

THE IDENTIFICATION AND DISTRIBUTION OF THE BRITISH WATERCRESS SPECIES

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In the *Comital Flora of the British Isles* (Druce, 1932), Watercress (*Nasturtium officinale* R. Br., *sensu lato*) is recorded as occurring in every vice-county. This plant, which was formerly regarded as being a single species, is now known to be represented in Britain by two distinct species and their hybrid. In consequence, information regarding the British distribution has been rendered obsolete.

The two species were distinguished by Howard & Manton (1945) as *Nasturtium officinale* R. Br. [*sensu stricto*] and *Nasturtium uniseriatum* [sp. nov.] (cf. Hyde, 1948). Airy Shaw (1947) has given good reasons for claiming *Nasturtium microphyllum* as a prior specific name for the latter and has suggested that, pending definite evidence to the contrary, it should be known as *Nasturtium microphyllum* Boenningh. ex Reichenbach, *sensu* Boreau (1857). (See also Wilmott, 1948.)

IDENTIFICATION

The two species can be readily distinguished by their fruits and seeds (figures 1 and 2; see also figures in Howard & Manton (1946) and Howard (1947)). It is also interesting to note that f. 52 in Fitch & Smith (1944) is of *N. officinale*, while f. 81 in Hutchinson (1945) is of *N. microphyllum*. In both cases the plants can be readily identified from the details of the fruits and seeds which are given in the plates. The hybrid can be distinguished by its short pinched fruits which only set an occasional seed. Care, however, must be exercised in the identification of wild hybrid plants, as, under crowded or very wet conditions, poor development of fruits in *N. microphyllum* has been noted. The hybrid can also be recognised by the fact that it produces very little good pollen.

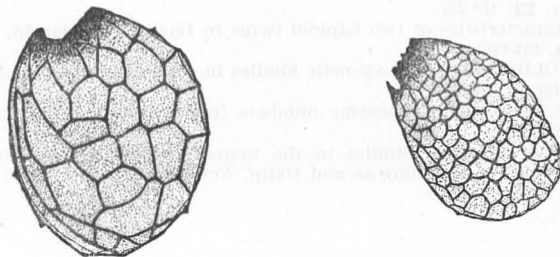


Fig. 2. Seeds of *N. officinale* (left) and *N. microphyllum* (right) ($\times 28$).

Unfortunately, apart from the use of stomatal indices (see Rowson, in Howard & Manton, 1946), it seems to be impossible as yet to distinguish between wild plants by any purely vegetative characters, ex-

