sult in 5-10% of misidentifications; the mean of ten measurements will almost always place a plant unambiguously.

The two species differ in flower-colour, though not sufficiently for easy identification. The relative length of the wings and the keel is *not* a good character; much *minor* in the New Forest and elsewhere has strongly curved wings longer than the keel.

U. minor ranges in height from *c.* 5-150 cm., and *U. gallii* from *c.* 10-200 cm. This difference in vegetative size, and characters of the length and rigidity of the spines, are only of value for identification when plants from closely comparable habitats are considered—or on the rare occasions when the two species grow together. Flower size is much less plastic than size of vegetative parts, but it is slightly affected by vegetative vigour. It is helpful to remember that a *small* plant with flower parts of borderline size, growing in short open heath, is likely to be *gallii*; a *large* plant with flowers of borderline size, growing on a roadside or in a woodland clearing, is likely to be *minor*.

U. gallii is predominant in the area west of Dorchester, Salisbury, Oxford and Sheffield (and near the East Anglian coast); *U. minor* is predominant in the south-east.

REFERENCES

BENOIT, P. M., 1962, *Ulex europaeus* × *gallii*, *Proc. bot. Soc. Br. Isl.*, **4**, 414-415.
PROCTOR, M. C. F., 1965, The distinguishing characters and geographical distributions of *Ulex minor* and *Ulex gallii*, *Watsonia*, **6**, 177-187.

RECOGNITION OF *CALLITRICHE* SPP. IN BRITAIN

By J. P. SAVIDGE

Little difficulty should be experienced in the identification of the British species of *Callitriche,* providing the specimens are flowering and/or fruiting, although in a few cases the use of a microscope may be necessary to confirm correct determination. The main purpose of this short synopsis is to indicate the most satisfactory characters by which each species can be recognized.

C. hermaphroditica L. (*C. autumnalis* L.) and *C. truncata* Guss. are very distinct from the other British species of *Callitriche* in that their leaves are without stomata and pellucid glands, their flowers are without bracts, and they have a basic chromosome number of $x=3$ instead of $x=5$. They have only linear leaves, which are usually less than 17 mm. long, and grow completely submerged. It is usually easy to separate the two by their fruits, that of *C. truncata* being distinctly broader than long with rounded mericarps, whereas the fruit of *C. hermaphroditica* is as broad as long and distinctly winged. *C. truncata* usually has shorter (less than 10 mm. long) pale green leaves as against the somewhat broader, darker leaves of *C. hermaphroditica*. The latter species is northern in its distribution, whereas *C. truncata* is a southern species. Only in the Midlands are the two likely to be found

growing together, although as yet they have not been recorded in the same locality.

C. hamulata Kütz. is readily distinguished by the possession of 12- and 16-celled pellucid glands as against the 4- or 8-celled glands found in the remaining species. Its fruit is small, usually black when mature, about as long as broad, with the reflexed styles closely adpressed to the lateral sides. The stamens are usually less than 2 mm. long and the anthers are creamy-white. In fast-flowing or deep water the linear leaves are characterized by their 'calliper'-shaped tips, the tips of the emarginate apex first curving outwards and then finally converging. However, in some habitats the submerged leaves have simple emarginate apices.

C. obtusangula Le Gall is a lowland species and can often be recognized by its many leaved rosettes with the rhomboid-spathulate leaves tending to push the apex above the level of the water. Good diagnostic characters are the pollen grains, many of which are at least twice as long as broad; the large cream coloured anthers on filaments 5 to 9 mm. long; and the longer than broad fruit with rounded mericarps and more or less persistent long (4 to 8 mm.) styles. The bracts in this species are often conspicuous, being up to 1·5 mm. long and persistent.

The two species which are most likely to cause trouble in identification are *C. stagnalis* Scop. and *C. platycarpa* Kütz., and extra care should always be taken to avoid misidentification. If possible, one should use a combination of characters rather than relying on just one character. The main differences are:

CHARACTER	*C. stagnalis*	*C. platycarpa*
leaf length/leaf width ratio	between 2 and 3	usually at least 3, often 4 or more
bracts	usually deciduous	normally persistent
stamens	usually less than 3 mm. long	usually more than 3 mm. long
anthers	cream, almost 100% of pollen viable	yellow, some pollen inviable
pollen size (mean)	21μ	25μ
styles	rarely more than 3 mm. long	usually 4 mm. or longer
fruit	distinctly winged mericarps	mericarps keeled or slightly winged
chromosome number	$2n=10$	$2n=20$

C. platycarpa is widespread, but is confined to land below about 500 ft., whereas *C. stagnalis* is common, especially on mud and in shallow water, up to 3,000 ft. When submerged, *C. stagnalis* retains its ovate leaves; but *C. platycarpa* produces linear 1-veined leaves up to 30 mm. long when in fast-flowing or deep still water.

C. platycarpa rarely produces abundant fruit and some colonies seem to be virtually sterile. This is in marked contrast to *C. stagnalis* which is usually very fertile, except when growing submerged.

