

Ranunculus ficaria L. sensu lato

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ABSTRACT

The taxonomy, nomenclature and typification of the segregates of *Ranunculus ficaria* L. (Ranunculaceae) in Europe are revised, taking particular notice of their biology. Five subspecies are recognised in Europe, four of which occur in the British Isles. Subsp. *calthifolius* is confined to east-central and south-east Europe. Subsp. *ficaria* is restricted to western Europe. Subsp. *bulbilifer* occurs throughout much of the range of the species, but is rare in the Mediterranean region. Subsp. *ficariiformis* is found in the central and west Mediterranean region and may be native north to the British Isles. Subsp. *chrysocephalus* is native in the east Mediterranean region and is grown in British gardens where it spreads naturally. All the subspecies can spread by tubers. Subsp. *bulbilifer* and subsp. *ficariiformis* can spread by axillary bulbils. All except subsp. *bulbilifer* can spread by seed. The chromosome number of subsp. *calthifolius* is unknown. Subsp. *ficaria* is diploid. The remaining three subspecies are tetraploid. Triploids have been recorded from the British Isles.

KEYWORDS: infraspecific taxonomy, reproductive biology, habitats, distribution, variation.

INTRODUCTION

In the broad sense, *Ranunculus ficaria* L. (Ranunculaceae), the Lesser Celandine, is a gregarious species, easily recognised by its heart-shaped, bluntly angled or crenate, usually dark green leaves and shining, golden yellow flowers with 7–13 petals. It is one of the heralds of spring, forming bright patches in woods, on banks and in other damp places from March to May.

In the taxonomic elucidation of the *Ranunculus ficaria* aggregate, too much emphasis has been placed on chromosome counts and not enough consideration given to morphology, ecology and biology. Five taxa are recognised in this account, which, if cultivated, or if examined at intervals through their flowering and fruiting periods, are easily recognised. If only seen once in the field, however, or only a single specimen is available, it is often difficult to identify the plant with certainty. For this reason and for the fact that intermediates occur and can spread vegetatively, I have treated them all as subspecies. Three have small flowers and two large flowers. Two of the small-flowered ones (subsp. *calthifolius* and subsp. *ficaria*) are without bulbils in the axils of their leaves; one (subsp. *bulbilifer*) has them. Subsp. *calthifolius* has short stems and leaves congested in a rosette at anthesis, whereas subsp. *ficaria* is more spreading with longer, leafy stems. One of the large-flowered plants (subsp. *ficariiformis*) has bulbils and the other (subsp. *chrysocephalus*) is without. Their ecology and their distribution appear to overlap, but tend to be different. There are three tetraploids and one diploid. Triploids are recorded. The chromosome number of subsp. *calthifolius* is unknown.

The nomenclature of the infraspecific taxa is in chaos. I have attempted to clarify it, but typification of taxa is difficult as ideal specimens are rarely collected, and one needs to know what a plant does in both flower and fruit. Only the early flowers reach full size. The best specimens are taken late when fruit and bulbils are developed, but at this stage any flowers still open are usually late ones, which are mostly smaller than those when the plant first comes into flower. Botanists should check their local populations, so that we know more about the distribution and ecology of the subspecies. On the first visit they should note flower size, checking the bulbils and fruits at a later date.

NOMENCLATURE

The first problem is to deal with the typification of *Ranunculus ficaria* L. The typification of Linnaean species is carried out by different authors in different ways. My method is that which I try to apply to all typifications, that is, to try to find material which was available to the author when the description was written, bearing in mind that the author of the taxon is not always the author of the description. In carrying out this typification I try not to be biased by my idea of the taxon, unless there is more than one equally applicable specimen, in which case I would choose one which would mean continuity of application.

Linnaeus usually validated his taxa in *Species plantarum* (1753) in one of three different ways:

1. By copying verbatim the description or descriptive name from his earlier works or from the works of other authors and following it by a reference in that work;
2. By altering the description slightly, but still giving the reference to the original work; or
3. By writing a completely new description with no reference after it.

In the first example the specimens available when the original description was made, or specimens of synonyms or illustrations cited with the original description, must in my opinion have priority over those added at a later date, which would not have been available when the description was written. This is supported by Art. 7.15 of the *International code of botanical nomenclature*: "When valid publication is by reference to a pre-starting point description, the latter must be used for purposes of typification". From the point of view of typification, I cannot see that there is any difference between reference to, or actually publishing again, that description. This view is supported by Heath (1991).

In the second case, although the description is slightly altered, Linnaeus still refers to its source and thus himself believes the alteration is not important. As the bulk of the description still applies to the original source and especially as the alteration is often made only because additional species are involved, I believe the type should still be chosen from the source material.

In the third case, Linnaeus has decided either the taxon is completely new, or none of the earlier descriptions are satisfactory and he needs to write a new description. In this case all the material in the protologue will have been seen by him before writing the description and be equally available for selection, although I would where possible choose the one in the Linnaean herbarium, as that is the one which is most likely to have been in front of him when writing it.

