with marshes described for E. England, the other apparently undescribed for the British Isles. The dominance of *Halimione portulacoides* var. *latifolia* in one and its almost complete absence from the other being one of the most obvious features of difference, special attention is given to its autecology. Edaphic factors, soil profiles, tidal factors such as the duration of immersion of the zones, as well as other habitat conditions are comparatively considered. No generalizations are yet possible till other marshes are similarly considered but data bearing on habitat have become available for the first time for any Irish salt marsh. Some of these data may perhaps help in the understanding of the broader problems of the nature of the salt marsh communities in these islands as a whole.

The annular colonies of *Triglochin maritimum*, within which the halosere is locally accelerated, have received recent attention by Y. and J. HESLOP-HARRISON (1958) who are also continuing studies on other saltmarsh phanerogams. A survey in progress of the diatom flora of certain north-eastern Irish salt marshes has revealed points of difference from corresponding floras in English salt marshes as well as notable sociological consistencies.

### 3. QUATERNARY AND GLACIAL

In 1949, the year of the 9th I. P. E. in Ireland, JESSEN's important paper «Studies in Late Quaternary Deposits and Flora History of Ireland» appeared. This paper was an important milestone on the road to the elucidation of the history of the Irish Flora.

This history has now been carried back to the middle of the Pleistocene and two studies of the vegetation of the Mindel-Riss interglacial are in the press. JESSEN, ANDERSON and FARRINGTON (1958) have described the deposit at Gort, Co. Galway and WATTS (1958) that at Kilbeg, Co. Waterford. The Gort deposit showed cold conditions at the base and the Kilbeg deposit cold conditions at the top. Among the plants recorded are *Abies*, *Buxus*, *Fagus*, *Picea* and *Rhododendron* together with *Azolla filiculoides*, *Daboecia*, *Erica scoparia* var. *macrosperma*, probably also *E. mackaiana*, and *Eriocaulon*. It will be noted that the Lusitanian and N. American elements of the modern Irish flora are represented. The general climatic picture is that of Ireland today. There



is however no further information concerning the Riss-Würm interglacial nor of the retreat of the ice of the last glaciation until the Alleröd stage is reached.

MITCHELL (1951, 1953, 1954, 1956, 1958) has continued his well-known series of quaternary studies applying, in his most recent paper (1958), radiocarbon dating to pollen zones and late glacial deposits. A mud of the Alleröd stage, for example, has been dated to  $9360 \pm 720$  B. C. He has also demonstrated (1954) that in late glacial time (Zones I—III) Ireland had many plants of southern affinities in addition to the striking arctic-alpine elements. The southern list includes: *Acinos arvensis*, *Artemisia* sp., *Callitriche stagnalis*, *Clinopodium vulgare*, *Eleocharis multicaulis*, *Erica tetralix*, *Helianthemum canum*, *Littorella uniflora*, *Lycopus europaeus*, *Mentha* sp., *Nasturtium microphyllum*, *Potamogeton crispus*, *P. friesii*, *P. pectinatus*, *Ranunculus lingua*, *Salix repens*, *Sparganium ramosum* subsp. *neglectum*, and *Zannichellia palustris* var. *pedunculata*.

MITCHELL's results and views on post-glacial events may be briefly summarized as follows. The post-glacial period opens with a short phase of grassland with herbaceous plants (Sub-zone IV a) which is then overgrown by *Salix* and *Betula* copses (Sub-zone IV b). The entry of *Corylus* quickly follows and in early Boreal time (Zone V) the calcareous regions of Ireland must have been covered by a uniform sheet of *Corylus* thicket. *Ulmus*, *Quercus* and *Pinus* appear in later Boreal time (Zone VI) and at the end of this period *Pinus* was commoner and *Ulmus* relatively rarer. The first Mesolithic settlement, dated by radiocarbon to 5725 B. C., occurs just before the end of this zone.

