

An introduction to the study of the British *Hieracia*, 1. History and classification

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ABSTRACT

A brief account is given of the historical background to the study of *Hieracium* L. in the British Isles. *Pilosella* Hill is recognized as a distinct genus. The typification of and differences between *Hieracium* and *Pilosella* are set out. The disparity between the Scandinavian and British schools of thought and those of central Europe as regards the definition of species is discussed.

HISTORY

From the time of Linnaeus onwards the number of described species of *Hieracium* has grown with ever-increasing rapidity. The first volume devoted to the genus in the British Isles was by Backhouse junior (1856), which was based on the classification of Fries (1847–1848). It contains 33 species in eight sections. Eleven of the species were new and have been subsequently maintained by the majority of authors. Eight of them belong to the series *Alpina* and series *Subalpina*, and the account deals essentially only with Upper Teesdale and the Clova and Braemar districts of Scotland. All the taxa are clearly defined and well represented by herbarium material (BM, CGE). An account of *Hieracium*, based on the work of Backhouse, was also published by Babington (1856) in the 4th edition of his *Manual*. The descriptions were probably drawn up by Babington from a set of *Hieracia* given him by Backhouse and now in CGE. The Preface of both works is dated 1st May 1856. I am indebted to William Stearn for the following information concerning the problem of priority between the two works. Backhouse's *Monograph* was reviewed in *Gard. Chron.*, 1856: 304 (3rd May 1856) and *Ann. Mag. Nat. Hist.*, Ser. 2, 17: 418 (May 1856), and was received by the Linnean Society on 16th June 1856. Babington's *Manual*, 4th ed., was reviewed in *Gard. Chron.*, 1856: 391 (7th June 1856) as "just appeared" and *Ann. Mag. Nat. Hist.*, Ser. 2, 18: 163 (August 1856), and received by the British Museum on 11th June 1856. From this it is reasonable to accept that Backhouse's *Monograph* was published in (April–) May 1856 and Babington's *Manual*, 4th ed., in June 1856. This accords with Babington's statement, presumably inserted in the last proof, that he had availed himself of the *British Hieracia* "lately published by my friend Mr James Backhouse, Jun.". A revised account of the genus, based on Backhouse's work, was published ten years later by Sowerby (1878). It adds one new species and four new varieties.

From 1878 until the end of the century, no more advanced elaboration was shown in any British Flora, and Hooker (1884) in fact reduced the number of species to ten.

Towards the end of the last century a number of amateur botanists became interested in *Hieracium*. Foremost of these was F. J. Hanbury, who published a number of papers in the *Journal of Botany (London)* (Hanbury 1888, 1889, 1892, 1893, 1894a,b) which culminated in 1894 with a list of all the taxa known to him in the British flora, 104 species and 114 varieties. Hanbury himself described as new 24 species and over 30 varieties. Although some of his descriptions were grossly inadequate, his herbarium (BM) was one of the finest ever made, and there is no difficulty in interpreting his taxa. Between 1889 and 1898 Hanbury started publishing *An illustrated monograph of the British Hieracia*, with large plates reproduced from water-colour drawings by Miss Gulielma

Lister. It was unfortunately never finished. The least satisfactory of Hanbury's works is the account with Miss R. F. Thompson of *Hieracium* in the 9th edition of Babington's *Manual of British Botany* (Hanbury & Thompson 1904), in which 97 species were described. Although the details of the descriptions are perfectly true as regard to facts, they are too general and do not contrast the important features and are utterly useless for the purpose of identification or classification. Hanbury referred many of his specimens to the Scandinavian botanists C. J. Lindeberg and M. Elfstrand for comment, and it is possibly this early contact that led British students of the genus to follow the Scandinavian school of thought as opposed to that which developed in central Europe.