The diagnosis of *Ranunculus ficaria* L. (1753) reads "*Ranunculus foliis cordatis angulatis petiolatis*" and is referred to *Flora Suecica* (1745) and there to the *Hortus cliffortianus* (1738), where it occurs with the exception of 'dentatis' instead of 'angulatis'. The *Hortus cliffortianus* is also referred to in *Species plantarum* immediately following *Flora Suecica*. There is a single specimen in the herbarium of the Hortus Cliffortianus (**BM**) labelled "Chelidonia Minor Rotundifolia CBP [Caspar Bauhin's *Pinax*]", a synonym given in the *Species plantarum* (1753).

When I first became interested in the nomenclature of this species I entered into a correspondence with V. H. Heywood, and a letter from him dated 1 March 1960 reads "As regards the typification, I was with Tutin and Dandy when the choice of the Hort. Cliff. plant was made and for the record I think it fair to say that Dandy did not venture a taxonomic opinion. On the occasion I agreed with Tutin about the identity of the plant, but since then I am not sure that a conclusive determination can be made of the Hort. Cliff. specimen. However, I think it would be wiser to regard it as the non-bulbiliferous form so as to avoid disturbing the nomenclature again".

I have examined this sheet, which has on it in Dandy's handwriting, "Type of *R. ficaria* L.!" There is a single plant which has three flowers, all of which are about 30 mm in diameter with the petals probably contiguous. I can see no sign of bulbils in the leaf axils. I agree with Tutin that it is the small-flowered plant without bulbils. Benson (1954) designated the specimen in the Linnaean herbarium, Savage Catalogue 715/12, as the lectotype of *R. ficaria*. This sheet contains three flowering stems with smaller flowers and less obviously contiguous petals. They are too young to show any signs of bulbils. The one word changed in the diagnosis in *Species plantarum* 'angulatis', is, if anything, more applicable to the Hort. Cliff. specimen. As stated above, in my opinion all syntypes are not equal and in this case the Hort. Cliff. specimen was available when the diagnosis was written and the Linnaean herbarium specimen was not. I am also less certain as to what the Linnaean herbarium specimen is, but if forced to give an opinion I would say it is probably subsp.

bulbilifer. I therefore reject Benson's lectotypification and designate the Hort. Cliff. specimen as the lectotype of *R. ficaria* L. Subsp. *ficaria* in this paper is thus as understood by Tutin in *Flora Europaea* 1: 234 (1964) and most other current works.

Ficaria verna Hudson (1762) is a new name for *Ranunculus ficaria* L. and therefore has the same type. *Ficaria ranunculoides* Roth (1788) is also a new name for *Ranunculus ficaria* L. and has the same type, and for that reason must be regarded as an illegitimate substitute for *Ficaria verna* Hudson. *Ranunculus praecox* Salisb. (1796) is an illegitimate substitute for *R. ficaria* L.

R. ficaria var. *aurantiacus* Turrill (1954) was based on material collected by Miss Alethea Robson near Windsor, Berks., and plants reproduced from it vegetatively at Kew. A specimen in **K** is labelled "*Ranunculus ficaria* var., flowers Cadmium Yellow (Ridgw. Pl. III) on back suffused Vandyke Red (Pl. XIII), in a field near Windsor, as a solitary plant of this colour growing with many ordinary yellow-flowered plants, 27 April 1932, Miss Alethea Robson". I designate it as the lectotype. Another sheet labelled "*Ficaria verna* var. *aurea*, origin from near Windsor, Cult. Kew, 22 Feb. 1935" is a paralectotype, although presumably vegetatively produced from the same plant. The colour of the petals of *R. ficaria* varies from pale to deep yellow, and Cadmium Yellow is only a slight increase in the depth of colour and does not seem worthy of recognition. As the plant has no bulbils and produces good seed, it is placed in the synonymy of subsp. *ficaria*. *R. ficaria* var. *fertilis* A. R. Clapham (1952) was never described in Latin and has remained invalid.

The other small-flowered plant without bulbils was first named *Ficaria calthifolia* Reichenb. (1832). Gussone (1844) described a different plant from Sicily as *Ranunculus ficaria* var. *calthifolius*, but he referred back to Reichenbach's plant and this name must be regarded as a new combination based on that taxon. Jordan (1847) probably described the same taxon, but he referred back to Gussone and thus indirectly to Reichenbach and he must be regarded as making a new combination in *Ranunculus*. *R. nudicaulis* Kerner (1863), *Ficaria intermedia* Schur (1866), *F. transilvanica* Schur (1866) and *F. pumila* Velenovsky (1887) are all referable to this taxon. *F. calthifolius* was made a subspecies of *R. ficaria* by Arcangeli in 1882, *R. nudicaulis* a subspecies of *R. ficaria* by Rouy & Foucaud in 1893, and *F. pumila* a subspecies of *F. verna* by Velenovsky in 1898.