Hybrids are very rare, although at least four of the species may be found growing together. So far, I have not come across any authentic British material of *C. palustris* L., but I have seen herbarium sheets which suggest that *C. polymorpha* Lønnr. may occur in the British Isles. I should be very pleased to hear from anyone who finds *C. platycarpa*-like plants with fruit obviously broader than long and less than 1 mm. in length.

KEY TO SPECIES OF CALLITRICHE OCCURRING IN BRITAIN

1 Flowers without bracts; leaves without pellucid glands and stomata; plants completely submerged with linear leaves less than 17 mm. long and 2 mm. wide 2
Flowers with two bracts (in *hamulata* and *stagnalis* these may be inconspicuous as they are less than 0·5 mm. long); leaves with pellucid glands and usually with stomata; plants submerged or terrestrial, if submerged then leaves usually more than 17 mm. long and/or 2 mm. wide 3

2 Fruit distinctly broader than long, 0·9-1·2 × 1·1-1·5 mm., the mericarps with rounded outer margins; leaves light green, 5-10 (-13) mm. long, with more or less parallel sides . *truncata*
Fruit about as broad as long, 1·2-2·7 × 1·2-2·7 mm., the mericarps distinctly winged in lake forms, but only keeled in canal forms; leaves dark green, (5-) 7-17 (-20) mm., becoming slightly broader towards the base ..... *hermaphroditica*

3 Fruit distinctly longer than broad, 1·3-1·8 × 1·1-1·4 mm., broadest at the middle, the mericarps with rounded outer margins; about 70% of pollen at least twice as long as broad; anthers pale cream, about 1·7 mm. wide ..... *obtusangula*
Fruits not distinctly longer than broad; no pollen twice as long as broad; mericarps with winged or keeled outer margins; anthers less than 1·5 mm. wide 4

4 Styles closely reflexed to lateral sides of fruit, more or less persistent; stamens up to 2 mm. long, anthers pale cream to white; mature fruit usually black (brown in var. *pedunculata*), slightly broader than long, 0·8-1·3 × 0·8-1·3 mm., the mericarps with keeled outer margins ..... *hamulata*
Styles not usually closely reflexed to lateral sides of fruit; mature fruit brown; stamens usually more than 2 mm. long; anthers dark cream or yellow 5

5 Outer margins of mericarps distinctly winged; caespitose and terrestrial forms with stamens 2-3 mm. long, leaves about twice as long as broad; submerged plants never with linear leaves; all forms with leaves possessing at least three veins; usually very fertile ..... *stagnalis*
Outer margins of mericarps keeled; stamens normally longer than 3 mm., even in terrestrial forms; leaves usually at least three times as long as broad and up to 30 mm. long, and 1-veined, in submerged forms; plants rarely producing abundant fruit and usually about 15% of pollen inviable ..... *platycarpa*

ROSA MICRANTHA BORRER EX SM., *R. TOMENTOSA* SM., *R. AFZELIANA* FR. AND *R. SHERARD II* DAVIES

By I. M. VAUGHAN

Roses possess a phenomenal ability for mutation, especially the section *caninae* with its four subsections *stylosae, eucaninae, villosae,* and *rubiginosae* but the mutations are contained within the limits of recognizable species. This tendency for mutation appears in the breeding of garden roses where the ability to produce "sports" is transmitted mainly through the female parent (in consonance with the peculiar breeding arrangements in *canina*). Mutations, both somatic and germinal, are much more frequent amongst F1 and F2 hybrids.

Wolley-Dod's 'Revision of the British Roses' in 1930-31 (Wolley-Dod 1930-31) is a dissection of the genus into a medley of groups, varieties, and forms, e.g. between *R. afzeliana* and the closely allied *R. coriifolia* Fr. he distinguishes no less than 32 varieties and forms. Wolley-Dod classified on the basis of almost each individual specimen but the question arises as to the stability and hereditability of his characters. He revised his revision of 1930-31 but it was never published. The MSS, which I have failed to trace, may be with his herbarium bequeathed to the British Museum (Natural History) which is involved in rearrangement and probably unavailable for another year. Wolley-Dod had grave doubts himself about his classification and in a letter quoted in Rayner's Supplement to Townsend's *Flora of Hampshire* (Rayner 1929) he attributed the varieties to a "series of very ancient hybrids, crossed and re-crossed an infinite number of times". "Very ancient" is an imprecise term; roses appear late and in small numbers in palaeobotanical records (Godwin, 1956) and possibly modern cytogenetics will not sustain his conclusion.

Clapham, Tutin and Warburg (1962) carried simplification to the opposite extreme but still referred to Wolley-Dod for further information: *R. afzeliana* (*R. glauca* Vill.) and *R. coriifolia* were amalgamated under the name *R. dumalis* which Wolley-Dod allotted to a member of the *dumales* group of *R. canina*. Wolley-Dod also gave specific rank to the hispid forms of *R. canina* as *R. dumetorum,* which is confusing. Further, Wolley-Dod retained the name *R. villosa* which the International Code of Botanical Nomenclature (1956) cited as an example of a *nomen confusum* and therefore illegitimate (see Article 65 (Lanjouw, 1956)).