

ALCHEMILLA VULGARIS L. agg. IN BRITAIN

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The "micro-species" distinguishable within the aggregate species *Alchemilla vulgaris* L. have been the object of study of a number of taxonomists in Britain, particularly since the accurate work of Buser in the Alps focussed attention on the group at the end of the last century. Records of a number of these species are scattered through the pages of the *Journal of Botany* and of the *B.E.C. Report*, especially in the period 1920-32, when Salmon, Druce and Wilmott collected and studied them; and in the recent *Check List of British Vascular Plants* (Clapham; 1946) no fewer than eighteen are listed. A close inspection of the literature reveals that the majority of these species, which were originally described by Buser on the Continent, owe their presence in a British species list to identifications of British material submitted to Buser's pupil, Jaquet, principally by Salmon; further, that Jaquet's identifications had sometimes been questioned, indeed rejected, by other authorities to whom the specimens had been submitted. Thus Lindberg considered material identified by Jaquet as *A. tenuis* Buser (now in Herb. Mus. Brit.) to be referable to *A. filicaulis* Buser; and Wilmott rejected Jaquet's determination of a specimen (in Herb. W. A. Sledge) as *A. firma* Buser, naming it *A. acutidens* Buser. Further study of the records of several of these species in Britain, combined with a perusal of recent continental literature, soon confirms one's suspicion that Jaquet's determinations are unfortunately most unreliable, and that a complete revision of the group in Britain is badly overdue. This paper does not pretend to do much more than to clear the ground for a fuller understanding of the group's British representatives; but it will have served its purpose if this very necessary clearance is accomplished.

In the Norwegian floras of Nordhagen (1940) and Lid (1944) good descriptions and a key are given for most of the Scandinavian *Alchemilla* species, based chiefly on the work of Lindberg (1909) and Samuelsson (1940, 1943 A, B). Changes of nomenclature have been incorporated following the work of Rothmaler, who published a series of papers between 1934 and 1944 on the systematics and nomenclature of the genus. In these papers a great deal of useful information is collected and to this further reference will be made. The work of Juzepczuk, who is responsible for the detailed treatment of the genus in the *Flora SSSR* (1941) should also be mentioned; both Rothmaler and Samuelsson availed themselves of this work. In 1943 Samuelsson published a detailed monograph on the distribution of "*vulgaris*" species in N.

Europe; in this paper, distribution maps are given for some twenty Scandinavian species, and their total range (i.e. Euro-Asiatic) indicated where known. Much of the following paragraph is based on this work.

The striking fact which emerges from the recent continental work is that not a single "*vulgaris*" species is known to be endemic to any part of Scandinavia. Correlated with this fact is a marked differentiation between species in geographical range. Thus Samuelsson distinguishes three main types of distribution in the Scandinavian species, each of which is represented by one or more British species: the Atlantic (e.g. *A. xanthochlora* Rothmaler = *A. pratensis* auct. non Schmidt); the continental (e.g. *A. monticola* Opiz = *A. pastoralis* Buser); and the Arctic-Alpine (e.g. *A. glomerulans* Buser). This state of affairs is in marked contrast to the situation in e.g. *Hieracium* in N. Europe, which contains a considerable number of local endemics. Samuelsson makes the suggestion that this difference is to be correlated with the purely vegetative apomixis of *Alchemilla*, allowing no meiosis and recombination, as contrasted with the possibility of genic recombination in embryoformation in *Hieracium*. For a further discussion of the status and possible age and origin of the apomicts, his monograph should be consulted.

On the basis of Rothmaler's work, the British *Alchemilla* species may be grouped as follows:—

Sub-genus *Aphanes* (L.) Rothm.

Annuals. Single stamen opposite a sepal, inserted on the inner margin of the disk, anthers extrorse. Cosmopolitan.

A. arvensis L.

Sub-genus *Lachemilla* (Focke) Lagerheim.

Perennials. Stamens 2 (rarely 1, 3 or 4) opposite the sepals, inserted on the inner margin of the disk, anthers extrorse. Central and South America.