The earliest name for the small-flowered plant with axillary bulbils is *Ficaria ranunculoides* var. *divergens* F. W. Schultz (1855). I have not designated a type, but have seen original Schultz material. The holotype of *R. ficaria* var. *bulbifer* Albert (Albert & Jahandiez 1908) is typical of this subspecies. The type of *R. ficaria* var. *sinuatus* Horwood (1916) is also referable to it. E. M. Marsden-Jones when describing *R. ficaria* var. *bulbifer* (1935) apparently did not know that Albert had used the same name for the same taxon. Marsden-Jones did not cite a type and apart from remarking that it occurs in all British vice-counties, mentions only two localities, Potterne in Wiltshire and Kew. I requested of **K** any material in their herbarium collected previous to the date of publication of *R. ficaria* var. *bulbifer* which could be regarded as types, and received five sheets all collected by W. B. Turrill at Kew in 1930 and all seen by Marsden-Jones. I have designated one of these sheets as the lectotype of *R. ficaria* var. *bulbifer* Marsden-Jones. It is labelled "*Ranunculus ficaria*, *bulbifer* [in pencil], Office of Works, Kew, under lime trees amongst Ivy. About 70 plants more or less female with some 100's hermaphrodite, 25 April 1930, W. B. Turrill (E. Marsden-Jones seen on 25 April 1930)". We shall never know which specimens the description was drawn up from, but at least this specimen was seen by Marsden-Jones during the studies which led to his publication of the name. The plants have rounded bulbils in the axils of the leaves and small flowers 14–16 mm in diameter. The name *R. ficaria* var. *bulbifer* Marsden-Jones is an illegitimate homonym of *R. ficaria* var. *bulbifer* Albert, and *R. ficaria* subsp. *bulbifer* Lawalrée (1955), based on Marsden-Jones' varietal name, is also illegitimate under Art. 64.4 of the *International code of botanical nomenclature*. Lambinon (1981), therefore gave it a new name, *R. ficaria* subsp. *bulbilifer*, the type of which is that of *R. ficaria* var. *bulbifer* Marsden-Jones. *Ficaria verna* subsp. *bulbifera* Á. & D. Löve and *Ficaria bulbifera* (Á. & D. Löve) Holub (1961) are both valid in that genus, and their type is that of *R. ficaria* var. *bulbifer* Marsden-Jones.

The name of the large-flowered plant with bulbils is the one most in doubt. *Ficaria grandiflora* Robert (1838) is probably it, but bulbils are not mentioned in the description and I have not seen a type. The epithet cannot be transferred to *Ranunculus* owing to *R. grandiflorus* L. (1753). Schultz (1858) thus gave it a new name *R. ficariiformis*. There are no specimens in Helsinki (**H**) or Geneva (**G**), the two herbaria which have some Robert material. Plants from the south of France, however, do seem to be the plant with bulbils. In view of the lack of original type material, I designate as the

neotype of *Ficaria grandiflora*, and thus also that of *R. ficariiformis*, an F. Schultz specimen no. ad 407 from Nice in CGE. It shows clearly the axillary bulbils and large hairy achenes, but the flowers, which are late ones, are only 30 mm in diameter. *R. ficaria* subsp. *grandiflorus* (Robert) Hayek is valid, but later than, and made illegitimate by, *R. ficaria* subsp. *ficariiformis*, which is based on the same type. Gussone (1844) described the large-flowered plants with bulbils, but his epithet *calthifolius* is referable to another taxon. Jordan (1847) said his plant does not have bulbils, but he referred to Gussone's plant which does. A Jordan plant from Toulon I have seen is in flower and the specimen does not have bulbils, but it looks like the plant which does. The description of Arcangeli's *R. ficaria* subsp. *calthifolius* refers to this plant, but the name belongs to another taxon.

R. ficaria forma *luxurians* Moss (1920) was described from Jersey, and was illustrated by E. W. Hunnybun from specimens sent to him from St Aubyns, Jersey, by S. Guiton on 19 February 1913. The original drawings of Hunnybun are in the Cambridge University herbarium (CGE) and this information is written on the drawing in Hunnybun's hand. The drawing was at first labelled "var. *calthaeifolia* vide Rouy & Foucaud *Flore de France* vol. 1, p. 73" and later "Moss says *R. ficariaeformis* F. Schultz". Both the material of Moss and of Hunnybun, used in their work on the *Cambridge British Flora*, is now to be found in CGE. The only specimens of this taxon to be found there are two sheets labelled "*Ranunculus ficariaefolia*, Jersey, 14 April 1913, E. W. Hunnybun". It is probable that Hunnybun did not keep the material he drew and these sheets were the only extant material available to Moss when he described forma *luxurians*. One of the sheets contains only basal leaves, the other, which I designate as the lectotype, contains one flower and one head of achenes. It is, in my opinion, *R. ficaria* subsp. *ficariiformis*.

