

MINT NOTES

By R. A. GRAHAM

V. MENTHA AQUATICA, AND THE BRITISH WATER MINTS

Water mints differ essentially from other British mint groups in having a *capitate* inflorescence, the capitulum being borne terminally and with or without underlying, axillary verticils. Rarely the inflorescence is very elongated to form a thick spike, the contiguity of the underlying verticils contributing to such an appearance. Certain hybrids of *M. aquatica* L. with *M. spicata* L. em. Huds., *M. longifolia* (L.) Huds. and *M. arvensis* L. sometimes produce capitate forms, and these will be dealt with in papers on the respective groups.

M. AQUATICA L., 1753, *Sp. Pl.*, 1, 576

Mentha floribus capitatis, foliis ovatis serratis petiolatis, staminibus corolla longioribus . . . Planta non hirta, Verticilli terminales in capitulum s. spicam obtusam conferti.

There is, in my opinion, no Linnean specimen that can be satisfactorily accepted as type or lectotype. Specimen No. 730/9 (Savage, 1945, *Catalogue*), which bears the name *aquatica* in Linnaeus' hand, is one of those mint oddities whose exact status cannot be ascertained without observation under cultivation, and cytogenetical investigation. Undoubtedly it has some connection, through hybridity, with a water mint, and it agrees with the description, in that (1) the stamens are exserted, and (2) that the inflorescence is somewhat subspicate due to a close arrangement of the verticils, *which are however far more numerous (up to 10) than is usual in a water mint*. From its general appearance, this specimen is *probably* an unusual form of *M. × verticillata* L. (*M. aquatica* × *arvensis*). Smith (1800, 198-9) considered it to be a connecting link between *M. hirsuta* Huds. and *M. paludosa* Sole, and, believing it to represent the mint described as *M. aquatica* in *Sp. Pl.*, he abandoned this binomial in favour of *M. hirsuta* to designate the water mint group. There can, in my opinion, be no reasonable doubt that by *M. aquatica*, Linnaeus intended the mint known to us as Water Mint, though to be sure he described a particular form. His citations point to this, and, further, water mints grow quite commonly in Sweden so that it is only reasonable to assume that Linnaeus knew them. This specimen is best regarded as a misidentified oddity – several of the Linnean mints are queer plants.

It is, perhaps, not strange that Linnaeus' description, being so short, agrees with the specimen in certain respects. But I do not believe it to be the plant from which his description was framed, and as this is of fundamental importance I give my reasons below for rejection.

(1) Linnaeus *accurately describes a normal water mint*, which has a capitate inflorescence composed either of a terminal capitulum alone, or with underlying verticils of which the uppermost one or two are contiguous or subcontiguous to the capitulum thus giving the appearance of an obtuse spike.

(2) The Linnean specimen is a *verticillate mint*. There is no capitulum, but an apical verticil smaller than the many underlying verticils. There is thus no appearance whatever of a capitate inflorescence, though it could be described as a spike or sub-spike (but of very different appearance to the "spike" of a water mint).

(3) It is clear, from his descriptions of other mints, that Linnaeus accurately recognised capitate and verticillate types of inflorescence. Had this specimen been the original *M. aquatica* it is hard to understand why he used the words *floribus capitatis* when *floribus verticillatis* would be much more correct.

(4) Linnaeus accurately described his *M. hirsuta* as *floribus capitatis*. His specimen of this is a normal but very hairy water mint. It is described as differing from *M. aquatica* only in being more hairy and with shorter petioles, and yet his specimen of *M. hirsuta* is very unlike that named as *M. aquatica*.

(5) Water mints apparently always have a hairy calyx tube. For this reason I do not think that "*Planta non hirta*" can imply a wholly glabrous state. But the specimen named *M. aquatica* is altogether too hairy reasonably to be described in these terms.

From Linnaeus' description of *M. aquatica* and from his comments in comparison with *M. hirsuta* (see under var. *hirsuta* below), together with inferences from his specimen of the latter mint (No. 730/8), the original *M. aquatica* L. can be suggested as a water mint with the following characters: *Whole plant subglabrous in appearance, though not wholly so in detail; leaves ovate, serrate, basally rounded to \pm cordate, on petioles long enough to be obvious; inflorescence either a terminal capitulum only, or with underlying verticils which may be contiguous to give the appearance of a blunt spike.* His specimen probably owes its identification to some character in which it appeared to Linnaeus to agree with his original *M. aquatica*.

