

**THE LIMONIUM BINERVOSUM COMPLEX IN WESTERN AND
NORTHERN IRELAND**

By H. G. BAKER
(University of Leeds)

It is quite clear that *Limonium binervosum* (G. E. Sm.) C. E. Salmon, *L. recurvum* C. E. Salmon, *L. transwallianum* Pugsley and *L. paradoxum* Pugsley are all members of an apomictic complex (Baker, 1950, 1953, etc.). It is also quite certain that the conventional classificatory treatment accorded to sexual species cannot be applied satisfactorily to this complex. An attempt is being made to classify these taxa and also the populations which do not fall neatly into them. In this attempt the results from a cytogenetic survey of natural populations are being used as an adjunct to morphological studies. This work is not nearly complete but it may be stated, already, that there is no evidence to support the belief of Pugsley (1924, 1930, 1931) that the populations ascribed to *L. recurvum*, *L. transwallianum* and *L. paradoxum* are more than local derivations from *L. binervosum*. They agree with *L. binervosum* in pollen and stigma type (Baker, 1950, 1953) and in each of the type-localities (Portland for *L. recurvum*; Giltar Point, Pembrokeshire, for *L. transwallianum*; St. David's, Pembrokeshire, for *L. paradoxum*), evidence can be found to support the belief that they have arisen locally (probably fairly recently) from *L. binervosum*, which accompanies them in each case. Consequently, it is reasonable to consider them together as members of a single complex.

A certain coastal population in Co. Clare has been claimed by Pugsley (1930) to contain *L. transwallianum*, while he also believed (Pugsley, 1931) that a population at Malin Head represented a northern Irish occurrence of *L. paradoxum*. However, an inspection of the literature has revealed considerable confusion about the history of this complex in western and northern Ireland. Alleged endemic species are fair game for speculations on the history of the British flora and it is important that this confusion should be removed. In presenting this brief historical survey it will be possible to consider whether or not the *L. binervosum* complex is relict or spreading in this region. The implication hitherto (Pugsley, 1924, 1931; Wilmott, *in litt.*) has been that the known populations are relics from a much earlier period which may have been inter-glacial or even pre-glacial.

The oldest Irish reference that I have seen to a *Limonium* which might have belonged to this complex is that given by Smith (1756) who refers to "*Limonium* Ger." occurring "Along the