I can find no name for the remaining large-flowered subspecies with no axillary bulbils, though some of the above mentioned names have been used for it, and I have described it below as subsp. *chrysocephalus*.

TAXONOMY

***Ranunculus ficaria* L., Sp. Pl. 550 (1753).** Habitat in Europae ruderalis, umbrosis spongiosis. LECTOTYPE: Hort. Cliff. 228 (BM).

Vernacular name: Lesser Celandine.

Description: Perennial, gregarious herb, with whitish, fibrous roots and numerous, whitish or pale brown, fusiform or clavate root-tubers 5–50 × 3.5–6.0 mm. Stems 3–40 cm, whitish (sometimes tinted purplish) at base, pale green above, glabrous, branched, ascending or erect, often rooting at the decumbent base. Leaves numerous, medium to dark green above with paler veins, often blotched or mottled whitish or purplish, paler and slightly bluish beneath with darker veins, glabrous or nearly so, rather fleshy; the basal with lamina 0.5–8.0 × 0.5–9.0 cm, broadly ovate, usually rounded-obtuse at apex, bluntly angled or crenate, rarely shallowly dentate, cordate at base with basal sinus wide or with overlapping lobes, the petioles up to 28 cm, pale green, with a sheathing base; the cauline similar to basal but smaller and with short petioles, sometimes with whitish or pale brown axillary bulbils. Flowers 15–60 mm in diameter, solitary at the end of each stem branch. Sepals 3 (rarely more), 5–10 × 3–7 mm, pale green, sometimes with a whitish area at the apex or along the margin, ovate or ovate-lanceolate, concave, obtuse at apex, caducous. Petals 7–13, rarely 0, 6–26 × 3–15 mm, bright, pale to golden yellow, very rarely orange, shining on inside, dull on outside and sometimes tinted purplish or greenish, fading to white, often contiguous, narrowly elliptical-oblong, oblanceolate or obovate, obtuse at apex, gradually narrowed at base. Stamens 5–72; filaments 2.0–8.5 mm, yellow; anthers yellow. Styles 5–72, 1.5–2.0 mm, greenish; stigmas yellowish. Receptacle concave, with short, pale simple eglandular hairs. Achenes either abortive or maturing in a globular cluster, when mature 2.5–5.0 × 1.7–3.5 mm, more or less globular or obovoid, with a cuneate base, keeled, minutely beaked, usually with few to numerous very short simple eglandular hairs. 2n = 16 (+0-7B), 24, 32.

1. Leaves up to 8 × 9 cm; petioles up to 28 cm; flowers up to 60 mm in diameter; achenes up to 5.0 × 3.5 mm 2.

1. Leaves up to 4 × 4 cm; petioles up to 15 cm; flowers up to 40 mm in diameter; achenes up to 3.5 × 2.2 mm 3.
 2. Stems rather robust, but straggling; bulbils present in leaf axils after flowering
d) subsp. *ficariiformis*
 2. Stems robust and erect; without bulbils in leaf axils after flowering ... e) subsp. *chrysocephalus*
 3. Leaves crowded at base with few on short stems a) subsp. *calthifolius*
 3. Leaves less crowded at base and more numerous on the elongated stems 4.
 4. Bulbils not present in leaf axils after flowering; achenes well developed b) subsp. *ficaria*
 4. Bulbils present in leaf-axils after flowering; achenes poorly developed c) subsp. *bulbilifera*
- a. subsp. **calthifolius** (Reichenb.) Arcangeli, *Comp. Fl. Ital.* 11 (1882).

Synonymy

Ficaria calthifolia [*calthaefolia*] Reichenb., *Fl. Germ. Excurs.* 718 (1832); *R. ficaria* var. *calthifolia* (Reichenb.) Guss., *Fl. Sic. Syn.* 2: 41 (1844) quoad basionym. exclud. descript.; *R. calthifolius* (Reichenb.) Jordan, *Obs. Pl. Crit.* 6: 2 (1847) quoad basionym. exclud. descript.; *Ficaria nudicaulis* Kerner in *Oesterr. Bot. Zeitschr.* 13: 188 (1863); *Ficaria intermedia* Schur, *Enum. Pl. Transs.* 14 (1866); *Ficaria transsilvanica* Schur, *Enum. Pl. Transs.* 14 (1866); *Ficaria verna* subsp. *calthifolia* (Reichenb.) Nyman, *Consp.* 7 (1878); *Ficaria pumila* Velen. in *Sitzb. Böhm. Gesell. Wiss.* 1887: 438 (1887); *R. ficaria* subsp. *nudicaulis* (A. Kerner) Rouy & Fouc., *Fl. Fr.* 1: 73 (1893); *Ficaria verna* subsp. *pumila* (Velen.) Velen., *Fl. Bulg. Suppl.* I: 6 (1898).