Many British water mints, especially from riparian areas, are largely subglabrous and can, in my opinion, be regarded as typical of Linnaeus' original *M. aquatica*. I have placed in the Oxford herbarium an example which indicates my conception of a typical plant in every character except that the upper part of the stem is perhaps a little too hairy although the whole plant is outwardly subglabrous. Gathered from Marlow river-side, Bucks., v.c. 24, it can be described as follows:

Stem green, branched, a little bearded at the nodes, otherwise almost glabrous below but becoming progressively more hirsute upwards with retrorse, white hairs; internodes up to 5.5 cm. *Leaves* ovate to oblong-ovate, thin in texture, obtuse to sub-acute, abruptly rounded and sometimes \pm truncate at the base, usually with a small wedge at the junction with the petiole; up to 5.5 \times 3.3 cm.; generally subglabrous but with whitish hairs on the nerves of both surfaces – more numerous on the upper, more immature leaves; serratures shallow, blunt, forward-directed, \pm regular in spacing, up to 1 mm. deep, and to 14 in number. *Petioles* up to 2.5 cm. long, with a few, scattered, white hairs. *Inflorescence* consisting of a terminal, \pm rounded capitulum of medium size, 2 cm. in diameter, with one pair of underlying, non-contiguous, axillary, shortly-pedunculate verticils. *Calyx* tubular, shortly ciliate with \pm ascending hairs. *Pedicels* rather shaggy with retrorse, white hairs. *Corolla* with a few scattered hairs externally. *Stamens* exerted.

Whereas typical *M. aquatica* L. is suggested as a mint with the general characters set out in the previous paragraph, it will become clear to anyone who consults the many specimens in our national herbaria and in private collections that water mint is extremely variable. The following paragraph is therefore devoted to a description of water mint forms in the aggregate, indicating variation in certain characters.

Stem squarish, simple or branched, green to red, glabrous to densely hairy with long, white hairs. *Leaves* orbicular to narrowly elliptical, very acute to rounded at the apex, cordate to long attenuate at the base, glabrous to densely pilose – the lower surface having sometimes a matted indumentum giving the appearance of a coarse tomentum (the upper, less mature leaves tend to be more hairy than the lower which have arrived at full maturity); serratures very few to very many, shallow to deep, sometimes salient, blunt and sometimes \pm crenate to jagged. *Inflorescence* essentially capitate, of either a

terminal capitulum only, or commonly with up to two pairs of underlying, axillary verticils, occasionally with as many as eight pairs which are contiguous at least at the apex thus forming an obtuse spike (such a form is the example recorded by Miss Muirhead from R. Eden, Cumberland, v.c. 70, in 1952, *Watsonia*, 2, 204, which I tentatively, and erroneously, named as *M. × palustris* Sole). *Calyx* glandular, ribbed, always tubular, shortly ciliate to densely shaggy with usually ascending hairs, probably never quite glabrous or even essentially so, the teeth $\frac{1}{4}$ - $\frac{1}{2}$ the length of the tube, occasionally rather longer. *Pedicels* shortly to densely hairy with white or whitish, usually retrorse hairs, apparently never glabrous. *Peduncles* of axillary verticils usually short, sometimes long and very noticeable. *Corolla* 4-fid, sometimes deeply so, varying somewhat in size (depending perhaps on sexuality), usually with a few scattered hairs externally and sometimes with a ring of hairs in the throat. *Stamens* exerted or included, sometimes perhaps absent. (See Schultz (1896, 433-434) for an interesting correlation of stamen development with the size of the leaves and capitula). *Scent* minty, but rather dull and not sweet, nor pungent as in *M. spicata* and *M. piperita* L. Very rarely examples are found with the scent characteristic of *M. citrata* Ehrh. and it is possible that these may be hybrids although they show no morphological indications of this. Those who wish for an anatomical account should consult A. & E. G. Camus (1911).