Sub-genus *Eu-Alchemilla* (Focke) Buser.

Perennials. Stamens 4, alternating with the sepals, inserted on the outer margin of the disk, anthers introrse. [Several sections of this sub-genus are confined to African mountains; and the section *Pentaphylleae*, containing the single species *A. pentaphyllea* L., is strictly Alpine.] Only the following has British representatives.

Section *Brevicaulon* Rothm.

Herbaceous. Stems (perennial) largely underground, apices only above ground, with very short internodes, bearing a rosette of leaves, and annual flowering stems. Style 1. N. Hemisphere (?Tropical African mountains, and Australia).

[Sub-section *Calycanthum* Rothm. (incl. *Calycinae* Buser).

Sepals longer than the urceoles, which are mostly turbinate, rarely sub-globose. Epicalyx segments longer or scarcely shorter than the sepals. Mature achene protruding from urceole, clearly exceeding the disk. Europe: Alps to Caucasus.]

Sub-section *Chirophyllum* Rothm. (= *Alpinae* Buser pro parte).

Sepals more or less equalling the sub-globose urceoles. Epicalyx segments minute, linear-lanceolate, scarcely half the length of the sepals. Mature achene enclosed in urceole, not exceeding disk.

A. alpina L., *A. conjuncta* Bab.

Sub-section *Heliodrosium* Rothm. (= *Vulgares* Buser pro parte).

Sepals shorter than the sub-globose or ovoid urceoles. Epicalyx segments $\frac{3}{4}$ length of sepals. Mature achene enclosed in urceole, not exceeding disk.

[1. *Splendentes* Buser.

Leaves 9 to 11-lobed; lobes deep, more or less entire laterally; teeth small, acute. Silkily-hairy on stems and lower surfaces of leaves.

A. splendens Christ, Alps, *A. faeroënsis* (Lge.) Buser. Faeroes, Iceland.]

2. *Pubescentes* Buser.

Plants usually dwarf, densely silkily-hairy, with pubescence extending to pedicels and urceoles. Inflorescence characteristically with flowers in dense clusters. Teeth of leaf-lobes (4) 5 (6), broad, rather obtuse.

(1) *A. minor* Huds.

3. *Eu-vulgares* E.-G. Camus.

Pubescence variable, but usually pedicels at least glabrous. Teeth of leaf-lobes (5) 6-9 (10), usually narrow and rather acute.

A large and heterogeneous group, subdivided artificially:—

(a) *Hirsutae* Lindb. fil.

Stems and petioles more or less densely clothed with spreading hairs.

(2) *A. acutiloba* Opiz.

(3) *A. filicaulis* Bus.

(4) *A. minima* Walters sp. nov.

(5) *A. monticola* Opiz.

(6) *A. vestita* (Bus.) Raunk.

(7) *A. xanthochlora* Rothm.

[(b) *Heteropodae* Bus.

Petioles of spring leaves glabrous; otherwise as (a).
Alps.]

(c) *Sub-glabrae* Lindb. fil.

Stems and petioles clothed with adpressed hairs to
a variable extent (may be almost glabrous).

(8) *A. glabra* Neyg.(9) *A. glomerulans* Bus.(10) *A. obtusa* Bus.(11) *A. Wichurae* (Bus.) Stéf.[(d) *Glabrae* Rothm.

Stems and petioles quite glabrous. Alps. e.g. *A.*
coriacea Bus.]

Groups in brackets have no British representatives.

The eleven species listed in the sub-section *Heliodrosium* are the only "*vulgaris*," species which can for the present be said with certainty to be British. All the other recorded species are either false determinations or highly questionable ones. Most of these species are already adequately described in the literature (see Wilmott 1922 B); descriptions are only given to *A. acutiloba* and *A. obtusa*, not previously recorded in Britain, and to *A. minima* sp. nov. in the account which follows, and a key is appended.

- (1) *A. minor* Huds. (= *A. hybrida* L. em. Mill. = *A. pubescens* Lam. = *A. glaucescens* Wallroth 1840; Erster Beitrag zur Flora hercynica; *Linnaea*, 14, 134).