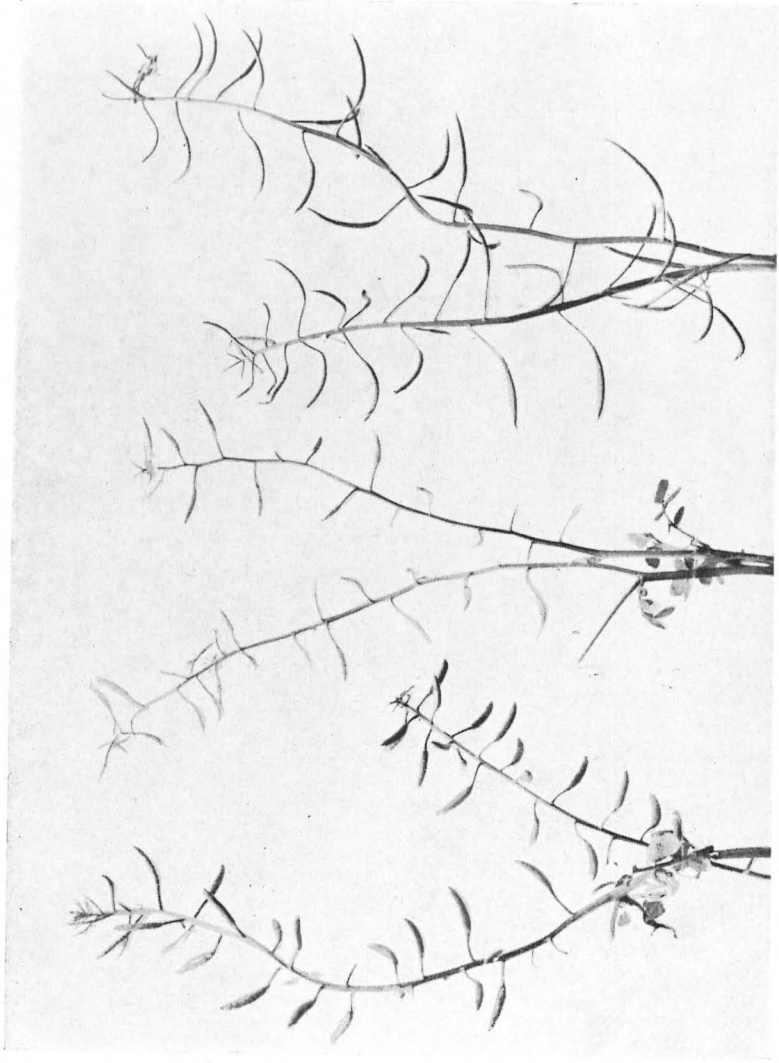


Fig. 1. Fruiting Branches of Watercress (\times approx. $\frac{1}{2}$). Left: *N. officinale*.
Centre: *N. microphyllum* \times *officinale*. Right: *N. microphyllum*.

cept in the winter when the foliage of *N. microphyllum* (and the hybrid) tends to turn a purplish-brown colour during cold spells.

Recently we have observed a flower character which appears to be useful in distinguishing the two species. In *N. officinale* the anthers have their pollen-bearing surfaces turned inwards (i.e. they are introrse), while in *N. microphyllum* the anthers of the long stamens have them turned outwards when ripe, so that the pollen-bearing surfaces face towards the short stamens (extrorse). It has not been found possible to employ this character in the determination of the hybrid, but it would appear that in this respect it tends to resemble *N. microphyllum* rather than *N. officinale*. Further observations are required to confirm this distinction.

Watercress is recognised as being a very plastic plant, a feature which has in the past led to much confusion. Thus, small stunted plants growing under relatively dry conditions have frequently been identified as "var. *microphyllum*." Many of the sheets which we have examined, labelled var. *microphyllum*, apparently on account of the small size of the leaflets, were found to be the species *N. microphyllum* as distinguished by the characters of the fruits and the reticulation and uniseriate arrangement of the seeds. Others, however, were clearly *N. officinale*, and some the hybrid *N. microphyllum* × *officinale*. The var. *siifolium* Reichb. is a variety of *N. officinale*, but identification based on leaf characters alone would also place specimens of *N. microphyllum* and the hybrid in this type. Several of the herbarium sheets labelled *N. officinale* var. *siifolium* were not in fact *N. officinale*. As yet, it cannot be definitely stated whether *siifolium* is a true genetic variety or merely a growth form. It must, however, be recognised that types of *N. officinale* occur both with narrow and with very broad leaves.

DISTRIBUTION

Certain preliminary records of the distribution of *N. officinale* and *N. microphyllum* have recently been published (Wallace, 1948; see also Riddelsdell, Hedley & Price, 1948). The following lists are therefore to some extent supplementary. In each case the vice-county number and name is given, followed by the locality, date of collection and collector's name, of the earliest specimen known to the authors. The letter in brackets indicates the herbarium in which the specimen is located and the figure in brackets the number of records noted. The key to the herbaria is as follows:—

- (A): University of Aberdeen.
- (B): British Museum (Natural History).
- (C): University of Cambridge.
- (E): Royal Botanic Garden, Edinburgh.
- (G): University of Glasgow.
- (K): Royal Botanic Gardens, Kew.
- (O): University of Oxford (including Herb. Druce).
- (W): National Museum of Wales.
- : University of St Andrews. (No first records.)

The lists have been compiled from an examination of material in the above herbaria supplemented in recent years by our own observations. Sheets of our specimens have been sent to the British Museum.

NASTURTIUM OFFICINALE R.Br.