Typical *M. aquatica* L. is, in my opinion, only a form that, by a combination of certain characters set out in the foregoing paragraph, can be selected out of the innumerable forms that occur. But the different combinations of characters are so endless, and the variation thereby so wide, and yet so gradual – indeed it is only seldom that one can exactly match examples from different localities – that I believe *M. aquatica* L. to be a polymorphic species whose division into the grades *varietas* and *forma* is taxonomically unsound. It is perhaps unfortunate that a great many different forms have received names from eminent specialists of the past.

The causes of the great polymorphism are not very clear. Cytological investigation indicates that $2n=96$ in most plants – if not all. Reproduction is largely vegetative, by runners, and no doubt many mutants become perpetuated in this way as clones. Seed is produced to a certain extent. No doubt also seasonal, edaphic and other environmental factors play their part in influencing the final characters of any given form, and it is clear that some of the named forms owe their status to such causes only. That the degree of hairiness of the stem and leaves is controlled, at any rate in part, genetically, is suggested by occasional occurrences of subglabrous and very hirsute forms sharing a habitat.

Strail, Braun, Briquet and Topitz are among those who have divided the water mints into many named forms, using *species*, *varietas* and *forma* as grades for the purpose. Indeed Topitz (1913, 168-179) contrived to recognise no less than 40. Leaf characters, degree of hairiness, size of the capitula, presence of axillary verticils, and degree of branching are among the chief criteria used for differentiation. Strail regarded the exertion or inclusion of the stamens as an important character, but this is probably a matter of sex-function. In my view, all the varieties listed by these and other authors (except var. *nemorosa* Fr.) are merely examples selected from the great variational range. Many are closely allied, and identification according to any of these four authors, or all, becomes a task of distracting difficulty. This is particularly so in view of intermediates, because, no matter how many named forms there are, intermediates will always be found in a species as polymorphic as this, and with so many names to choose from the correct placing of any given intermediate often becomes taxonomically impracticable.

This paper, in view of the complexity of the problem, should be regarded as a preliminary attempt to simplify the British water mints as a whole – to restore a semblance

of order out of chaos. The great tangle of the past is thereby reduced to a basis whereon future constructive work can be based.

It may be convenient for herbarium purposes to separate the various forms into different groups. I therefore give below all the varieties and forms that have been included in British lists, with a few others that can be recognised by a simple character. It is necessary to deal in some detail with all the varieties, etc., recognised by Fraser (1925 and 1927), as some of his descriptions differ in certain details from the originals – this being due to Fraser's having framed his texts on examples identified by Briquet, but apparently without adequate reference to the original descriptions in each case. But it must be remembered that, within the reasoning of this paper, no importance is attached to these varieties, etc., with the possible exception of var. *nemorosa* Fr.

Distribution and status

Water mints in the aggregate are common throughout the British Isles, being recorded from every vice-county. Essentially lowland plants, they inhabit marshes, ditches, river-sides, and other types of habitat where damp conditions prevail, and they tend to become stunted or die out in the wild state if the accustomed humidity becomes permanently denied them. Although mentioned in certain horticultural works, they do not appear to have been seriously cultivated, if at all, and it is unlikely that their status is other than native – as on the Continent. Information on medical properties is rather scanty, but Sole mentions the use of his *M. aquatica major* in cases of hysteria.

SOME WELL-KNOWN FORMS OF *MENTHA AQUATICA* L.

1. *With a rounded to cordate leaf-base*

(a) *Mentha aquatica* L., *sensu stricto* (see above).

(b) var. *hirsuta* (Huds.) Hudson, 1778, *Fl. Angl.*, ed. 2, 252.

'*Mentha floribus capitatis, foliis ovatis serratis subsessilibus pubescentibus, staminibus corolla longioribus.*' Hudson, *loc. cit.*

M. hirsuta Hudson, 1762, *Fl. Angl.*, ed. 1; Linnaeus, 1767, *Mantissa*, 81

"*Differt a M. aquatica foliis magis sessilibus hirsutis; convenit staminibus corolla longioribus, et toto facie. Pistillum corolla longius. Corolla profunde 4-fida, fere regularis. Calyces ciliati.*" Linnaeus, *loc. cit.*

No specimen of Hudson's appears to exist. But the Linnean specimen No. 730/8, named as *hirsuta* in Linnaeus' hand, agrees with the description and can be regarded as typical of this variety. It is described as follows:

Stem square, simple, reddish, covered – especially thickly above – with retrorse, whitish hairs. *Leaves* ovate, ± acute, basally subcordate, up to 3 × 2.8 cm., very hairy and dark green above, paler below and thickly matted with grey-white hairs forming a coarse tomentum; nerves of the upper, and midrib of the lower surface whitish; serratures unequal in spacing, size, and shape, shallow but jagged and rather salient, up to 1 mm. deep, and up to 14 in number. *Petioles* short, up to 8 mm. long, shaggy. *Inflorescence* of a terminal capitulum and two pairs of axillary verticils, the upper subcontiguous with the capitulum. *Corolla* with scattered hairs externally (not examined within). *Stamens* exserted. *Calyx* and *pedicels* shaggy.

This specimen is very hirsute throughout, and thereby has a very different appearance from typical *M. aquatica* L. But between the two there is every degree of intermediate in this character, and it is impossible to draw a distinctive line. Short petioles are often found in the more hirsute forms, but they are not restricted to them, and provide a most unreliable character. Probably Linnaeus thought little of *M. hirsuta*, and many writers

since have held a similar view. For those who wish to differentiate between them, Grenier & Godron (1850, 651) provide the following succinct distinction: *M. aquatica* "var. *genuina*" having leaves "*munies de poils épars ou presque glabres,*" and var. *hirsuta*, "*couvertes de longs poils blancs presque tomenteuses.*" Such a distinction is easy when extremes are handled, but the bulk of the material lies between the two. I regard var. *hirsuta* as merely a hirsute form of *M. aquatica*.

(c) var. *tomentosa* Sole (1798, 55, no fig.).

"*Mentha spicis glomeratis, caule erecto villosa non ramoso, foliis cordato-ovatis serratis petiolatis, incanis, mollioribus, staminibus corolla brevioribus: odore aromatico.*"

This variety seems to have been largely neglected, perhaps due to its secluded position at the end of Sole's fine book. There are several authentic specimens, those at the British Museum and the Linnean Society being apparently the same sort of mint, and no doubt from the same habitat. I have been unable to find any good distinction from var. *hirsuta*. The leaves may be a trifle softer but this feature is difficult of assessment when a specimen is stuck down. Sole's specimens are rather paler green in colour, but this may be due to difference in drying conditions. I regard var. *tomentosa* as a softly hairy form of var. *hirsuta*, the two being questionably differentiable.

(d) var. *chaixii* Timbal-Lagrave (1860, 332).

. . . leaves "*couverte surtout en dessous de poils blancs gros et brillants, ce qui n'y a lieu ni dans l'hirsuta ni dans l'aquatica.*"

This variety, whose additional characters are a simple, hirsute stem, with elongate-oval, acute, basally subcordate leaves with fine and unequal serratures, is characterised chiefly by the *long, brilliantly white hairs of the leaves*. I have seen no British examples that answer exactly to the description, but they are quite likely to occur, and this variety is included here as perhaps representing the extreme of hairiness in the water mint group.

(e) var. *grandidentata* (Strail) Briquet (1891, 78).

M. grandidentata Strail (1887, 96)

According to Briquet's description, which follows Strail closely, this variety is a very hirsute form, distinguished by *leaves little longer than broad with deep, regular, sharp serratures*. I possess specimens from the periphery of Braunton Burrows, v.c. 4, which can be named as this variety, which I regard merely as a form of var. *hirsuta* with the above-mentioned leaf shape and serrature characters.

(f) var. *denticulata* (Strail) H. Braun (1890, 420).

M. denticulata Strail (1887, 104)

M. aquatica var. *lupulina* Briquet (1891, 79)

Stengel . . . mit etwas zurückgekrümmten Haaren bekleidet. Blätter oberseits zerstreut behaart, unterseits hauptsächlich an den Nerven behaart, alle gestielt, breit-oval, am Grunde fast herzförmig, lang spitz nach vorn, 4 cm lang, 3 cm breit, am Rande wenig tief gesägt, mit spitzen und genäherten Sägezähnen. Köpfchen nicht breit . . .