The name *A. minor* is being used for this plant, although there is no agreement between the various authors on this point of nomenclature. Juzepczuk (1941) considers Hudson's name valid; Samuelsson, however, uses *A. glaucescens* and Rothmaler *A. hybrida*. (See Wilmott 1939, and Rothmaler 1941 and 1944).

For the distribution of *A. minor* Huds. in Britain, see Wilmott (1939). The status of the plant in v.-c. 83 seems doubtful; an escape from cultivation is probable. This is certainly the case with the v.-c. 17 (Surrey) record (see Salmon, *Flora of Surrey*, 287). Authentic records, however, exist for v.-c. 105 (W. Ross) (Wilmott, spec. in Herb. Mus. Brit.), and Ireland. The main area of the plant in Britain is undoubtedly the N. English limestone; thus, on the limestone pavement of the slopes of Ingleborough (v.-c. 64), it is locally abundant. The species exhibits a "continental" type of distribution, widespread in Central Europe and ranging from the W. Alps to W. Siberia. It is locally common in Denmark and S. Scandinavia, particularly on calcareous rock.

(2) *A. acutiloba* Opiz (= *A. acutangula* Bus.).

This species was first noted as British by Wilmott, who in 1946 found a sheet in Herb. Mus. Brit. collected in Teesdale in 1933 by J. F. G. Chapple and previously labelled *A. pastoralis* Bus. A visit to Upper Teesdale in July 1947 has revealed that the plant is occasional on roadsides and in hay meadows, growing with *A. monticola* and the other common species over several miles of the valley, and in at least one locality is very luxuriant and locally dominant. All the localities so far seen are in v.-c. 66.

As no account of the species is available in English, the following outline description is given; for a full description of the species, see Lindberg's monograph (1909).

(1) Plant robust, tall-growing, with rather long narrow inflorescence; lowest cauline leaf long-petioled.

(2) Summer leaves with characteristic triangular, pointed lobes.

(3) Thick spreading hair on petioles and on lower part of stem; inflorescence-branches and floral region glabrous. Summer leaves very variably hairy above; some uniformly covered, others with hair only on folds, others practically glabrous.

The plant has a "continental" distribution in Europe, very closely resembling that of *A. monticola* (q.v.), which it frequently accompanies in sub-alpine meadows and on roadsides. The similar association of the two species in Teesdale is yet another indication of the floristic uniqueness of this region.

(A third species, *A. gracilis* Opiz (*A. micans* Bus.) has a similar European distribution; it should be looked for in Teesdale, particularly in view of the fact that there is a single inadequate Teesdale specimen (Druce, in Herb. Mus. Brit.) which is doubtfully referable to this species. The plant resembles *A. monticola* closely in hairiness, except for the possession of glabrous urceoles; the inflorescence is very narrow, and the leaves are reniform in outline with rather acute teeth. It is included in the key to the species.)

(3) *A. filicaulis* Bus.

This plant is not uncommon above 1500' on Scottish mountains; it occurs also in N. England (*A. Salmoniana* Jaq. on Helvellyn, v.-c. 69, also Mickle Fell, v.-c. 65: Walters, July 1947), and at low levels in the extreme North (e.g. Orkneys). In many herbaria, typical *A. vestita* (q.v.) has been labelled *A. filicaulis*, following a paper by Linton (1895), and some confusion arises because of this. The extra-British distribution of this species is discussed with that of *A. vestita* later.

(4) *A. minima* sp. nov.

Planta minima, rhizomate satis longo, tenue; foliis parvis 1.5 ad 3 cm. latis, 1.2 ad 2.5 cm. longis, reniformibus, sinu basale lato, in vivo, supra caesiis, subtus griseo-viridibus 5 aut (praesertim foliis aestivalibus) imperfecte 7 lobis; lobis, praesertim foliorum praecocium, ab

incisuris profundis edentulis separatis; dentibus (7) 9 aut 11 in margine distale loborum, satis angustis, acutis, conniventibus; foliis cum pilis patulis longis varie vestitis, pilis, saepe, nisi in venulis subtus plicisque supra sparsis; petiolis praecocibus saepe fere glabris, serotinis cum pilis patulis; stipulis laete brunneis; caulibus 3 ad 8 cm., arcuato-ascendentibus, tenuibus, fere filiformibus, cum pilis patulis vestitis; inflorescentia parva, pauciflora, floribus (3 mm.) in glomerulis densis parvis; urceolis in vivo 1.5 ad 2 mm. longis, anguste piriformibus, cum pilis patulis; pedicellis quoque cum pilis patulis.