V-C

- 1, W. Cornw.; Phillack, 1839, *C. C. Babington*, (C), (6).
- 2, E. Cornw.; Downderry, 1887, *J. Vaughan*, (O), (3).
- 3, S. Devon; Salcombe, 1839, *S. Babington*, (C), (3).
- 5, S. Som.; Dunster, 1906, *A. H. Maude*, (B), (8).
- 6, N. Som.; Bedminster, 1882, *J. W. Painter*, (B), (2).
- 9, Dorset; Shapwick 1886, *R. P. Murray*, (B), (4).
- 10, Wight; Grange, Brixton, 1867, *F. Stratton*, (O), (3).
- 11, S. Hants; Bishops Waltham, 1847, *S. Robinson*, (B), (2).
- 13, W. Sussex; Ferring, c. 1840, *Mrs H. Dixon*, (B), (2).
- 17, Surrey; Clapham Common, 1831, *S.A.N. ?*, (B), (6).
- 18, S. Essex; Dagenham Docks, 1933, *R. S. Vine*, (K), (1).
- 19, N. Essex; Colnebrook, 1892, *J. W. Statter*, (B), (1).
- 20, Herts.; Welwyn, 1819, *W. Blake*, (O), (3).
- 21, Middlx.; Mill Hill, 1837, *Mr Children*, (B), (8).
- 23, Oxon.; Noke, 1871, *E. F. Linton*, (B), (10).
- 24, Bucks.; Wraysbury, 1881, *G. Nicholson*, (A), (4).
- 26, W. Suff.; Stoke-by-Nayland, 1941, *H. W. Howard*, (B), (1).
- 28, W. Norf.; Grimston to Pott Row, 1946, *E. L. Swann*, (K), (1).
- 29, Cambs.; Nine Wells, 1903, *A. Hosking*, (B), (O) & (C), (3).
- 30, Beds.; Hockliffe, 1944, *E. Milne-Redhead*, (K), (2).
- 32, Northants.; Thornhaugh, 1903, *H. H. Slater*, (W), (1).
- 33, E. Glos.; Siddington, 1944, *E. Milne-Redhead*, (K); Fairford, 1944, *F. Ballard & C. E. Hubbard*, (K), (4).
- 34, W. Glos.; Lydbrook, 1947, *C. C. Townsend*, (K), (1).
- 36, Heref.; Pontrilas, 1841, *G. Bentham*, (K), (6).
- 37, Worcs.; Tenbury, 1878, *J. Fraser*, (C), (2).
- 41, Glam.; Uplead & Ystrad, 1877, *A. Langley*, (W), (3).
- 42, Brecon; near Erwood, 1904, *S. H. Bickham*, (C), (2).
- 43, Radnor; Bottledock, Bach Howey, 1929, *A. E. Wade*, (W), (1).
- 44, Carm.; Kidwelly, 1930, *A. E. Wade*, (W), (1).
- 46, Card.; Penbryn, 1946, *E. Milne-Redhead*, (K), (2).
- 47, Montg.; Newton, 1939, *J. A. Webb*, (W), (1).
- 48, Mer.; Towyn, 1878, *H. E. Fox*, (O), (1).
- 49, Caern.; New Llandudno, 1867, *S. H. Bickham*, (C), (2).
- 53, S. Lines.; near Rauceby station, 1945, *A. H. G. Alston*, (B), (1).
- 54, N. Lines.; Kirkby-on-Bain, 1945, *A. H. G. Alston & N. D. Simpson*, (B), (1).
- 55, Leics.; Sibstone, 1884, *Bishop Mitchison*, (O), (1).
- 56, Notts.; Wollaton Park, 1877, *E. F. Linton*, (A) & (C), (2).
- 57, Derby; Cromford, Via Gellia, 1901, *E. Drabble*, (B), (1).
- 59, S. Lancs.; Ainsdale Beach, 1916, *F. A. Leeds*, (B), (1).
- 60, Mid Lancs.; Lancaster Marsh, 1782, (Herb. Drabble), (B), (1).
- 62, N.E. York; Scarborough, 1857, *Dr Harland*, (B), (1).
- 64, M.W. York; Bardsey near Leeds, 1902, *A. E. Bradley*, (B), (1).
- 66, Durham; Durham, 1870, *H. E. Fox*, (O), (1).
- 68, Chev.; Emleton, 1845, *W. Borrer*, (B), (1).
- 71, Man; Jurby, 1925, *C. I. Paton*, (B), (1).
- 73, Kirke.; Kirkcudbright, 1883, *F. R. Coles*, (B), (1).
- 81, Berw.; "Berwickshire", 1865, *J. Anderson*, (B), (1).
- 82, Hadd.; Longniddrie, 1850, *J. T. Syme*, (B, K), (3).
- 85, Fife; Auchertool, 1848, [s.n.], (E), (3).
- 89, E. Perth; Blair Atholl, 1871, (Herb. R. Wight), (A), (1).
- 96, Easterness; Drumnadrochit, 1947, *Miss E. J. Gibbons*, (B), (1).