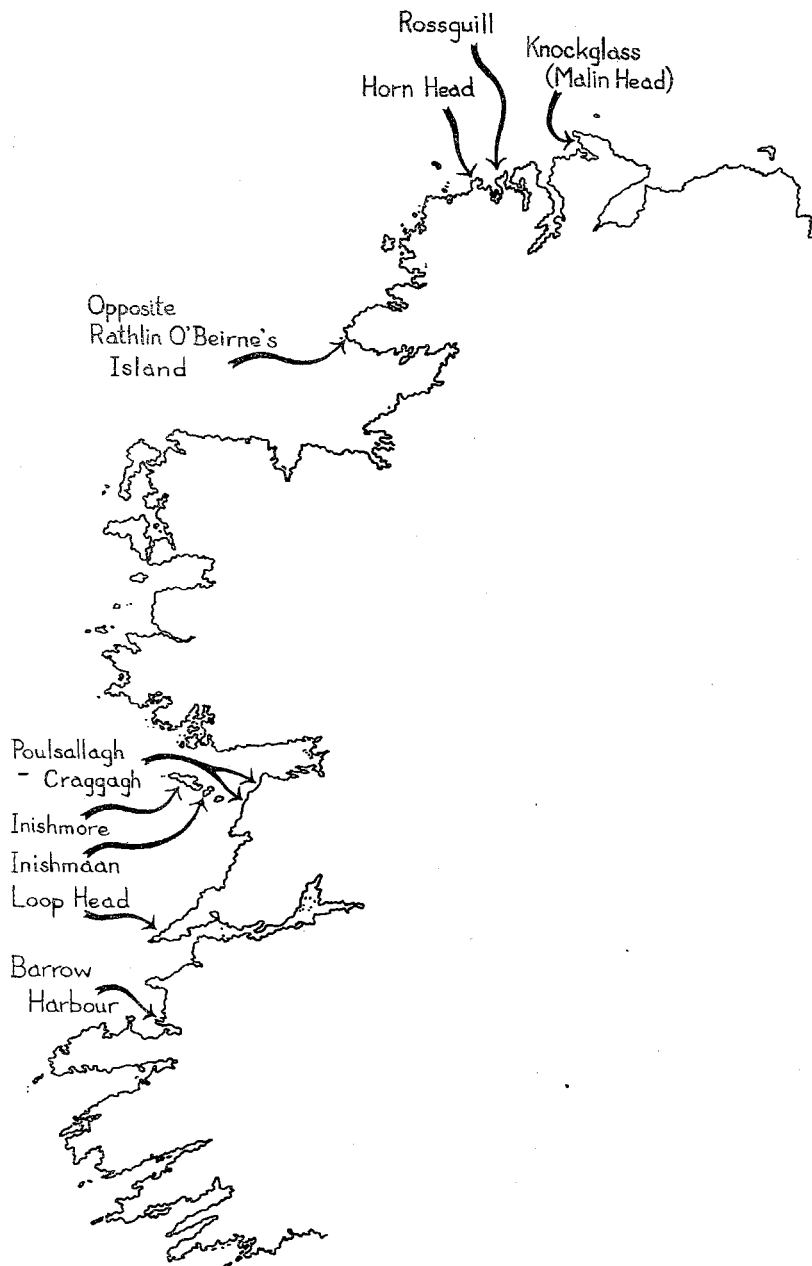


Fig. 1. The known stations for the *Limonium binervosum* complex in western and northern Ireland.

sea-coast in Iveragh" (a district of Co. Kerry). Scully (1916), in his Flora of that county is inclined to consider that this refers to *Limonium humile* Mill., but even that species has not been seen in recent years from the Iveragh district. Nevertheless, this may be the basis for the statement by Mackay (1836) in the *Flora Hibernica* that *L. binervosum* (as *Statice spathulata* Desf.) occurs in "many places on the Kerry coast."

The oldest Irish specimen of this complex that I have seen was collected in 1829 on Howth Hill (Co. Dublin) and rests in the Walker-Arnott herbarium (now incorporated in the herbarium of the Royal Botanic Garden, Edinburgh). In the *Flora Hibernica* (Mackay, 1836) it is recorded from four localities in Co. Dublin as well as from the Kerry coast as mentioned above. Specimens continued to be collected and referred to and there is a (misleading) taxonomic note by Babington (1854) on a Waterford collection. Moore and More (1866) give a larger number of vice-comital records but it is only with those referring to western and northern Ireland that we are now concerned.

In their *Contributions towards a Cybele Hibernica*, these authors repeat Mackay's (1836) statement of occurrence in Kerry and then give two stations for County Clare (with the Aran Isles). They also cite two stations for Donegal. The occurrences of the complex in these three areas are worthy of separate analysis, beginning with the most southerly.

NORTH KERRY (v.c. H.2).

The first certain North Kerry record was made by Scully (1888): "In some plenty on rocks at both sides of the entrance to Barrow Harbour, over a limited area, and on an adjoining old tower on the east side" (see Fig. 1 for all known populations in western Ireland). *L. binervosum* was seen here again by Scully in 1902 and he repeats the record in his Flora of the county (Scully, 1916). I visited this locality in 1948 and found strong plants growing in cracks between rocks and on the rather grassy old limestone walls. Rebuilding of the walls has undoubtedly reduced the numbers of plants at this station.

During 1952, members of the B.S.B.I. visited this region and collected plants from the low limestone cliffs below a round tower which must be the one referred to by Scully. In addition they found a large colony at Banna Strand, about a mile or so from the previous station. This colony appeared to be increasing in size and was growing on muddy sand which was not yet fully stabilised. This is an unusual ecological situation for this species, nevertheless the specimens are truly referable to *L. binervosum*. Mr. O. Buckle has grown a specimen from the Banna Strand population in his garden and is satisfied that it is true *L. binervosum*.

Opinions have been expressed that these plants should be referred to *L. recurvum* C. E. Salmon. However, I do not think that the spikes of these plants can be described as "arcuately recurved" (most material from the western shores of the British Isles shows a greater recurving of the spikes than south-eastern British plants); they are not remarkably dense-flowered and stout; they are not particularly congested at the ends of the branches and scape and the characteristic formation of the spikes into a cross at the tip of scape is not seen. The spikelets are not arranged with the same remarkable regularity that they show in material from Portland and they are not "so compressed that (the) outer bracts of (the) same row are distinctly imbricate" (Salmon, 1903). The bract sizes do not agree with those of true *L. recurvum* and the colour of the bracteoles is different. The scapes of the Kerry plants are not remarkably stout and they disagree with Portland plants in tapering from the base upwards rather than in the reverse direction. On the other hand, it must be agreed that, in leaf shape and the asperity of the scape, there is relatively close agreement. Nevertheless, in the last character, *L. binervosum* itself shows considerable variation between populations in the British Isles.