There was undoubtedly a small population of *Alnus* in Ireland in Boreal time and this population suddenly expanded at the beginning of Atlantic time (Zone VII). At this period sea-level and lake-levels were rising and conditions presumably became more favourable for *Alnus*. The next feature is a characteristic «landnam» phase of Neolithic forest clearance, with a sharp and temporary reduction in *Ulmus*, a rise in *Corylus* and the appearance of *Plantago lanceolata*. This can be seen in outline in many of MITCHELL's diagrams and has been shown by SMITH (1958) in further detail. The process of Neolithic forest clearance in Ireland must have been very similar to that studied by IVERSEN in Denmark. The clearance has not yet been dated in Ireland but probably started about 3000 B. C. when similar clearance was going on in Holland and England. Zone VII comes to an end at the first appearance of forest clearance.

In the Blytt-Sernander scheme «Sub-Boreal» time then follows. This is supposed to have been a dry period but there is no evidence of dryness in Ireland at this time. Indeed this was a time when fens and bogs

were expanding laterally and overwhelming the surrounding forests, of which, incidentally, *Taxus* seems to have been an important constituent. There probably was some fluctuation in climate because the upper part of the raised bogs do show layers of ombrogenous peat varying in humification but these cannot be traced consistently from bog to bog.

For dating purposes MITCHELL (1956) has set up a long Zone VIII which runs from the first diminution of *Ulmus* about 3000 B. C. to the almost complete elimination of this tree at about 500 A. D. He suggests that this virtual elimination is due to more intensive agricultural practices introduced by Christian missionaries. The zone is divided into two sub-zones, Sub-zone VIII a, in which *Quercus* is rising to a maximum and Sub-zone VIII b in which *Quercus* becomes much less prominent. Radiocarbon dating indicates an age of 1500 B. C. for the maximum of *Quercus* at which the division is made, a date lying in the Middle Bronze Age.

In Bronze Age and Iron Age times after 1500 B. C. the Irish woodlands were reduced in extent and altered in composition by human activity and it is difficult to trace any coherent pattern in the pollen diagrams. One raised bog shows a retardation-layer with stumps of *Pinus* and radiocarbon dating of the *Pinus* gave an age of 365 A. D. In the associated pollen-diagrams the stump lay a short distance below the marked *Ulmus* fall that ends Zone VIII and it is this stump that dates the end of the zone to about 500 A. D. Woodland clearance continued in Ireland and was further accelerated in the 16th and 17th centuries. Organized tree planting probably started about 1700 A. D., and in raised bogs which have continued to grow to the present day pollen of *Pinus* and *Fagus* can be found in the topmost layers. Zone IX covers the period from 500 A. D. to 1700 A. D. and Zone X the period from 1700 A. D. to the present time.

A school of quaternary studies has recently been initiated in connection with HESLOP-HARRISON's Department at Queen's University, Belfast from which came the paper by SMITH (1958), referred to above, on the bog in Co. Derry. Two sites with deposits referable to the late-glacial period have recently been located in N. E. Ireland. These also show a dominance of herb pollen, indicating a relatively treeless landscape, and a feature of interest is the expansion of *Juniperus* before the closing of the early post-glacial birch forest period.

MITCHELL and his co-workers have continued their interest in pre-Pleistocene floras and WATTS (1957) has published a short note showing that a pipe-clay in Co. Tipperary must be of early Tertiary Age. Work on the Lough Neagh clays has started. The claim of JOHNSON (1951) that a *Sphagnum* occurred in these clays at a pre-Miocene level

gives an obvious special interest to their examination but emphasizes the necessity of a critical determination of their age.

It should finally be mentioned that the British Ecological Society are sponsoring a far-reaching investigation of the famous Burren region of Co. Clare. This investigation, which will be spread over a number of years and has already begun with an examination of certain fen deposits, will include not only palynological studies but also the phytosociology and the general floristic revision of the area.

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