Simultaneous with the work of Hanbury was that of two brothers, the Revs E. F. and W. R. Linton. Efficient field botanists, they published accounts of their new species and varieties which were much more detailed and accurate than those of Hanbury. As well as papers in the *Journal of Botany (London)* (E. F. Linton 1891, 1897, 1911; E. F. & W. R. Linton 1893; W. R. Linton 1890), one of them brought out *An account of the British Hieracia* (W. R. Linton 1905). It contained 124 species, one subspecies and 135 varieties and forms. It was the most generally useful work until Pugsley (1948). In total the brothers Linton described 16 new species and 37 new varieties. In 1896 they began the issue of a *Set of British Hieracia* which extended to 160 numbers by 1901, and an additional fascicle of 25 numbers was sent out in 1906. The sets were filled partly by wild specimens and partly by cultivated ones. This, together with the fact that some numbers were made up of plants from different localities, means that the sets should be used with care, as the same number sometimes contains more than one species.

Another connoisseur of hawkweeds was the Rev. A. Ley, who concentrated mainly on the Welsh species. He published several papers describing new taxa (Ley 1895, 1898, 1899, 1900, 1901, 1907, 1909, 1910), the most important being on Brecon and West Yorkshire Hawkweeds (Ley 1909). W. H. Beeby collected and described some of the first new species in the series *Alpestris* from Shetland (Beeby 1891a,b, 1908), and the Rev. W. H. Purchas named a new species from Derbyshire and a new variety from the Wye Valley (Purchas 1895, 1899). Perhaps the most critical of all British field botanists, the Rev. E. S. Marshall, described three new species and collected a wealth of interesting material especially from Scotland (Marshall 1892a,b, 1894, 1913). The finds made on these Scottish journeys are published, sometimes with F. J. Hanbury or W. A. Shoolbred, in numerous papers in the *Journal of Botany (London)*.

While all this activity was going on in the field, F. N. Williams was sitting in the British Museum or Kew producing his *Prodromus Florae Britannicae*. His account of *Hieracium* (Williams 1902, 1903) contains 75 species and many varieties. The descriptions, though of considerable length, show no salient or contrasting characters and the species are somewhat grotesquely arranged within the sections. It is quite clear Williams knew little about the living plants. He was, however, the first British botanist to find foliar glands in the series *Alpina* and to use the character of the receptacle pits.

On the Continent of Europe, A. Jordan, C. Arvet-Touvet and H. Sudre had described many new species from France, while C. J. Lindeberg, J. P. Norrlin, M. Elfstrand and H. Dahlstedt were busy in Scandinavia. Although some of these authors started by giving their new taxa the rank of subspecies, they usually finished up by accepting them as species. In central Europe, however, the enormous works by Naegeli & Peter (1885–1886) and Zahn (1921–1923) were adopting a system of *species principales* each with numerous subspecies which are taxonomically equivalent to the species of British and Scandinavian botanists. The basic difference between the two schools of thought, which still exists, is that the central European botanists believe they can tell how their taxa originated and the British and Scandinavian botanists do not think this is possible. Zahn's (1921–23) monumental monograph in Engler's *Pflanzenreich* describes 756 *species principales* in four subgenera with a vast number of subspecies. The index includes approximately 18,000 names. There are 47 sections, but a great many of the main taxa are regarded as *species intermediae* (each with numerous subspecies) which are considered to be intermediate between sections. Although an invaluable source of reference to the dedicated hieraciologist, it is useless for identification by any normal procedure as the keys only cover typical members of the group, and *species intermediae* are not included in the keys at all. Zahn's knowledge of the British *Hieracia* was almost entirely based on Linton's *Set of British Hieracia*, for the contents of which he coined many new names.

Between the two World Wars very little was published on British *Hieracia*. H. H. Johnston and G. C. Druce sent many specimens to H. Dahlstedt (then more interested in *Taraxacum*) and K. H.

Zahn (who had finished his monographic work). Numerous new subspecies and species were described by them based on poor specimens from a flora they did not know well, and most of these names have disappeared into synonymy. Two lists were produced in the 1920s, the first by Roffey (1925) and the second by Druce (1928). Neither author knew much about *Hieracium* and both tried to combine the work of British botanists with that of Zahn. Many new names were introduced to the British literature.