Thus, although individual plants may approach *L. recurvum* in some characters, I do not believe that the populations as a whole show these characters in the striking manner of the Portland plants and I do not believe that their ancestry shows any direct connection with that of the Portland population. I think that the not unaggressive North Kerry populations are best referred to *L. binervosum*, at least until cytological determinations have been made.

CLARE (v.c. H.9).

Farther north, across the estuary of the River Shannon, at the extreme south-west tip of Co. Clare, is the peninsula which terminates in Loop Head. The first record of *L. binervosum* from here is by Praeger (1909, *a, b*) who records that it is to be found on the steep cliffs between Kilkee and Loop Head itself. Although I have not seen any material from this region, the descriptions of the local ecology and the associated species given by Praeger raise no doubts as to the correctness of the species-identification. He says that "On spray-swept stony slopes, *Suaeda maritima* grows 100 feet above the sea, with the three *Spergularias*, *Statice occidentalis* and *Cochlearia danica*". Nevertheless, an earlier survey of the area published by Stewart (1890) does not include *L. binervosum*.

This vice-county includes the Aran Isles and the first record of this complex from them is by C. Moore (Moore & More, 1866): "On the west side of Great Aran Island." Hart (1875) expanded this by stating that '*Statice occidentalis*' is found along the cliffs

between Dun Aengus and Bungowla; abundant at the western extremity of the Great Island". All of these statements refer to the island best known as Inishmore. There is no further mention of the species in the reports of Nowers and Wells (1892), Colgan (1893) or Praeger (1895) but the last-named author repeats the record in "Irish Topographical Botany" (Praeger, 1901) and later (Praeger, 1909 *a*) adds the island of Inishmaan.

On the mainland opposite the Aran Isles there is a very famous population of this complex. Probably no other population has suffered so much confusion. The first record seems to be that by Moore & More (1866): "On rocks by the road-side south of Black Head, Clare". These authors performed what must have been one of the very first experiments in "genecology" for they remark that the form found in the Aran Isles and in the Clare population "differs remarkably in appearance from the ordinary state of the species as found along the east coast, being only about half the size with a less branched panicle, and it does not survive the ordinary winter at Glasnevin when planted in the open ground". They were not only the first botanists to record these populations but were more observant than some succeeding authors who noticed no difference between plants from Co. Clare and those from other parts of the British Isles.

Hart (1875, p. 16) also refers to the occurrence of this species "at Poulsallagh, on the opposite coast (from Aran) of Clare". This is the first exact location of this famous population. Praeger (1901) presumably was not unaware of it and says that the species was 'local' in the 'Burran' (sic!). He also records it from Fanore on the authority of a collection in 1900 by Miss Knowles. Collections in the west of Ireland dating from this period are not always very accurately localised but Fanore School is $5\frac{1}{2}$ miles north of Poulsallagh. Praeger (1909 *a*, p. 116) mentions that '*Statice occidentalis*' was "local in (the) Burren" apart from recording 'var. *intermedia* Syme' from "near Poulsallagh". The Poulsallagh population was probably ascribed to this variety because of the determination by Arthur Bennett of specimens collected there by P. B. O'Kelly in 1891 and 1892. O'Kelly described the locality as "Ballyryan, near Poulsallagh". Actually the specimens are no closer to (or farther from) *intermedium* than any other of the western Irish plants. Praeger's belief in the heterogeneity of the northern Clare plants is maintained in *The Botanist in Ireland* (Praeger, 1934) where, on p. 350, he refers to the occurrence of both *L. binervosum* and *L. transwallianum** in the Burren. In his census list (p. 517), *L. binervosum* is recorded from v.c. H.9 as well as *L. transwallianum*.

Nevertheless, other authors appear to have been unaware of variation. It was in 1930 that Pugsley claimed that his species

*By a curious slip, Praeger (1934, p. 133) refers to *transwallianum* and *paradoxum* as segregates of *L. humile* Mill.!