Illustrations: Reichenb., *Ic. Fl. Germ. Helv.* 3: t. 1 (1838–1839); T. Săvulescu, *Fl. Rep. Pop. Rom.* 2: 557, pl. 89, Fig. 6 (1953); M. Josifović, *Fl. Rep. Soc. Serb.* 1: 253, t. 37, Fig. 2 (1970).

Description: Plant small, with short stems at anthesis. Leaves crowded at base, few on stems, up to 4 × 4 cm; petiole up to 7 cm, without bulbils in axils. Flowers up to 30 mm in diameter; petals 10–15 × 2.5–6 mm, contiguous; pollen viable. Achenes fertile, c. 2.5 × 2.0 mm, with few to numerous, short, rigid simple eglandular hairs.

b) subsp. **ficaria**

Synonymy

Ficaria verna Hudson, *Fl. Angl.* 214 (1762) nom. nov. pro *R. ficaria* L.; *Ficaria ranunculoides* Roth, *Tent. Fl. Germ.* 1: 241 (1788) nom. nov. pro *R. ficaria* L., nom. superfl. illegit. pro *Ficaria verna* Hudson; *R. praecox* Salisb., *Prodr. Stirp. Allerton* 372 (1796) nom. superfl. illegit. pro *R. ficaria* L.; *R. ficaria* var. *aurantiacus* Turrill in *Bot. Mag.* 170: 226 (1954) (LECTOTYPE: field near Windsor, Berks., v.c. 23, 27 April 1932, A. Robson (K)); *R. ficaria* var. *fertilis* A. R. Clapham in Clapham, A. R., Tutin, T. G. & Warb., E. F., *Fl. Brit. Isles* 101 (1952) nom. invalid. sine diagn. latin.; *R. ficaria* subsp. *fertilis* Lawralrée in Robyns, *Fl. Gén. Belg. (Spermat.)* 2: 50 (1955) nom. invalid., sine diagn. latin.; *R. ficaria* var. *incumbens* auct., non F. W. Schultz, *Arch. Fl. Jour. Bot.* 122 (1855).

Illustration: Ross-Craig, *Draw. Brit. Pl.* 1: pl. 35 (exclud. H) (1948).

Description: Plant rather rigid, erect and with elongated stems. Leaves up to 5 × 5 cm, numerous on stems; petiole up to 15 cm, without axillary bulbils. Flowers usually 20–40 mm in diameter; petals 10–20 × 4–9 mm, often contiguous; pollen largely viable. Achenes mostly fertile and well-developed, 2.5–3.5 × 1.7–2.2 mm, with few to numerous simple eglandular hairs. 2n = usually 16, sometimes 16 + 1–7B, sometimes 24.

c) subsp. **bulbilifer** Lambinon in *Bull. Jard. Bot. Nat. Belg.* 51: 462 (1981) nom. nov. pro *R. ficaria* var. *bulbilifer* Marsden-Jones, non Albert.

Synonymy

Ficaria ranunculoides var. *divergens* F. W. Schultz, *Arch. Fl. Jour. Bot.* 122 (1855) (Described from the Wissembourg area, France); *R. ficaria* var. *bulbilifer* [*bulbilifera*] Albert in Albert & Jahandiez,

Cat. Pl. Vasc. Var 7 (1908) (HOLOTYPE: Champs inondés l'hiver, Ampus, Var, France, 27 May 1880, A. Albert (TLON)); *R. ficaria* var. *sinuata* Horwood in *Rep. botl Exch. Club. Brit. Is.* 4: 312 (1916) (LECTOTYPE: Ratcliffe, Leicester, 29 April 1909, A. R. Horwood (NMW)); *R. ficaria* var. *divergens* (F. W. Schultz) Horwood in Horwood & Noel, *Fl. Leicester* 19 (1933); *R. ficaria* var. *bulbifer* [*bulbifera*] Marsden-Jones in *J. Linn. Soc. London (Bot.)* 50: 40 (1935) (LECTOTYPE: Office of Works, Kew, under lime trees amongst ivy, 25 April 1930, W. B. Turrill (K)), non Albert (1908); *R. ficaria* var. *ficaria* sensu A. R. Clapham in Clapham, A. R., Tutin, T. G. and Warb., E. F., *Fl. Brit. Isles* 101 (1952); *R. ficaria* subsp. *bulbifer* Lawalrée in Robyns, *Fl. Gén. Belg. (Spermat.)* 2: 60 (1955) pro *R. ficaria* var. *bulbifer* Marsden-Jones, non Albert, nom. illegit.; *Ficaria verna* subsp. *bulbifera* Á. & D. Löve in *Bot. Not.* 114: 52 (1961) pro *R. ficaria* var. *bulbifer* Marsden-Jones, non Albert; *Ficaria bulbifera* (Á. & D. Löve) J. Holub in *Preslia* 33: 400 (1961) pro *R. ficaria* var. *bulbifer* Marsden-Jones, non Albert.