This brings us to the fine monograph produced by Pugsley (1948). It provided detailed descriptions of 260 species and brought together names used by all previous British authors as well as linking them up with Continental works. Pugsley described 62 new species and 53 new varieties and was responsible for ten new names and 36 new combinations.

Over the last 35 years, I have, in co-operation with Dr C. West, examined most of the specimens cited by Pugsley and seen the majority of the species in the field, many in their type localities. Some of Pugsley's species have been reduced to synonymy and more new species have been described. In Dandy (1958) we brought Pugsley's species nomenclaturally up to date, and later mapped all the species then known to us (Sell & West 1968). The new species and nomenclatural corrections were published in separate papers in *Watsonia* (Sell & West 1955, 1962, 1965, 1967).

Work on the distribution of the *Hieracia* has continued, particularly by A. G. Kenneth and A. McG. Stirling, who published an account of the hawkweeds of western Scotland (Kenneth & Stirling 1970). M. McC. Webster included 88 species in her *Flora of Moray, Nairn and East Inverness* (Webster 1978), and Dr West and I endeavoured to make a key to them. In 1981, a *Hieracium* Study Group was started within the B.S.B.I., with 36 members. It has so far distributed six series of notes. One of the most obvious results of recent work is that when areas such as Ross and southern Scotland, which have previously received little attention, are investigated, they produce a number of new species, whereas more intensive investigation of Cardiganshire, v.c. 46, by Chater (1984) has not produced any new species, but has added considerably to the number of species known in the county. D. J. Tennant has devoted much time over the last 20 years working on the species of the series *Alpina*. Not only has he seen all of them in the field, but he has cultivated most of the species in his garden. The writing up of this group is in progress.

A word or two needs to be said about the genus in Ireland. Ireland has produced no hieraciologist of its own. R. L. Praeger collected many specimens on his travels (DBN) and most of the British botanists interested in *Hieracium* made at least one visit to Ireland. The material as a whole is not very well preserved and good modern specimens are badly needed for a re-appraisal of the Irish species. In particular, the rediscovery of *H. hartii* (F. J. Hanb.) P. D. Sell & C. West is desirable. It is a species which, when originally described by Hanbury (1892), was said to be in great profusion on Slieve League, Donegal.

CLASSIFICATION

When preparing the accounts of *Hieracium* for *Flora Europaea* (Sell & West 1976) and *Flora of Turkey* (Sell & West 1975a), Dr West and I had to consider the classification of the genus throughout its range and to decide which of the two schools of thought to adopt as regards the definition of species.

Zahn (1921–1923) has four subgenera. One of these, *Pilosella* Hill, we had treated as a separate genus in Sell & West (1968), and continued to do so in the *Flora of Turkey* (Sell & West 1975a). For *Flora Europaea*, the editors, Tutin *et al.* (1976), after consultation with regional advisers, decided against this treatment, preferring continuity with the treatment of Zahn. Our separation of *Pilosella* from *Hieracium* was based on the characters in the following descriptions.

HIERACIUM L., *Sp. Pl.*, 799 (1753); *Gen. Pl.*, 5th ed., 350 (1754).

Lectotype: *H. murorum* L. (vide N. L. Britton & A. Brown, *Ill. Fl. N. United States*, 2nd ed., 3: 328 (1913)).

Perennial herbs, the descending or oblique rootstock with thick fibres, not stoloniferous. Stems usually solitary, sometimes few. Basal leaves, when present, in a rosette, sometimes withered at anthesis; cauline leaves none to numerous; all entire to deeply dentate, at least the basal usually

distinctly petiolate. Margins of receptacle pits more or less dentate, sometimes with more or less long fimbriae. Ligules yellow, sometimes dingy yellow, rarely greenish. Achenes 3–5 mm, 10-ribbed, ribs apically confluent in an obscure ring; pappus hairs in two series, unequal. *About 10,000 species, probably mainly apogamous, described from Europe, N.W. Africa, N. and W. Asia and N. America.*