- 97, Westerness; Sundale & Swordale, Ardnamurchan, 1890, *S. M. Macvicar*, (B), (4).
 102, S. Ebudes, Port Ellen, Islay, 1944, *G. P. Carson*, (B), (2).
 103, Mid Ebudes; Tiree, 1947, *I. A. Williams*, (B), (1).
 104, N. Ebudes; Canna, Allt Gheodrain, 1937, *Glasgow Univ. Canna Expedition*, (G), (1).
 106, E. Ross; by Cromarty Firth, 1890, *C. Bailey*, (B), (1).
 110, O. Hebr.; Barra, 1888, *A. Somerville*, (B), (6).
 111, Orkney; Bu' Hoy, 1877, *H. H. Johnstone*, (E), (2).
 112, Zetl.; Sandwick, 1921, *G. C. Druce*, (O), (1).
 S., Sark; damp side of Creux Road, 1928, *F. Ballard & E. A. Golby*, (K), (2); Jersey; St Peter's Marsh, 1851, *J. Picquet*, (O), (2).
 H.1, Kerry, S.; Ventry Harbour, 1938, *B. L. Burt*, *S. Ross-Craig & J. R. Sealy*, (K), (1).
 H.9, Clare; Roighan, Killenaboy Parish, 1947, *J. G. Dony*, (B), (1).
 H.16, Galway, W.; Dog's Bay, Connemara, 1948, *R. D. Meikle*, (K), (1).
 H.16 or 17, Galway, W. or N.E.; Galway, 1852, *A. Prior*, (K), (1).
 H.33, Ferm.; Lurgan R., near Belcoo, 1948, *R. D. Meikle*, (K), (1).
 H.39, Antrim; near Larne, 1945, *H. W. Howard*, (B), (3).

NASTURTIUM MICROPHYLLUM Boenn. ex Rchb.