Illustrations: J. Linn. Soc. London (Bot.) 50: 45, Figs 6, 7, 8, 10 (1935).

Description: Plant rather slender, with elongated stems and a loose spreading habit. Leaves up to 4 × 4 cm; petiole up to 15 cm with small, globular, rounded-obtuse, axillary bulbils which reproduce the plant vegetatively. Flowers usually not more than 25 mm in diameter; petals 6–11 × 2–5 mm, usually narrow and not contiguous; pollen largely non-viable. Achenes rarely fertile, but sometimes yielding up to six well-developed ones per flower. 2n = usually 32, sometimes 24.

d) subsp. *ficariiformis* (F. W. Schultz) Rouy & Fouc., *Fl. Fr.* 1: 73 (1893).

Synonymy

Ficaria grandiflora Robert, *Pl. Phan. Toul.* 112 (1838) (NEOTYPE: Lieux cultivés, prairies humides, bords des fosses, champs à Nice, Alpes Maritimes, France, 1866, Rec. Choulette, F. Schultz, herb. Norm. Suppl. 1, no. ad 407 (CGE)), non *R. grandiflorus* L., *Sp. Pl.* 555 (1753); *R. ficaria* var. *calthifolius* [*calthefolius*] sensu Guss., *Fl. Sic. Syn.* 2: 41 (1844) quoad descript. exclud. syn.; *R. calthifolius* sensu Jordan, *Obs. Pl. Crit.* 6: 2 (1847) quoad descript., non *Ficaria calthifolia* Reichenb., *Fl. Germ. Excurs.* 718 (1832), nec *R. ficaria* subsp. *calthifolius* (Reichenb.) Arcangeli, *Comp. Fl. Ital.* 11 (1882) quoad basionym.; *R. ficariiformis* [*ficariaeformis*] F. W. Schultz, *Arch. de Flore* 260 (1858) nom. nov. pro *Ficaria grandiflora* Robert, non *R. grandiflorus* L.; *R. ficaria* subsp. *grandiflora* (Robert) Coutinho, *Fl. Port.* 232 (1913); *Ficaria ranunculoides* subsp. *grandiflora* (Robert) Cadevall & Sallent, *Fl. Catalunya* 1: 42 (1913); *R. ficaria* forma *luxurians* Moss, *Camb. Brit. Fl.* 3: 126 (1920) (LECTOTYPE: Jersey, 14 April 1913, E. W. Hunnybun (CGE)); *Ficaria verna* subsp. *grandiflora* (Robert) Hayek in *Feddes Repert.* 30: 327 (1927) quoad basionym, exclud. descript.; *Ficaria calthifolia* subsp. *grandiflora* (Robert) Trinajstić in *Zborn. I. Simp. Biosist. Jugosl.* 160 (1971).

Illustrations: Moss, *Camb. Brit. Fl.* 3: pl. 128 (1920) as forma *luxurians*.

Description: Plant up to 40 cm, rather robust but stems and leaves arching and straggling. Leaves up to 7 × 7 cm; petioles up to 28 cm, with ovoid or globular axillary bulbils. Flowers up to 50 mm in diameter; petals 17–26 × 4–12 mm, contiguous or overlapping; pollen largely viable. Achenes 4–5 × 2.5–3.5 mm, covered with numerous very short, rigid, pale simple eglandular hairs. 2n = 32.

e) subsp. *chrysocephalus* P. D. Sell in *Bot. J. Linn. Soc.* 106: 117 (1991) (HOLOTYPE: Hort. E. A. Bowles, Waltham Cross, 4 April 1931, W. T. Stearn (CGE).)

Illustration: *Bot. Mag.* 153: t. 9199 (1927) as *R. ficaria grandiflorus*.

Description: Plant up to 40 cm, robust and erect. Leaves up to 8 × 9 cm; petioles up to 21 cm, without axillary bulbils. Flowers up to 60 mm in diameter; petals 18–25 × 9–15 (–18) mm,

contiguous or overlapping; pollen largely viable. Achenes 3–4 × 2.0–2.5 mm, covered with numerous, very short, rigid, pale simple eglandular hairs. $2n = 32$.