Hieracium murorum was first described by Linnaeus (1753, p. 802). His diagnosis, *Hieracium caule ramoso, foliis radicalibus ovatis dentatis; caulino minori*, is taken from the *Hortus Cliffortianus* no. 6 on page 388 without change. There is a sheet in the *Hortus Cliffortianus* (BM) labelled "*Hieracium macrocaulon, hirsutum, folio rotundiore*" and in an unknown hand "*murorum 6*". The sheet contains a stem with a bract and an inflorescence of 20 capitula, a second stem with four capitula and one large, ovate, nearly entire leaf, and two unattached basal leaves which are large, ovate and nearly entire. The two stems belong to different species. The one with 20 capitula certainly belongs to the aggregate species *Hieracium murorum* as understood by most Continental botanists, but it is too inadequate to identify as to segregate species. The second stem I cannot place at all. It does not belong to the aggregate species *Hieracium murorum*. I would not like to say to which stem, if either, the two basal leaves belong. I have selected the stem with 20 capitula as the lectotype of *Hieracium murorum* L. It will enable the Continental botanists to continue its usage in the aggregate sense. As the type species of the genus it does not disagree with Linnaeus' generic diagnosis. A second sheet in the *Hortus Cliffortianus* labelled "*Hieracium murorum laciniatum minus, pilosum*" is referable to *Hieracium murorum* β of Linnaeus (1753, p. 803).

PILOSELLA Hill, *Brit. Herb.*, 441 (1756).

Holotype: *Pilosella major repens hirsuta* Bauhin = *P. officinarum* C. H. & F. W. Schultz (*Hieracium pilosella* L.).

Perennial herbs, with horizontal or oblique rhizomes and persistent rosettes of leaves from the axils of which prostrate leafy, or underground scaly stolons are often developed. Stems (1–) few to numerous. Leaves entire or slightly denticulate, never distinctly petiolate, often all basal; cauline leaves when present usually small. Margins of receptacle pits shortly dentate. Ligules yellow, outer sometimes with a red stripe on outer face, rarely reddish. Achenes up to 2.5 mm, 10-ribbed, each rib projecting to form a crenulate truncate apex; pappus hairs in 1 series with a few shorter than the rest. *18 species, probably mostly sexual, in Eurasia and N. W. Africa.* Hybrids between most species that grow together have been recorded.

The two remaining subgenera of Zahn's monograph are mainly American, with isolated species in S. Africa and southern Europe. Jeffrey (1966) concluded that the S. African species of subgenus *Stenotheca* Fries, *H. capense* L., should really belong to the genus *Tolpis* Adanson, where it was placed by Schultz-Bip. in 1861; and in *Flora Europaea* (Sell & West 1976), *H. staticifolia* All. of southern Europe was also included in *Tolpis* as Schultz-Bip. had earlier concluded. Whether *Tolpis* is the correct place for these species or whether they should be in a separate genus (*Chlorocrepis* Griseb. is available), West and I were not certain, but we considered they should not be included in *Hieracium*.

The American species of the subgenera *Stenotheca* and *Mandonia* Arvet-Touvet bear no resemblance in general facies to the majority of species in *Hieracium* proper, but they fit in much better with the facies of species included in *Crepis*. If the generic descriptions in Zahn's monographic treatment of *Hieracium* and Babcock's (1947) description in his monographic treatment of *Crepis* L. are compared it will be seen there are no characters which will absolutely distinguish the two genera. In Europe and western Asia, the main area of diversity of the two genera, they can be readily separated by the arrangement of the involucre bracts and their general facies. In *Hieracium* the involucre bracts are in a graduated series, in *Crepis* there is an inner row of long bracts and an outer row of lax, short bracts giving the appearance of a cup and saucer. In all *Hieracium* species the pappus is discoloured and rather stiff, and in *Crepis* it is mainly white and soft, but in some species (including *C. paludosa*) it is like *Hieracium*. In *Hieracium* the apex of the achene is always broad and truncate, while in *Crepis* it is often narrowed and sometimes beaked. The American species of *Hieracium* of the subgenera *Stenotheca* and *Mandonia* have the general