Very dwarf plant, with rather long slender rhizome. Leaves small, 1.5 to 3 cm. wide, 1.2 to 2.5 cm. long, reniform, with wide basal sinus, blue-green above and greyish-green below in fresh state, 5-lobed or (particularly on summer leaves) incompletely 7-lobed. Lobes, especially on early leaves, deeply separated ($\frac{1}{3}$ to $\frac{1}{2}$ of lamina) by toothless incisions; teeth (7) 9 or 11 on distal margin of lobes, rather narrow, acute and connivent. Leaves variably clothed with long spreading hairs, often poorly-developed except on veins below and folds above. Early petioles often almost glabrous, later ones with spreading hairs. Stipules light brown. Stems 3 to 8 cm., arcuate-ascending, slender, almost filiform, with long spreading hairs. Inflorescence poor, few-flowered; flowers (3 mm.) in small condensed glomerules. Urceoles 1.5 to 2 mm. long in fresh state, rather narrowly pyriform, with spreading hairs, which are present also on pedicels.

Simon Fell, Ingleborough, M.W. Yorks. (v.-c. 64), S. M. Walters, 29-7-47; type in Herb. Univ. Cantab.

A. minima is quite easily separable in the field from small *A. vestita* (which is the only plant with which it might be confused) by its deeply-5-lobed blue-green leaves and its very dwarf habit of growth. Plants cultivated since June 1946 are still (September 1947) perfectly dwarf, rising less than 3 cm. above soil-level. Although it possesses many of the characters of Buser's "subnival" dwarf species of the Alps (Buser, 1894) it is clearly not identical with any which he described. It seems to resemble most closely *A. exigua* Bus. (*A. pusilla* Bus., 1893, *Bull. Herb. Boiss.*, 1, App. 2, 23, non Pomel) but differs in both hair distribution and leaf-shape sufficiently to make a distinction necessary. In view of this, it has been thought desirable to describe the plant as a new species, although further study may reveal that it is identical with an already described continental species. It is very remarkable that no such dwarf species are known in Scandinavia, where very extensive study has been given to the *Alchemilla* segregates.

The plant is as yet only known in Britain from the slopes of Ingleborough (v.-c. 64), where it grows in at least three quite separate areas on damp grazed limestone pasture between 1000' and 2000', associated with one or more of the three common species, *A. glabra*, *A. vestita* and *A. xanthochlora*, all dwarfed by grazing. In habitat requirements *A. minima* is quite distinct from *A. minor*, which grows in the vicinity, but only on the drier, barer limestone. It is likely that a care-

ful search of herbarium material from the northern limestone will show that the plant occurs elsewhere. Buser in his paper on the subnival species (1894) makes the interesting comment that the relative scarcity of such plants in herbaria is probably due to their being overlooked by collectors as environmentally-dwarfed specimens of the species of normal stature. It seems clear that in the Alps, as on Ingleborough, genetic dwarf species and phenotypically dwarf plants of the taller species grow mixed together. Their separation in the field is, according to Buser, always possible; but it is naturally difficult where the number of species involved is greater than two or three. So far, however, the problem appears to be relatively simple in Britain, although the assumption that the vast majority of our upland *Alchemilla* populations of dwarf stature are made up simply of phenotypically dwarf specimens referable to the widely-distributed "normal" species is one which should be tested by extensive cultivation experiments. It is hoped to publish the results of some such experiments at a future date.

(5) *A. monticola* Opiz (= *A. pastoralis* Bus.).

For a discussion of the validity of this and other Opiz names, see Rothmaler (1941).