V-C

- 3, S. Devon; Otterton, River Otter, 1881, *W. Fawcett*, (B), (1).
 6, N. Som.; canal near Ashcott, 1892, *R. P. Murray*, (B); ditch near Shapwick, 1892, *E. F. Linton*, (B), (6).
 9, Dorset; Wilke's Wood, 1883, *Mansel-Pleydell*, (B), (8).
 10, Wight; near St Catherine's Point, 1932, *C. E. Hubbard & T. A. Sprague*, (K), (1).
 11, S. Hants.; New Forest, 1889, *Capt. Stewart*, (W), (6).
 13, W. Sussex; Selham, 1916, *C. C. Lacaita*, (B), (1).
 14, E. Sussex; Isfield, 1867, *B. D. Jackson*, (A), (2).
 15, E. Kent; Ham Ponds, 1888, *E. S. Marshall*, (C), (2).
 16, W. Kent; Abbey Wood, Lownes Park, 1916, *C. Robinson*, (B), (1).
 17, Surrey; Gatton Park Pond, 1857, *J. S. Mill*, (K), (16).
 19, N. Essex; Great Bardfield, 1869, *H. E. Fox*, (O), (2).
 20, Herts.; Hitchin, 1841, *J. Brown*, (E), (6).
 21, Middlx.; R. Colne at Uxbridge, c. 1890, *J. Benbow*, (B), (1).
 22, Berks.; Sunning Hill, 1773, (Herb. Banks), (B), (4).
 23, Oxon.; Oxford, 1871, *E. F. Linton*, (B), (24).
 24, Bucks.; Wycombe Regis, 1864, *E. Chandler*, (B), (2).
 25, E. Suff.; Lowestoft, 1859, *H. Trimen*, (B), (1).
 26, W. Suff.; Pakenham, 1830, *Mrs Casborne*, (C), (8).
 27, E. Norf.; Horning, 1838, *T. R. Tuck*, (B), (5).
 28, W. Norf.; Watton, 1911, *T. Robinson*, (B), (4).
 29, Cambs.; Cambridge, 1840, Rothery Plants (ex *C. Darnell*), (C, E), (5).
 30, Beds.; Hockliffe, 1944, *E. Milne-Redhead*, (K), (3).
 31, Hunts.; Wyton, stream near Huntingdon Road, 1945, *H. W. Howard*, (B), (1).
 32, Northants.; Thornhaugh, 1902, *H. H. Slater*, (W), (1).
 33, E. Glos.; Barbers Bridge, Rudford, 1944, *H. K. Airy Shaw*, (K), (2).
 34, W. Glos.; Frampton-on-Severn, 1909, *H. J. Riddelsdell*, (B), (1).
 35, Mon.; Rumney, 1922, *A. E. Wade*, (W), (2).
 37, Worcs.; Burford, Tenbury, 1878, *J. Fraser*, (B) & (W), (1).
 38, Warw.; Lighthorne, 1852, *C. E. Palmer*, (O), (1).
 39, Staffs.; Needwood Forest, 1837, *S. Babington*, (C), (1).
 40, Salop; canal, Shrewsbury-Uffington, 1836, *W. A. Leighton*, (C), (3).
 41, Glam.; Kenfig Pool, 1947, *E. Nelmes*, (K), (1).
 42, Brecon; Llangorse Lake, 1925, *A. E. Wade*, (W), (2).
 43, Radnor; Rhos-goch bog, 1881, *A. Ley*, (B), (1).
 45, Pemb.; Tenby, 1860, (Herb. *J. S. Gale*), (O), (2).
 49, Caern.; Llandudno, 1869, *S. H. Bickham*, (C), (2).

- 52, Angl.; Cors Bodeilio, 1930, *A. Wilson*, (W), (1).
 54, N. Lincs.; Kirkby Lane, Woodhall Spa, 1931, *A. H. G. Alston*, (B), (3).
 55, Leics.; Glenfield, 1913, *A. E. Wade*, (W), (2).
 57, Derby; Great Longstone, 1944, *W. J. Garnett*, (B), (1).
 58, Ches.; Bebington, 1924, *H. E. Green*, (W), (1).
 59, S. Lancs.; Ince Blundell, 1901, *W. W. Mason*, (O), (2).
 62, N.E. York; Buttercrambe, 1878, *G. Webster*, (A), (1).
 63, S.W. York; Roche Abbey, 1883, *P. F. Lee*, (B), (1).
 64, M.W. York; R. Nidd at Knaresborough, 1879, *M. Kirkly*?, (C), (3).
 67, S. Northumb.; Newton near Rothbury, 1948, *B. L. Burt*, (K), (1).
 69, Westm.; Peat Trenches, Ulverston, n.d., *E. Hodgson*, (B), (2).
 82, Hadd.; Luffness Marshes, 1902, *E. Evans*, (E), (1).
 83, Edinb.; Cramond, 1825, *W. Macgillivray*, (A), (6).
 84, Linl.; Kirkliston, 1906, *W. E. Evans*, (E); stream near Winchborough, 1906, *R. F. Adamson*, (B), (2).
 85, Fife; Balmuto, 1873, *J. B. Syme*, (B), (2).
 89, E. Perth; near Blair Atholl, 1871, (Herb. R. Wight), (A), (1).
 90, Forfar; Monifieth, 1870, [s.n.], (E), (2).
 91, Kinc.; shore, Stonehaven to Netherley, 1901, *C. Bailey*, (O), (1).
 92, S. Aberd.; Walkers Dam, Aberdeen, 1947, *A. G. Lyon*, (B), (5).
 94, Banff; Boyne Bay, 1947, *Miss McCallum Webster*, (B), (1).
 106, E. Ross; near Tain, 1891, *E. S. Marshall*, (C) & (B), (3).
 110, O. Hebr.; S. Uist, 1888, *G. Somerville*, (B), (8).
 S., Jersey; St Peter's Marsh, 1838, *C. C. Babington*, (C), (2).
 H.6, Waterford; Dungarvan, 1880, *J. Britten*, (A), (3).
 H.8, Limerick; Limerick, 1915, *J. E. Day*, (K), (1).
 H.9, Clare; Carron near Corofin, 1947, *J. G. Dony*, (B), (1).
 H.16 or 17, Galway, W. or N.E.; near Galway, c. 1923, *Mrs Evans*, (O), (1).
 H.33, Ferm.; Lough near Boho, 1947, *R. D. Meikle*, (K), (2).
 H.37, Armagh; near Lough Neagh, Ellis's Cut, 1947, *R. D. Meikle*, (K), (1).