facies and involucre bracts of *Crepis* and the pappus of *Hieracium*. The achenes are sometimes narrowed or shortly beaked at the apex. The basic chromosome number of *Hieracium* is 9, a number not recorded in *Crepis*, although the basic number of that genus varies from 3 to 13. Those American species of *Hieracium* subgenus *Stenotheca* whose chromosomes have been counted have a base number of 9. Nevertheless, on morphological grounds they are best placed in *Crepis*, which includes great morphological variation and has by some authors been split into several genera. This leaves *Hieracium* more clearly defined, and including only the subgenus *Eu-Hieracium* of the classification of Zahn.

The only entity below the rank of genus that has any useful meaning is that which the Scandinavian and British botanists call a species and the central European botanists call a subspecies. They are not subspecies in the normal sense of the word (that is, either geographically or ecologically discrete taxa) as several can grow intermingled, nor is the near relationship of all the subspecies included by Zahn under a *species principalis* certain. What is known about the subspecies of Zahn's *species principales* suggests that most are apogamous triploids and tetraploids which almost certainly have a hybrid origin, as do those subspecies within *species intermediae* considered by him to be intermediate between sections. The present known diploids are few (Merxmüller 1975) and most are in southern Europe. Even if all the chromosome numbers of the taxa were known, it is doubtful if a workable phylogenetic classification could be suggested as some at least of the ancestral species will have died out. As it is, the greater part of any suggested phylogenetic relationship in *Hieracium* is pure guesswork and it is better to group the taxa according to their morphological affinities. When several taxa grow together in one locality, all the specimens can be put into these taxa: there are no intermediates. It is therefore better to give all such taxa binomials and regard them as species. Any grouping of the species results in intermediates between groups in many directions. It is possible to make major groups into which large numbers of species fall absolutely and many others fall on a majority of characters. As these are mainly a collection of apogamous taxa which may or may not have any phylogenetic relationship it is best to give them the lowest possible rank, that of series. An added incentive to use this rank is that the epithets used for these groups by Fries (1847–1848) and most later authors can in the main be retained.

In *Flora Europaea* (Sell & West 1976), we divided the account of subgenus *Hieracium* into 38 of these series, but we did not give them names in deference to our central European colleagues who still wished to use Zahn's classification. It was not practical to include all the vast number of species that had been described and some grouping was therefore necessary. The most sensible thing to do was to use most of Zahn's *species principales* and *intermediae* as groups and arrange them within our series. It sometimes proved difficult to correlate our classification with that of Zahn, as we had some groups which were different from those of Zahn and we transferred some segregates to other groups. These groups are in no sense comparable with ordinary sexual species. We did, however, try to find the correct name for each group (contrary to the statement by Jeffrey (1978, p. 499)) for those who wished to call them species. To use 'group' and not 'sensu lato' with an authority was the decision of the editors, not the authors. Those who wish to use Zahn's complete classification will have to make many hundreds, if not thousands, of new combinations at all ranks to bring it up to date. Dr West and I pointed out some of the problems involved (Sell & West 1975b).

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REFERENCES

- BABCOCK, E. B. (1947). The genus *Crepis*. *Univ. Calif. Publ. Bot.*, **21** & **22**.
 BABINGTON, C. C. (1856). *Manual of British botany*, 4th ed. London.
 BACKHOUSE JUN., J. (1856). *A monograph of the British Hieracia*. York.