L. transwallianum (which had been described in 1924) was to be found in Co. Clare (although A. J. Wilmott had wanted to give this name to some specimens in 1925). Pugsley (1930) gave the locality as Ballyvaughan and based his determination on living material grown by T. J. Foggitt at Thirsk, in Yorkshire. According to the label of a herbarium sheet (now in Herb. Mus. Brit.) containing a collection made by Mr. Foggitt at this locality, the material must have been in cultivation for 32 years before being seen by Pugsley. During this time it had preserved its diagnostic characters.

Wilmott (1930) stated that his material was gathered farther south at Poulsallagh and dismissed Ballyvaughan as a possible station "as there is no suitable ground for the plant at that place" and he was no more inclined to accept Foggitt's alternative labelling (on his herbarium sheet) of "Black Head, Ballyvaughan". Wilmott (l.c., p. 347) then makes a most remarkable statement: "When Mr. Francis Druce and I collected there in 1925, Mr. P. B. O'Kelly, who showed us the plant, said that it was the only locality for *L. binervosum* in the west of Ireland. Evidently, therefore, all the records refer to the one place, which was a small cleft in a rather isolated low rock-cliff at a considerable distance from both the Black Head and Ballyvaughan". It is surprising that O'Kelly should have said this and amazing that Wilmott should have accepted it! Apparently, both were quite unaware of the long-standing records from Barrow Harbour, Loop Head and the Aran Isles, apart from those from farther north.

Nevertheless, it is reasonable to trust Mr. O'Kelly's judgment as far as the more restricted area of the Burren is concerned. There can be no doubt that his knowledge of this fascinating region, in which he spent his life, was extraordinarily detailed. As the coastline of the Burren is easy of access, he must have covered it thoroughly and it is very likely that when he demonstrated the plants in 1925, the "small cleft in a rather isolated low rock-cliff" represented the extent of the distribution of the *L. binervosum*-complex in the Burren. O'Kelly died in 1931.

When I visited this region in 1948, I was assisted in searching suitable localities by my wife and by members of the South Wilts. Speleological Society (who were investigating the caverns of Poulnagollom in Slieve Elva). There was no difficulty in locating the Poulsallagh station, although the number of plants appeared to have increased considerably since 1925, for the population consisted of two relatively compact colonies about 80 yards apart, each containing at least 50 mature plants. Seedlings were frequent and occasional plants connected the colonies. It seemed that the grassiness of the cliffs away from the sites already occupied might be restricting the expansion of the population.

Although the plants showed the narrow petals of *L. transwallianum* and many of them possessed narrow leaves without

discernible petioles, there was considerable variation in leaf-shape, some plants possessing quite broad, spathulate leaves. Plants brought back to Leeds and cultivated there have retained their distinguishing characters.

On July 25th, 1948, Miss Brenda Sugden discovered plants of this complex on the rocks of the headland opposite Craggagh, about $4\frac{1}{2}$ miles farther north than the Poulsallagh population. Subsequently, other plants were seen between these stations, and collections were made. There can be no doubt that the *L. binervosum*-complex is spreading on the coast of the Burren.

Apart from those collections already cited, there are a few others made since 1925. P. B. O'Kelly is distressingly vague in the labelling of his 1931 collection, but in 1935 H. S. Redgrove labelled a specimen (now at Kew) as being from "Fanore" which may represent a similar population to that found by Miss Sugden (or even the same one). In June 1952, Miss B. M. C. Morgan collected material, specimens from which are in the herbaria at Kew and the British Museum. The locations are extremely vague, the dates of collection are uncertain and the specimens are tiny and very immature. Again it has been suggested that these plants should be ascribed to *L. recurvum*, but there is less justification for this than with the Kerry plants. Pugsley's ascription of the Burren plants to *L. transwallianum* is much more satisfactory, but even this breaks down for the broad-leaved plants. A detailed cyto-taxonomic study of all the segregates of *L. binervosum* is being made and, until that is completed, these plants are best referred to the aggregate species, with a note of their morphological resemblance to *L. transwallianum*.

It is probable that if Pugsley had seen the wild population at Poulsallagh (rather than herbarium specimens) before naming it in 1930 he, too, would have hesitated before describing it as belonging to the same species as that at Giltar Point in Pembroke-shire. When he visited the locality in 1933 for the first time, he collected specimens (now at the British Museum) which even he hesitated to name *L. transwallianum*.

DONEGAL (v.c. H.34 and H.35).