HABITAT AND DISTRIBUTION

This is difficult to assess, as a large proportion of herbarium sheets cannot be determined with certainty and my field experience is restricted to the British Isles. There is, however, quite a lot of published information, which I have been able to put together with reasonable certainty. The species, as defined here, occurs in a wide range of communities in deciduous woodlands and hedgerows, on roadsides and ditch banks, in damp pasture, on cliff-ledges and cliff-tops and as a weed in gardens and lawns. It is found in open habitats and in deep shade on both heavy and light soils (especially those which are periodically wet), with a pH which varies from 4.4–6.9. Its altitudinal range in the British Isles is from sea-level to 360 m in N. England, 730 m in N. Wales, 550 m in Sutherland and 720 m in Kerry. In Continental Europe it reaches 305 m in S. Norway, 1200 m in the Tatra, 1620 m in the Pre-Alps and 1900 m in the Greek mountains. It ranges throughout Europe to approximately 60° E. in central and south-eastern parts of the former U.S.S.R., and is introduced in N. America (cf. Meusel *et al.* 1965, 168; Jalas & Suominen 1989, map 1833).

Subsp. *calthifolius* is a plant of east-central and south-east Europe, particularly on wood margins, roadside banks and neglected grassland. *Ficaria stepporum* Smirnov, from the southern area of the former U.S.S.R., is a plant I know nothing about, but appears to be similar to this subspecies.

Subsp. *ficaria* is restricted to western Europe from south-west Norway southwards through France to the westernmost Mediterranean region. It is rare in Belgium, the Netherlands and Denmark. I question the records for the central Mediterranean (Jalas & Suominen 1989, map 1836).

Subsp. *bulbilifer* probably occurs throughout the range of the species, but is rare or absent in the Mediterranean region. It is probably the only subspecies of cliffs and mountainous regions in many areas. It is an abundant weed of lawns and gardens, where it spreads rapidly and is very difficult to eradicate.

Subsp. *ficariiformis* occurs in the central and west Mediterranean region and may be native north to the British Isles. Plants from Jersey, Guernsey, the Isles of Scilly and a small patch of low woodland at St Ishmaels, Pembrokeshire are certainly it. It may be a native in some of these localities, but in 1979 D. E. Coombe and C. D. Preston failed to find any large-flowered *R. ficaria* outside gardens in Guernsey. Elsewhere, it may occur in and escape from gardens. In the drive from Grange Road to Leckhampton House, Cambridge, it has survived since 1940 (*J. Rishbeth* in CGE).

Subsp. *chrysocephalus* would appear to be native of the east Mediterranean region. Hayek (1927 as *Ficaria* subsp. *grandiflora*) says the large-flowered plants of Greece and Crete are without bulbils, and J. R. Akeroyd (pers. comm.) says this is also his experience both in the field and when cultivating them. In the spring of 1991 he found that it was common in Crete in minimally cultivated fields, edges of copses and by streams, especially on plateaux between 700 and 800 m; in April 1993 he observed it in S.W. Turkey. Meikle (1977) (as *R. ficaria* subsp. *ficariiformis*) says the large-flowered plant of Cyprus is without bulbils. Turrill first drew attention to this plant when he published a fine illustration of it in the *Botanical Magazine* in 1930. W. T. Stearn collected a specimen of it (CGE) from the garden of E. A. Bowles, which Bowles said was the clone from which the specimen was taken for this illustration. This is confirmed by an annotation on a specimen in K. This also seems to be the clone which Marsden-Jones & Turrill (1952) discovered was tetraploid, but without bulbils. I have used the Stearn specimens as the type of subsp. *chrysocephalus*.

P. D. Williams grew plants in his garden at Lanarth, Cornwall, which he obtained from Bowles. Lavender Williams transferred some of these to St Tudy, near Camelford, some of which she also sent to D. E. Coombe at the Cambridge Botanic Garden. Dr Coombe went to live in Chesterton Towers, Cambridge in 1982. In the spring of 1983 he discovered it in the garden of 1, Chesterton Towers, since when it has spread at least 100 m. It there grows with subsp. *bulbilifer* and appears to produce no intermediates. In 1979 D. E. Coombe and C. D. Preston collected plants in the garden of Dr and Mrs D. G. Jameson, Les Fontanelles, Forest, Guernsey, which had been transplanted from Mill House, Balsham, Cambridgeshire. This suggests that subsp. *chrysocephalus*, which is a handsome plant, may be fairly widespread in British gardens, where it could easily spread and become mixed with the common weed, subsp. *bulbilifer*.

RELATIONSHIP TO MAN, ANIMALS AND FUNGI

Ranunculus species contain the glycoside ranunculin, from which the irritant substance protoanemonin is formed. This is recorded in *R. ficaria*. The highest concentration of protoanemonin is present when the plant is flowering. All domestic animals appear to be susceptible to protoanemonin poisoning, from which various symptoms develop, but it rarely kills them.

To the adherents of the Doctrine of Signatures, the tubers looked like piles and it was formerly recommended for them both internally and externally, hence its alternative name, Pilewort. Its acrid nature makes it more suitable as an ointment. The tuber was also likened to a cow's udders and hung in the byre to produce more cream in the milk. As a harbinger of spring it is a plant mentioned by poets. The chocolate brown teleutosori of *Uromyces ficariae* (Alb. & Schw.) Lév. are very common on its petioles from March to early June, and honey-coloured spermogonial and orange aecidial stages of *Uromyces dactylidis* Oth are common on the undersides of leaves and on the petioles from March until May. *Entyloma ficariae* Fischer & Waldb. commonly forms yellowish to brown spots (delimited by the veins) on the leaves in April and May. *Septoria ficariae* Desm. is common on the fading leaves of the plants from May to July.