- BEEBY, W. H. (1891a). *Hieracium protractum* Lindeb. in Britain. *J. Bot. (Lond.)*, **29**: 53.
- BEEBY, W. H. (1891b). A new *Hieracium*. *J. Bot. (Lond.)*, **29**: 243–244.
- BEEBY, W. H. (1908). On the flora of Shetland. *Ann. Scot. nat. Hist.*, **1908**: 110–117.
- CHATER, A. O. (1984). Recent collections of *Hieracium* in v.c. 46. *Hieracia Group Notes*, **6**: 1–3.
- DANDY, J. E. (1958). *List of British vascular plants*. London.
- DRUCE, G. C. (1928). *British plant list*, 2nd ed. Arbroath.
- FRIES, E. (1847–1848). Symbolae ad historiam Hieraciorum. *Nova Acta Reg. Soc. Sci. Uppsala*, **13**: 383–416 (1847); **14**: 1–220 (1848).
- HANBURY, F. J. (1888). Notes on some *Hieracia* new to Britain. *J. Bot. (Lond.)*, **26**: 204–206.
- HANBURY, F. J. (1889). Further notes on *Hieracia* new to Britain. *J. Bot. (Lond.)*, **27**: 73–76.
- HANBURY, F. J. (1889–1898). *An illustrated monograph of the British Hieracia*. London.
- HANBURY, F. J. (1892). Further notes on *Hieracia* new to Britain. *J. Bot. (Lond.)*, **30**: 129–134; 165–170; 206–209; 255–261; 366–370.
- HANBURY, F. J. (1893). Further notes on *Hieracia* new to Britain. *J. Bot. (Lond.)*, **31**: 16–19.
- HANBURY, F. J. (1894a). Notes on British *Hieracia*. *J. Bot. (Lond.)*, **32**: 225–233.
- HANBURY, F. J. (1894b). A tentative list of British *Hieracia*. *J. Bot. (Lond.)*, **32**: post 224.
- HANBURY, F. J. & THOMPSON, R. F. (1904). *Hieracium* L., in BABINGTON, C. C. *Manual of British botany*, 9th ed. London.
- HILL, J. (1756). *The British herbal*. London.
- HOOKER, J. D. (1884). *The student's Flora of the British Islands*, 3rd ed. London.
- JEFFREY, C. (1966). Notes on Compositae, 1. *Kew Bull.*, **18**: 427–486.
- JEFFREY, C. (1978). Review of *Flora Europaea*, 4. *Kew Bull.*, **32**: 498–500.
- KENNETH, A. G. & STIRLING, A. MCG. (1970). Notes on the hawkweeds (*Hieracium sensu lato*) of western Scotland. *Watsonia*, **8**: 97–120.
- LEY, A. (1895). *Hieracium diaphanum* Fr. var. *cacuminum*, n. var. *J. Bot. (Lond.)*, **33**: 86–87.
- LEY, A. (1898). Two new forms of *Hieracium*. *J. Bot. (Lond.)*, **36**: 6–7.
- LEY, A. (1899). Two new *Hieracium* forms. *J. Bot. (Lond.)*, **37**: 35–36.
- LEY, A. (1900). Some Welsh hawkweeds. *J. Bot. (Lond.)*, **38**: 3–7.
- LEY, A. (1901). Notes on Welsh hawkweeds. *J. Bot. (Lond.)*, **39**: 167–168.
- LEY, A. (1907). *Hieracium* notes. *J. Bot. (Lond.)*, **45**: 108–112.
- LEY, A. (1909). Brecon and West Yorkshire hawkweeds. *J. Bot. (Lond.)*, **47**: 8–16, 47–55.
- LEY, A. (1910). Three South Wales hawkweeds. *J. Bot. (Lond.)*, **48**: 326–327.
- LINNAEUS, C. (1738). *Hortus Cliffortianus*. Amstelaedami.
- LINNAEUS, C. (1753). *Species plantarum*. Holmiae.
- LINNAEUS, C. (1754). *Genera plantarum*, 5th ed. Stockholm.
- LINTON, E. F. (1891). Some British hawkweeds. *J. Bot. (Lond.)*, **29**: 271–273.
- LINTON, E. F. (1897). *Hieracium ogweni*, sp. nov. *J. Bot. (Lond.)*, **35**: 407–408.
- LINTON, E. F. (1911). Some new forms of *Hieracia*. *J. Bot. (Lond.)*, **49**: 353–356.
- LINTON, E. F. & W. R. (1893). British hawkweeds. *J. Bot. (Lond.)*, **31**: 145–149, 177–182, 195–202.
- LINTON, E. F. & W. R. (1896–1906). *Set of British Hieracia*. Fascicle 1 (May 1896); 2 (1896); 3 (Oct. 1897); 4 (Oct. 1898); 5 (Oct. 1899); 6 (Jan. 1901); *Supplement* (1906).
- LINTON, W. R. (1890). *Hieracium holophyllum*, sp. n. *J. Bot. (Lond.)*, **28**: 376.
- LINTON, W. R. (1905). *An account of the British Hieracia*. London.
- MARSHALL, E. S. (1892a). A new British *Hieracium*. *J. Bot. (Lond.)*, **30**: 18–19.
- MARSHALL, E. S. (1892b). “*Hieracium anfractiforme*”. *J. Bot. (Lond.)*, **30**: 183.
- MARSHALL, E. S. (1894). New variety of *Hieracium dovreense* Fries. *J. Bot. (Lond.)*, **32**: 215–216.
- MARSHALL, E. S. (1913). Two new Scottish hawkweeds. *J. Bot. (Lond.)*, **31**: 119–122.
- MERXMÜLLER, H. (1975). Diploide Hieracien. *Anal. Inst. Bot. Cavanilles*, **2**: 189–196.
- NAEGELI, C. & PETER, A. (1885–1886). *Die Hieracien Mittel-Europas*. München.
- PUGSLEY, H. W. (1948). A prodromus of the British *Hieracia*. *J. Linn. Soc. Lond. (Bot.)*, **54**.
- PURCHAS, W. H. (1895). *Hieracium murorum* var. *pachyphyllum*, n. var. *J. Bot. (Lond.)*, **33**: 114–115.
- PURCHAS, W. H. (1899). *Hieracium cymbifolium*, sp. n. *J. Bot. (Lond.)*, **37**: 421–422.
- ROFFEY, J. (1925). *Hieracium* L., in HANBURY, F. J., ed. *The London catalogue of British plants*, 11th ed. London.
- SELL, P. D. & WEST, C. (1955). Notes on British *Hieracia*, I. *Watsonia*, **3**: 233–236.
- SELL, P. D. & WEST, C. (1962). Notes on British *Hieracia*, II. The species of the Orkney Islands. *Watsonia*, **5**: 215–223.
- SELL, P. D. & WEST, C. (1965). A revision of the British species of *Hieracium* section *Alpestris* [Fries] F. N. Williams. *Watsonia*, **6**: 85–105.
- SELL, P. D. & WEST, C. (1967). *Hieracium* L., in Notes on the British flora. *Watsonia*, **6**: 303–313.
- SELL, P. D. & WEST, C. (1968). *Hieracium* L. and *Pilosella* Hill, in PERRING, F. H. & SELL, P. D., eds. *Critical supplement to the atlas of the British flora*, pp. 75–134. London.