This variety, which Braun regarded as a minor variant of his *M. aquatica* L. is characterised by the *many, small, sharp serratures*. It is evidently only thinly hairy, and Fraser was perhaps in error in describing the upper leaves as densely hairy with a grey

tomentose subsurface. Still (in correspondence with me) regarded this variety as a very hirsute form, but this would seem to be incorrect although hirsute forms with serratures as described above certainly occur. At its best this variety can be easily told by the saw-like leaf edges, but there is every degree of variation in serrature characters, and no distinction can be adequately described between this and forms with fewer serrations except as a matter of extremes.

Fraser considered the miniature examples from Braunton Burrows dunes to be this variety, a view with which I have never been able to agree, as the number of serratures on the reduced leaves of these small plants seems to be relatively insufficient for agreement with var. *denticulata*. Furthermore, these specimens are shaggy with hairs. In my view they are more likely to be reduced examples of var. *grandidentata*, which evidently has fewer though deeper serratures in its normal state than var. *denticulata*.

Briquet's var. *lupulina*, which would appear to have been chosen to replace the earlier, valid name (Braun's various forms are clearly to be regarded as of *varietal* grade), has a slightly different description from that of var. *denticulata*. Those who wish to do so can seize the chance to differentiate between them, but it would seem preferable to regard the two as essentially the same sort of water mint, as Briquet no doubt intended.

(g) var. *pedunculata* Persoon (1807, 119).

Hirsuta, foliis subinciso-serratis, capitulis lateralibus longe pedunculatis subfastigiatis.

This variety probably owes its state to luxuriance. It is told primarily by the *long-pedunculate axillary verticils*, which would probably appear as lateral capitula rather than verticils. A further character is the subincise leaves. I possess a specimen from near Westerham, v.c. 17 (D. B. Fanshawe), which has subsending peduncles no less than 8 cm. long at maturity – these being the longest I have yet seen. But this example differs from Persoon's description in being markedly subglabrous throughout, and in having very shallow serratures.

(h) var. *purpurea* (Host) Pérard (1870, 340).

Plante plus ou moins velue. Tige et feuilles rougeâtres. M. purpurea Host (1831, 141). *Folia petiolata, subcordata . . . Folia, caules, rami, bracteeae sunt plerumque colore purpureo tincta.*

This more or less hairy water mint is purely a colour form, dependent no doubt for its colour on the chemical content of the ground water. Such highly coloured forms will be met with quite often, perhaps more commonly amongst subglabrous material.

(i) var. *minor* Sole (1798, 23-24, fig. 10).

For a general description see Sole's text, with which his specimens at the Linnean Society and British Museum agree. In this variety, which is quite easily recognised at its best, the *stems* are usually reddish; the *leaves* rather small (up to 4.2 × 2.8 cm.), *ovate, acute, basally rounded or subcordate, with neat, rather jagged serratures*, sparsely hairy above and more thickly so below; the *inflorescence* a large, showy, terminal capitulum, with or without axillary verticils; the *stamens* exserted. The large terminal capitulum, especially during anthesis, affords a somewhat topheavy appearance to the plant owing to its surmounting the rather small leaves. Sole's specimen called *Mentha aquatica decumbens* appears to be essentially the same sort of water mint as var. *minor* but with included stamens. (Water mints are essentially erect plants, and a decumbent state is presumably due to an artificial factor). Despite its name, var. *minor* is not necessarily a small plant. One of the Linnean Society specimens is 32 cm. tall.

- (j) var. *weiheana* (Opiz) H. Braun (1890, 424).

Stengel . . . mit kurzen Haaren, und kurzen blüthentragenden Zweigen bekleidet. Blätter beiderseits dicht behaart, alle gestielt, breit-oval, am Grunde abgerundet, nicht an den Blattstiele herablaufend, an der Spitze lange und allmählig verschmälert, 5-6 cm. lang, 3-3.5 cm breit, tief gesägt, Sägezähne spitz, gleich weit von einander entfernt . . .

This variety is characterised chiefly by the long, drawn-out leaf apex, and no doubt approaches var. *acuta* (below) in this respect. The serratures are deep, well spaced. Fraser's comment that the leaves are thinly and shortly hairy disagrees with *beiderseits dicht behaart*, and other discrepancies between his text and Braun's will be noticed.