This plant was first detected in Britain by Wilmott in Teesdale material (Wilmott 1922). It has since been recorded for v.-c.'s 17, 37, 64 and 96; of these records the last two are false identifications, that for 37 has not been traced, and only 17 (Surrey) is known to be correct. A sheet of the Surrey plant (near Woking, 1906 and 1908, M. Saunders) is in Herb. Mus. Brit.; and the plant occurred much more recently in Surrey, for it was collected near Box Hill in 1932 by J. E. Lousley. Unfortunately, it may have gone from the latter locality, and has not been confirmed in the earlier one.

In Teesdale (July 1947) *A. monticola* is frequent or even abundant on the roadsides and in hay meadows, extending for at least 10 miles along the valley, and occurring in at least one smaller valley to the south. It is, therefore, in both v.-c.'s 65 and 66. Whatever doubt may reasonably attach to the status of the plant in Surrey, its native status in Upper Teesdale can hardly be questioned. The parallel between the disjunct distribution shown by this species and by *A. acutiloba*, and that shown by other "continental" Teesdale rarities (e.g. *Viola rupestris*) is very striking.

(6) *A. vestita* (Bus.) Raunk. (Raunkiaer, 1906, *Dansk Ekskursionsflora*, p. 145) (*A. minor* auct. non Huds., *A. anglica* Rothm., *A. pseudominor* Wilmott).

This name has been adopted by the Scandinavians for the wide-ranging species which Buser originally described as a variety of *A. filicaulis*. It is the most widely-distributed *Alchemilla* in Britain, and practically all the records for *A. vulgaris* L. agg. in the south of England refer to this plant.

Although the morphological difference between *A. vestita* and *A. filicaulis* is very slight—the only “good” character appears to be the hairiness of the inflorescence—nevertheless, the two can with rare exceptions be satisfactorily separated in the field, and exhibit somewhat different geographical ranges. Both have an “amphi-atlantic” distribution, occurring in Iceland, Greenland and N. America as well as N. and W. Europe, but *A. filicaulis* is constantly more northern or Alpine, and in Britain largely restricted to mountain habitats.

- (7) *A. xanthochlora* Rothm. (Rothm. 1937, *Rep. Spec. Nov. Reg. Veg.*, 42, p. 167) (*A. pratensis* auct. non Schmidt).

This species, one of the common British *Alchemillas*, shows a rather clearly oceanic distribution in Europe—Samuelsson likens it to the *Ilex*-element of the European flora. In S.W. Scandinavia, it is restricted to one or two areas where it may possibly be introduced, and is absent from the Faroes and Iceland.

- (8) *A. glabra* Neugeb. 1821, *Enchirid. Bot. Siles.*, 67; cf. Rothmaler, 1937, *loc. cit.*, 168 (*A. alpestris* auct. vix Schmidt).

This species is common in Northern England and Scotland; it is somewhat oceanic in general distribution in Europe, though by no means in so restricted a sense as *A. xanthochlora*, and is quite widespread in Central and South Scandinavia.

- (9) *A. glomerularis* Bus.

This plant is markedly arctic-alpine in distribution. In Britain it occurs at altitudes above 2000' on Scottish mountains (rarely lower where washed down streams), and also in Teesdale, v.-c. 66 (Walters, July 1947). Its discovery in Teesdale, at altitudes from 1000' to 1500', is a striking addition to the arctic-alpine flora of this valley. Outside Britain it occurs in the Alps (whence Buser first described it), and is widespread in Iceland, Greenland and Scandinavia, particularly in the mountains of Norway and Sweden.

- (10) *A. obtusa* Buser.

A plant collected by Mr A. H. G. Alston at Balgavies Loch in Angus (v.-c. 90) on 31-8-47 is referable to this species. For a complete description, see Buser (1895) and also Lindberg's monograph (1909). Typically, the plant differs from *A. glabra*, which it rather closely resembles, in the following points:—

- (1) Leaf-lobes wide, shallow, very obtuse.
- (2) Teeth on lobes large, wide, sub-equal.
- (3) Cauline leaves well-developed; inflorescence narrow and poorly-developed.
- (4) More obvious pubescence, not closely appressed; stem hairy up to first inflorescence-branch, and all except the earliest petioles hairy.