NASTURTIIUM MICROPHYLLUM × OFFICINALE

- 1, W. Cornw.; between Maenporth & Tolypool, 1883, (Herb. H. Davies), (B), (1).
 4, N. Devon; Marwood, 1892, *W. H. Painter*, (B) & (O), (1).
 6, N. Som.; Bath, 1839, *S. Babington*, (C), (2).
 13, E. Sussex; near Loxwood, 1880, *W. H. Beeby*, (B), (2).
 17, Surrey; Barnes Common, 1872, *J. H. Morgan*, (B), (5).
 21, Middlx.; Staines, 1841, *J.F.G.*?, (B), (4).
 24, Bucks.; R. Chess, Chesham, 1945, *A. H. G. Alston*, (B), (1).
 27, E. Norf.; Framingham, 1890, *R. S. Standen*, (B), (1).
 28, W. Norf.; Watton, 1915, *F. Robinson*, (B), (3).
 29, Cambs.; Sheeps Green, 1944, *H. W. Howard*, (B), (1).
 30, Beds.; Barton, 1899, *D. M. Higgins*, (B), (1).
 33, E. Glos.; below Seven Springs, 1916, *H. J. Riddelsdell*, (B), (1).
 34, W. Glos.; Frampton-on-Severn, 1909, *H. J. Riddelsdell*, (B), (2).
 39, Staffs.; Hoo Brook, Grindon, 1947, *H. K. Atry Shaw*, (K), (1).
 41, Glam.; Fairwater, 1920, *A. E. Wade*, (W), (1).
 48, Mer.; near Nannan, 1941, *J. A. Webb*, (W), (1).
 49, Caern.; Bardsey, 1933, *P. M. Butler*, (B), (1).
 52, Angl.; Llandona, 1943, *N. Y. Sandwith*, (B & K), (2).
 54, N. Lincs.; Black Dyke, Waddingham, 1947, *J. Gibbons*, (K), (1).
 57, Derby; Matlock, 1916, *A. J. Wilmott*, (B), (2).
 58, Ches.; Disley, 1947, *H. W. Howard*, (B), (2).
 60, Mid Lancs.; Blackburn, n.d., *C. A. Newdigate*, (B), (1).
 62, N.E. York; Goathland, 1865, *M. Mennell*, (B), (2).
 65, N.W. York; Cronkley Pastures, 1948, *A. J. Wilmott*, (B), (1).
 66, Durham; below Dale House, Forest, Teesdale, 1948, *B. L. Burt*, (K), (1).
 68, Chev.; Bamburgh, 1909, *H. E. Fox*, (O), (1).
 69, Westm.; Arnside, 1923, *W. C. Worsdell*, (K), (1).
 77, Lanark; Possil Marsh, 1884, (Herb. R. M. Buchanan), (G), (1).