REPRODUCTIVE BIOLOGY

Plants are diploid ($2n = 16$), triploid ($2n = 24$) or tetraploid ($2n = 32$). Gill *et al.* (1972) record up to seven B-chromosomes in diploid plants, but none are recorded for triploids and tetraploids. In the British Isles diploids are widespread, though tetraploids are more common in the east. Diploid plants with B-chromosomes are virtually confined to southern England and the Midlands. Triploids have been recorded from a number of widely separated localities and may be frequent (cf. Marchant & Brighton (1974)). The diploid records for the British Isles will be referable to subsp. *ficaria* and the tetraploid mostly, if not all, to subsp. *bulbilifer*. The triploids are possibly hybrids between these two subspecies as they are recorded in their area and may or may not have bulbils. The flowers are protandrous, the anthers dehiscing extrorsely. The species is normally hermaphrodite, but male plants (usually diploids) with large petaloid perianth segments, no nectaries and numerous stamens and carpels abortive or absent occur in some populations, while some plants of tetraploid subsp. *bulbilifer* sometimes produce a few smaller female flowers as well as hermaphrodite ones. It is entomophilous, but self-pollination occurs in the absence of visits by insects, which include Coleoptera (particularly *Meligethes* sp.), Diptera, Hymenoptera (particularly *Apis mellifera* L.) and Lepidoptera. For a detailed list of species visiting *R. ficaria*, see Marsden-Jones (1935 & 1937a). A large proportion of the pollen of those plants found to be triploids and the tetraploid subsp. *bulbilifer* is non-viable and few seeds are set, but pollen from diploids and the large-flowered tetraploids is viable and many achenes are produced. *R. ficaria* is unusual among the dicotyledons in having only one cotyledon, and Marsden-Jones (1937b) has shown that it is a single foliar organ, on which after two or three months, a rudimentary root tuber develops. Clones of all the subspecies can be produced by division of the root tubers. A greater and quicker spread of clones occurs in subsp. *bulbilifer* and subsp. *ficariiformis*, where axillary bulbils separate off as the shoot system dies and can produce flowering plants in the first year. Subsp. *calthifolius*, subsp. *ficaria*, subsp. *ficariiformis* and subsp. *chrysocephalus* also spread by seed. Marsden-Jones (1935) says seedlings of subsp. *ficaria* do not begin flowering until the second year. Flowering normally takes place between February and May. More detailed accounts of the species occur in Taylor & Markham (1978) and Grime *et al.* (1988), but the general biology and ecology will not properly be understood until detailed studies of the individual subspecies are made.

By the drive which runs from Grange Road to Leckhampton House at Cambridge, there is a colony of subsp. *ficariiformis* which has been there since at least 1940 (fide J. Rishbeth). Subsp. *bulbilifer* is also present along the whole length of the drive. Although I have searched there over a number of years, I have never seen any plants I would call intermediate in morphology. Along a stream in the Cambridge Botanic Garden, subsp. *ficariiformis* used to grow with subsp. *ficaria*. In that locality there did seem to be morphological intermediates, but they were never examined cytologically.

Plants from the Leckhampton colony of subsp. *ficariiformis* and the Coombe/Preston plants from

La Gouffre, Guernsey, of subsp. *chrysocephalus*, were grown in pots in the Botanic Garden, Cambridge, together with examples of subsp. *ficaria* and subsp. *bulbilifer*. I was there able to watch them all together right through the season and R. A. Finch kindly counted their chromosomes for me. The tetraploid count of subsp. *chrysocephalus* confirms that made by Marsden-Jones (Marsden Jones & Turrill 1952). As the plants of subsp. *chrysocephalus* die, the stalks bend over so that the falling seeds form a ring round the old plant and later produce a circle of seedlings.

VARIATION

As well as the variation given in the formal account of the five subspecies, there is considerable variation in flower colour, number of petals, leaf-blotching and width of basal sinus of leaf which to some extent is genetically controlled, but can occur in all subspecies (Marsden-Jones & Turrill 1952). Var. *aurantiacus* with orange petals seems to have been found only once, but you can buy it as 'Cupreus' from no fewer than 13 nurseries. It did not come true from seed produced either from self-pollination or cross pollination, but was easily multiplied vegetatively. Its chromosome number was given as $2n = 20$ (presumably $16 + 4B$). In Philip & Lord (1991) 25 variants are listed as being available for sale in a wide range of nurseries. More work is needed on these garden variants to establish to which subspecies they belong.

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