Although a well-grown plant of *A. obtusa* is easily recognisable on these points, it seems likely that separation of less well-developed plants from *A. glabra* will present some difficulty, as the characteristic hairiness in particular may not appear on small specimens. As in other species, a knowledge of the phenotypic range must be gained by cultivation.

The Euro-Asiatic distribution of *A. obtusa* is remarkably wide and scattered, and is exceptional in covering almost the whole area of the aggregate (cf. Samuelsson's monograph, 1943 B, 21).

(11) *A. Wichurae* (Bus.) Stéf. (Stéfansson 1901, *Flora Islands*, 135).

In his monograph (1909) Lindberg confessed that he was unable to separate the several species described by Buser as *A. acutidens*, *A. conivens*, its variety *Wichurae*, etc., and, therefore, included all such forms under *A. acutidens* Bus. ampl. Lindb. fil. The recent Scandinavian authors, however, appear to have distinguished to their satisfaction at least three species of "acutidens" type, viz., *A. Wichurae* (Bus.) Stéf., *A. Murbeckiana* Bus. and *A. oxyodonta* (Bus.) C. G. West. Of these, much of the British material is referable to *A. Wichurae*, with which Salmon's var. *alpestriformis* of *A. acutidens* seems to be identical (Salmon, 1914). There are, however, British plants not satisfactorily referable to this species, on which further study is necessary.

The distribution of *A. Wichurae* in Britain is very incompletely known, but it appears to be restricted to calcareous rock and soil in mountainous regions of N. England and Scotland. On Ben Lawers and the adjoining mountains it is frequent on wet rock in the corries and on streamsides. In N. England plants collected by me on Ingleborough, v.-c. 64 (June 1946), and in Teesdale, v.-c. 65, 69 (July 1947), are typical.

Its complete distribution is, like that of *A. glomerulans*, arctic-alpine; it is recorded from Greenland, Iceland, Scandinavia and the Alps.

Some attempt must now be made to assign the various species described by Jaquet as occurring in Britain to their correct place. Rothmaler (1941), 245, has made such an attempt, which, particularly in view of the sparse nature of his British material, was a very creditable one. It is perhaps of interest to quote him *in extenso* :—

"Concerning the occurrence of *Alchemilla* species in Britain the most remarkable ideas have been circulated through Jaquet's work"—(here follows a passage on the unreliability of Jaquet's determinations)—"*A. subcrenata* Bus., a Euro-Siberian species, was described (i.e. by Jaquet) from England as varying with hairy urceoles; *A. coriacea* Buser is mentioned with a hairy stem, and a new species of the *Splendentes* with patent hairs on the stem. Particularly absurd are the references to the S.W. European *A. coriacea*, the high alpine *A. tenuis*, *A. heteropoda*, *A.*

colorata and *A. curtiloba*. Because of shortage of British material I have not yet been able to clear up all these points; but according to Buser and Lindberg, who saw many British specimens, the following species occur commonly in the British Isles: *A. glabra* Neyg., *A. minor* Huds., *A. xanthochlora* Rothm., and *A. filicaulis* Buser. Ostenfeld later discovered *A. Wichurae* (as '*A. acutidens*') on the East side of Scotland. Later, *A. hybrida* and *A. glomerulans* were found, but only as rare occurrences. All further records are quite unbelievable: *A. coriacea* Jaq. = *A. glabra* Neyg.; *A. Salmoniana* Jaq. and *A. tenuis* Jaq. = *A. filicaulis* Buser; *A. subcrenata* Jaq. = *A. minor*; while *A. curtiloba* Jaq. might be based on autumn specimens of *A. xanthochlora*. *A. acutidens*, *acuminatidens*, *reniformis*, *connivens* and *firma* belong partly to *A. Wichurae*, partly to *A. glabra*!"