- 82, Hadd.; Tantallon Castle, 1932, *E. H. Stuart*, (E), (2).
 83, Edinb.; Liberton, 1846, *W. B. Backie*, (B), (2).
 85, Fife; Balmuto, 1875, *Boswell*, (B), (2).
 86, Stirl.; Mugdock Loch, Strathblane, 1893, *R. Kidston*, (G), (1).
 90, Forfar; Inverarity, 1944, *C. H. Cadman*, (B), (1).
 96, Easternness; Allanfearn near Inverness, 1943, *U. Duncan*, (Herb. Brennan), (1).
 97, Westernness; Glenmoidart Bridge, 1895, *S. Macvicar*, (B), (1).
 109, Caithn.; Thurso River near Halkirk, 1881, *J. Grant*, (B), (1).
 110, O. Hebr.; Pennylodden, Benbecula, 1947, *A. J. Wilmott*, (B), (1).
 H.16, Galway, W.; Maam, 1895, *W. A. Shoolbred*, (B & W), (3).
 H.20, Wicklow; banks of Dargle near Bray, 1872, *C. E. Palmer*, (O), (1).
 H.29, Leitrim; near Manorhamilton, 1946, *S. Ross-Craig & J. R. Seaty*, (K), (1).
 H.33, Ferm.; near Lough Melvin, 1948, *R. D. Meikle & E. N. Carrothers*, (K), (2).
 H.37, Armagh; Newry, 1945, *H. W. Howard*, (B), (1).
 H.39, Antrim; Ligoniel, near Belfast, 1945, *H. W. Howard*, (B), (5).

These lists must be regarded as being provisional only, and we would request the co-operation of other botanists in filling the gaps both from existing herbarium material which has not yet been determined, and also from new gatherings. Information, too, is required regarding the altitudinal limits of the species. Records for Watercress treated as a single species have been given by Wilson (1929) which indicate that, although mainly a lowland type, it may extend to above 1000 ft. The only recent and specific record has been communicated to one of us by Dr J. W. Gregor, who has collected specimens of *N. microphyllum* at 800 ft. in Midlothian. The only ecological preference so far found is in v.-c. H.39 (Antrim), where *N. officinale* occurs on the chalk near the coast and the hybrid on the basalt inland. Rather similar data for *N. officinale* and *N. microphyllum* have been given by Riddelsdell, Hedley & Price (1948).

We would like to take this opportunity of thanking those in charge of the herbaria listed above, for granting facilities for the examination of material in their respective charges.

Acknowledgment is due by one of us (A.G.L.) to the Agricultural Research Council for the provision of a research grant during the tenure of which the material for this article was assembled.

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- AIRY SHAW, H. K., 1947, The Botanical name of the Wild Tetraploid Watercress, *Kew Bull.*, **1947** (1), 39-46.
 DRUCE, G. C., 1932, *Comital Flora of the British Isles*.
 FITCH, W. H., & SMITH, W. G., 1944, *Illustrations of the British Flora*, Ed. 5.
 HOWARD, H. W., 1947, Wild and cultivated Watercress Types, *Agriculture*, **53**, 453-457.
 HOWARD, H. W., & MANTON, I., 1946, Autopolyploid and Allopolyploid Watercress with the description of a new species, *Ann. Bot.*, N.S., **10**, 1-13.
 HUTCHINSON, J., 1945, *Common Wild Flowers*.
 HYDE, H. A., 1948, in Plant Notes, *B.E.C. 1946/7 Rep.*, 256.
 RIDDELSDELL, H. J., HEDLEY, G. W., & PRICE, W. R., 1948, *Flora of Gloucestershire*, 609-610.
 WALLACE, E. C., 1948, Plant Records, *B.E.C. 1946/7 Rep.*, 283.
 WILMOTT, A. J., 1948, Nomenclature and corrections to the B.P.L., *B.E.C. 1946/7 Rep.*, 248.
 WILSON, A., 1929, Altitudinal Range of British plants, *N.W. Naturalist*, **6**, supplement, p. 10.