The confusion which has clouded the occurrence of this complex in County Clare has also shadowed the only record from the northern part of the west coast. In v.c. H.35 (W. Donegal) there is a record by Hart (1885): "On rocks at the signal tower on the mainland abreast of Rathlin O'Beirne's Island, west of Slieve League". This record for the south-west of the county is repeated in the *Flora of Donegal* (Hart, 1898) and by Colgan and Scully (1898), but I have found no record of this important population ever being revisited, although it is referred to by Praeger (1934).

Passing to the north coast, but still within the bounds of v.c. H.35, there is a well-documented record. This is from "one

place only on the west side of Horn Head" and is attributed to Moore (Moore & More, 1866). The plants were seen again by Hart (1879), but although the record is repeated (Colgan & Scully, 1898; Praeger, 1901) there is no record of any subsequent visitor. Hart (1898), in his Flora of the county, gives greater precision to the record saying that the plant occurs "Near MacSwyne's Gun, Horn Head", and noting that Mr. Arthur Bennett had determined the plant as the variety *intermedia* of Syme. This would seem to indicate a resemblance to the western Irish populations already referred to and is an important point because plants from the next population, only about eight miles to the east, were determined (also by Mr. Bennett) as of the variety *occidentale* Syme and, therefore, showing a greater resemblance to Scottish and much eastern Irish material. It is highly desirable that some suitably situated botanist should revisit these Donegal populations.

This next population occurs "On the cliffs at Boyeagher Bay, Rossgull" (or Rossguill according to the *Times Survey Atlas*). This peninsula lies between Horn Head and Fanad Head. The record first appears almost simultaneously in Hart (1898) and Colgan & Scully (1898), and is variously attributed to one or more of the Misses Kinahan. There is a passing reference to this population in Praeger (1934) but I know of no other visitor to it.

The most famous Donegal population is across the vice-comital border in v.c. H.34 (E. Donegal) and was discovered by C. Moore (Moore & More, 1866). This has received attention because Pugsley (1931) claimed it for his new endemic species *L. paradoxum* (otherwise known only from St. David's in Pembrokeshire). Pugsley (1931, p. 44) refers to a single specimen in the herbarium of the British Museum collected in 1898 by Hart. This is now preserved as a paratype specimen. Pugsley (*loc. cit.*) believed that the population was "possibly a relic of an early Atlantic flora. . . Its occurrence on two headlands jutting out into the Atlantic, one the most westerly in Wales, the other the northernmost point of Ireland (Malin Head), indicates that it is an ancient survival and affords an interesting parallel to what is known of the more normal species *L. transwallianum* L."

These dogmatic words were written before Pugsley, himself, visited the Donegal coast with Mr. C. R. Nodder and collected *L. paradoxum* in 1937. There is no evidence that he was at any time aware of the existence of other Donegal populations.

Reference to Hart's account of "Botanical Excursions in Donegal" (Hart, 1899) gives us full details of his encounter with this population. He describes (*l.c.* p. 126) how he left the town of Malin and followed the coast, passing along mud flats to the sandy beach of the Back Strand. He continued along here until he reached the first rocky point below Knockglass. He then continued "along the base of these disintegrating rocks, some-

times of a black basaltic nature". "About a mile along the base of these cliffs there is a grand show of *Statice binervosa*. This is C. Moore's old record, "rocks of Dunargas". His herbarium sheet is labelled "between Knockglass and Caloort". He was still about four miles from Malin Head itself (which may explain why some later searchers for this species have failed to find it there). On p. 156 of the same paper, Hart repeats the record and observes that Mr. Bennett had referred his specimens to var. *intermedia* Syme and comments (not without truth) that *intermedia* "seems to be the commonest form in Ireland, as it is in nearly all western stations in England". C. E. Salmon has annotated the British Museum specimen: "*L. occidentale*, O.K. Abnormal growth; caused by stem being damaged". Pugsley's later specimens show that this is not true and the reduced and irregular development of the spikes is characteristic of the population through time.

This is not the place to discuss the significant differences between these specimens and those from Pugsley's type-locality at St. David's Head but it does not seem in the least likely that the populations have had a direct common origin. They are almost certainly of separate derivation from *L. binervosum* stock. However, there is some morphological resemblance between the Knockglass population and small plants of the well-known Mull of Galloway (Wigtown) form of *L. binervosum* (which was named *L. binervosum* var. *humile* (Gir.) by Salmon (1907). Similarly, there is considerable resemblance in leaf-shape and in the reduction of the foliar mucro between both of these populations and the western Irish ones. Geographically all these populations form a series, so that a common ancestor does not seem impossible.