An inspection of herbarium material determined by Jaquet quickly shows that Rothmaler's remarks are fully justified. Adopting the approximate order of the species in Clapham (1946), the following would appear to be the correct assignments of the Jaquet determinations:—

- "*A. curtiloba*" = *A. xanthochlora*.
- "*A. subcrenata*" = *A. vestita*.
- "*A. heteropoda*"; "*A. tenuis*"; *A. Salmoniana* Jaq. = *A. filicaulis*.
- "*A. reniformis*" = *A. glomerulans*.
- "*A. connivens*"; "*A. firma*" = *A. Wichurae*.
- "*A. coriacea*" = *A. glabra*.
- "*A. crinita*" = *A. monticola*.
- "*A. colorata*" = *A. vestita*.
- "*A. acuminatidens*"; "*A. controversa*" = *A. glabra*.

It should be emphasised that the ten Buser species thus excluded from the British list are perfectly distinct in the Alps, whence Buser described them.

With the exception of *A. minima*, the truly British species dealt with in this paper are all widespread in Europe, occurring both in the Alps and in Scandinavia; and, while careful study of British *Alchemillas* may reveal the presence of some other species, such facts concerning distribution and lack of local Northern endemics as have been outlined suggest that these will be few in number.

The appended Key to the British species is based partly on the keys of Samuelsson (1940), 449, and in Lid's *Norsk Flora* (1944).

A fuller account of the British *Alchemillas* is in preparation for the Biological Flora of the British Isles, and any information relevant to the distribution and ecological differentiation of the species would be gratefully received. I should also be very pleased to see any material which is not readily identifiable.

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KEY TO THE BRITISH SPECIES UNDER *ALCHEMILLA VULGARIS* L. agg.

- 1a. Stem (at least the lower part) and petioles with spreading hairs.
- 2a. Whole plant, including pedicels and urceoles, hairy.
- 3a. Leaves more or less circular in outline, with 7 or 9 broad, obtuse lobes, and with basal sinus closed by the often overlapping basal lobes. Teeth of lobes 9 or 11, rather straight and obtuse. Stipules brownish. Plant rather dwarf, strongly silkily hairy all over. Upland limestone in N. England; also in Scotland and Ireland
A. minor Huds.
- 3b. Leaves reniform in outline, with open basal sinus.
- 4a. Plant very dwarf, with rather long slender rhizomes, and weak, decumbent-ascending few-flowered stems, 3-8 cm. long. Leaves 5- or incompletely 7-lobed; lobes, especially on spring leaves, separated by deep, toothless incisions $\frac{1}{2}$ to $\frac{1}{3}$ width of lamina. Teeth (7)9 or 11, rather acute and connivent, on distal margin of lobe. Leaf-lamina 1.5 to 3 cm. wide, 1.2 to 2.5 cm. long, rather strikingly blue-green in fresh state. Stipules light brownish. Whole plant covered with rather scattered spreading hairs, often very sparse on early petioles and restricted to folds on upper leaf-surface and veins below. Ingleborough, Yorks. ? elsewhere
A. minima Walters.
- 4b. Plant typically larger than the two preceding species. Leaf usually 7-lobed, lobes semicircular to semi-elliptical $\frac{1}{2}$ to $\frac{1}{3}$ width of lamina, with (9)11 or 13 rather curved, acute teeth all round lobe margin. Stipules more or less wine-red. Hairiness rather variable in density, typically greater than in *A. minima*, less than in *A. minor*. Widely distributed, extending into S. and E. England *A. vestita* (Bus.) Raunk.
- 2b. Pedicels, at least, glabrous.
- 5a. Upper leaf-surface hairy, at least on the folds.
- 6a. Leaves more or less circular in outline, 9- to 11-lobed, with closed basal sinus, strongly hairy on both surfaces. Inflorescence-branches and urceoles usually quite hairy. Teesdale (and Surrey) *A. monticola* Opiz.
- 6b. Leaves more or less reniform in outline, 7- to 9-lobed, with open basal sinus.
- 7a. Leaf-lobes markedly triangular, pointed, with (13)15-19(21) narrow pointed teeth, of which the middle ones on the lobe margin are the largest. Urceoles glabrous. Plant robust. Teesdale *A. acutiloba* Opiz.
- 7b. Leaf-lobes rounded.
- 8a. Teeth on lobes (9)11 or 13(15). Urceoles often sparsely hairy. Plant usually small, with slender stems. Scotland and N. English mountains *A. filicaulis* Bus.
- [8b. Teeth on lobes (13)15 or 17. Urceoles glabrous. Leaves and petioles more strongly hairy than in *filicaulis*. Plant medium in stature, inflorescence typically long and narrow *A. gracilis* Opiz.]