- SELL, P. D. & WEST, C. (1975a). *Hieracium* L. and *Pilosella* Hill, in DAVIS, P. H., ed. *Flora of Turkey*, 5: 696–763. Edinburgh.
- SELL, P. D. & WEST, C. (1975b). *Hieracium* L., in HEYWOOD, V. H., ed. *Flora Europaea. Notulae systematicae ad floram Europaeam spectantes*. No. 19. *Bot. J. Linn. Soc.*, 71: 256–267.
- SELL, P. D. & WEST, C. (1976). *Hieracium* L., in TUTIN, T. G. *et al.*, eds. *Flora Europaea*, 4: 358–410. Cambridge.
- SOWERBY, J. (1878). *English Botany*, 3rd ed., vol. 5. London.
- TUTIN, T. G. *et al.* (1976). *Flora Europaea*, 4. Cambridge.
- WEBSTER, M.McC. (1978). *Flora of Moray, Nairn & east Inverness*. Aberdeen.
- WILLIAMS, F. N. (1902, 1903). *Hieracium* in *Prodromus florum Britannicae*. Brentford.
- ZAHN, K. H. (1921–1923). *Compositae–Hieracium*, in ENGLER, H. G. A., ed. *Das Pflanzenreich*, IV. 280. Leipzig.

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