In summary, one may say that there seems little likelihood that the discontinuous distribution of the *L. binervosum*-complex on the west coast of Ireland is due to the persistence of isolated populations from inter-glacial or even pre-glacial times. The *L. binervosum*-complex is generally distributed, in suitable habitats, around the coasts of England and Wales. It reaches no farther north than Lincolnshire on the east coast and the Mull of Galloway in extreme south-western Scotland. This does not suggest that any member of the complex is (or was) physiologically suited for survival in a nunatak. It seems quite reasonable to believe that this apomictic complex is a post-glacial immigrant into the British Isles. In such a case the relative abundance of *L. binervosum* on the east and south coasts compared with the west and north may be the result of longer tenancy. The present distribution of the complex on the west coast of Ireland is spotty but there is some evidence that the gaps may be slowly filling. Occasional seeds may be dispersed to a considerable distance from the parent population and, because of the apomictic nature of the plants, a single seed may be sufficient to start a new, seed-

reproducing colony in a fresh locality. Fruiting calyces of *L. binervosum* may be distributed by wind or by adhesion to the feathers of birds. Tests have shown that the seeds can withstand immersion in sea-water.

The following specimens, supporting the records and observations mentioned above, have been seen by the author. The locations and dates are given *in extenso* because of their importance in this instance.

NORTH KERRY (v.c. H.2)

- Herb. H. G. Baker.* Barrow Harbour; limestone rocks. July 14, 1948.
H. G. Baker.
- Herb. O. Buckle.* Banna Strand, near Ardfert. June 20, 1952.
O. Buckle.
- Herb. Kew.* Mud flats at Banna Strand, N. of Tralee. June 20, 1952.
Miss B. M. C. Morgan.
- Herb. Mus. Brit.* Low limestone cliffs below Round Tower at N. entrance to Barrow Harbour. Aug. 13, 1952. *A. P. Fanning.*
- Herb. Mus. Brit.* Same locality. Aug. 13, 1952. *Miss Muirhead, P. M. Newey and Mrs. B. Welch.*

CLARE, WITH ARAN ISLES (v.c. H.9)

- Herb. Kew; Herb. Mus. Brit.* Near Ballyryan. July 20, 1891.
P. B. O'Kelly.
- Herb. Mus. Brit.* (2 sheets); *Herb. Yorks Phil. Soc.; Herb. Univ. Sheffield.* Ballyryan, near Poulsallagh. Aug. 12, 1892. *P. B. O'Kelly.*
- Herb. Mus. Brit.* Rocks $\frac{1}{4}$ to $\frac{1}{2}$ mile from sea, Black Head, Ballyvaughan. July, 1898. *T. J. Foggitt.*
- Herb. Mus. Brit.* Limestone cliff facing sea, N. of Poulsallagh. June 18, 1925. *A. J. Wilmott.*
- Herb. Mus. Brit.* Inishmore, Aran Islands. Aug. 13-17, 1927. *C. St. G. Poole.*
- Herb. Kew.* The Burren. June 20, 1931. *P. B. O'Kelly.*
- Herb. Mus. Brit.* Rock face near Poulsallagh. May 18, 1933. *H. W. Pugsley and R. L. P(raeger).*
- Herb. Kew.* Fanore. Aug. 5, 1935. *H. S. Redgrove.*
- Herb. H. G. Baker.* Limestone headland, near Poulsallagh. July 21, 1948. *H. G. and I. Baker.*
- Herb. H. G. Baker.* Limestone rocks, opposite Craggagh. July 27, 1948. *Miss M. E. Bradshaw.*
- Herb. Kew* (as *recurvum*). Black Head, in limestone rock. c. June 24, 1952. *Miss B. M. C. Morgan.*
- Herb. Mus. Brit.* (as *recurvum*). On sheer limestone rocks, "Clare". June, 1952. *Miss B. M. C. Morgan.*

E. DONEGAL (v.c. H.34)

Herb. Mus. Brit. Paratype of *L. paradoxum*. Rocks between Knockglass and Calcoort. Malin Head. Aug. 1898. *H. C. Hart*.

Herb. Mus. Brit. Cliff near Malin Head. Aug. 14, 1937. *H. W. Pugsley* and *C. R. Nodder*.

Herb. Mus. Brit. Near Malin Head (Hart's locality). Aug. 19, 1937. *H. W. Pugsley*.

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