- 5b. Upper leaf-surface glabrous.
- 9a. Leaf-lobes rounded, teeth sub-equal. Common in Scotland and N. England *A. xanthochlora* Rothm.
- 9b. Leaf-lobes triangular, pointed; teeth largest in middle of margin. Teesdale *A. acutiloba* Opiz.
- 1b. Stem and petioles with adpressed hairs (may be \pm absent).
- 10a. Petioles and stem (except usually the inflorescence-branches) quite densely clothed with silky adpressed hairs. Upper leaf-surface usually distinctly hairy. Leaf-lobes very characteristically wavy in fresh state (in pressed leaves this is revealed as folded, overlapping lobes). Inflorescence very compact. Plant robust. Scottish mountains and Teesdale *A. glomerulans* Bus.
- 10b. Stem glabrous above second internode; upper leaf-surface glabrous.
- 11a. Leaf-outline more or less circular, with closed basal sinus, and wide, obtuse lobes. Leaf-lobes separated by a distinct toothless V-shaped groove. Teeth on lobes narrow, curved, acute, sub-equal, terminal tooth usually as wide as laterals and little if any shorter than them. Mountains, Scotland and N. England
A. Wichurae (Bus.) Stef.
- 11b. Leaf-outline more or less reniform with open basal sinus. No distinct toothless V-shaped groove between lobes. Teeth on lobes broad, obtuse or obtusish, terminal tooth markedly narrower than its neighbours and usually much shorter.
- 12a. Leaf-lobes triangular to $\frac{1}{2}$ -ovate, $\frac{1}{4}$ to $\frac{1}{2}$ of "radius" of leaf; teeth rather unequal, with largest teeth midway between tip and base of lobe. Stem almost completely glabrous, or with adpressed hairs on lowest (short) and next lowest (long) internode. Common in Scotland and N. England ... *A. glabra* Neyg.
- 12b. Leaf-lobes arcuate, very obtuse, not more than $\frac{1}{4}$ of "radius" of leaf; teeth large, sub-equal. Stem typically with sub-adpressed hair up to first inflorescence-branch (i.e. 3 internodes usually). Angus *A. obtusa* Buser.

The following points should be observed:—

1. *Leaf-characters*, unless otherwise stated, refer to mature summer rosette leaves; the early spring leaves, and the cauline leaves, often differ considerably in shape, toothing and hairiness.

2. Although *hair-distribution* is a valuable character, and much less variable than one might expect, nevertheless there is variation, particularly in *A. acutiloba*, *A. filicaulis*, *A. glomerulans*, *A. Wichurae*, *A. obtusa* and *A. glabra*, and a key dependent on hairiness only would occasionally fail to distinguish accurately between the last three in particular.

3. The distinction between "spreading" and "adpressed" hairs may seem trivial, yet in practice it is found to work remarkably well. Hairs are "spreading" when most of them make an angle greater than 45° with the stem or petiole; in forms with "adpressed" hairs these are closely applied to stem or petiole and adpressed hairiness may be rather difficult to distinguish without a lens.

4. *Habit of plant*, although affording useful points of distinction, is difficult to employ in a key owing to the impossibility of separating phenotypic from genotypic effects without cultivation. Thus *A. glabra* will on cultivation (and often does in the wild state) make a medium-

sized or even large plant, standing 1' or more in height, whereas *A. Wichurae* remains much more dwarf in cultivation; yet where the two are growing together, both may be quite dwarf, and the character useless.

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