- (k) var. *nemorosa* Fries (1828, 183).

Glabriuscula. *Caules altiores, virentes. Folia ovata s. oblonga, sparsim pilosa. Capitula minus congesta. Pili pedicellorum brevissimi, subadpressi. Calyx passim glabra.* (The comparatives are in distinction from var. *hirsuta*).

This variety differs from all others that I have seen described in literature (except *M. citrata* Ehrh. which is doubtfully a true water mint), in that the calyx is quite glabrous. Such a feature is clearly most unusual in a water mint. I have examined a great wealth of material, both British and Continental, but have failed to find a single example of an undoubted water mint with a glabrous or essentially glabrous calyx, indeed in only two instances were the cilia so short as to give a glabrous appearance. Fries' specimen has not been traced, and it is not at present known to me whether it exists. Information was requested from certain Swedish botanists, but unfortunately no reply has to date been received.

In my view, a mint with a glabrous calyx and morphological resemblance to a water mint can arise only as a result of hybridity. *M. citrata* Ehrh., which will be the subject of a later paper, is very like a water mint in appearance, and has been classed as a variety of *M. aquatica* L. by several authors. Its calyx is essentially glabrous, and it is likely to have arisen either as a sport or form of a hybrid, or as a double hybrid, of *M. aquatica* with *M. spicata*. It is clear that var. *nemorosa* cannot be the same sort of mint as *M. citrata*, as Fries describes the two separately. The only mint known to me which might bear relationship to var. *nemorosa* is the well-known "Roydon mint," from near Roydon, v.c. 20, which has a wholly glabrous calyx, and is indeed almost glabrous throughout. But this is very likely also to be a hybrid of the two parents suggested for *M. citrata*, or possibly a sport of the latter.

According to present knowledge it is not possible to be definite about var. *nemorosa*. The solution can only lie in the original specimen. This much, however, can be said, that on account of the glabrous calyx var. *nemorosa* is unlikely to be a true water mint, and is probably a hybrid of which one parent is *M. aquatica* L. It will be noted that Fries cites this latter as a synonym of var. *nemorosa*, but I have doubts as to the accuracy of this view.

2. With an attenuate leaf base

- (l) var. *ortmanniana* (Opiz) H. Braun (1890, 421).

M. Ortmanniana Opiz (1826, 437)

Stengel dünn, schlaff, aufrecht, unterwärts kahl oder an den Kanten behaart, Blattstiele zerstreut mit weisslichen Haaren bekleidet. Blätter ziemlich lang gestielt, dünn, klein oder mittelgross, die obersten am Stengel klein, beiderseits wenig aber hauptsächlich nur an den Nerven behaart, nach oben spitz, öfter in eine längliche Spitze vorgezogen, eiförmig-lanzettlich, in den Blattstiel fast rhombisch zugeschweift,

am Rande fein und öfter stumpflich gesägt. Blütenstiele und Kelche von kurzen Härchen fläumich. Blütenquirle ziemlich klein; Kelche oft violett überlaufen. Durch die kleinen, dünnen, eilanzettlich geformten, spitzen Blätter und die kurz fläumiche Behaarung der Blütenstiele und des Kelches sehr ausgezeichnet.

Evidently a *weak, thinly hairy form, with a slender stem; long-stalked, thin, ovate-lanceolate, acute, small leaves, often with a long point; and with small capitula.* Braun also stresses the *downy petioles and calyx.* Fraser gives rather different leaf characters, describing the bases as rounded, which scarcely agrees with *fast rhombisch zugeschweift*, nor can his "broadly ovate" be found in the above text. I possess specimens from the Oxted area, v.c. 16 (D. B. Fanshawe), which can be regarded as this variety, and it is likely to be met with in damp habitats.

Braun's description follows that of Opiz generally, the latter referring to the leaves as *fere internodiis brevioribus* – another indication of their small size. Braun no doubt consulted Opiz' specimens, which are extant in Germany (*Mit Ausnahme der Linné'schen Sole'schen und Hudson'schen Arten und Formen habe ich fast alle nachfolgend besprochenen Menthen in Original-Exemplaren vorliegen gehabt* – Braun (1890, 352)).

(m) var. *elongata* Pérard (1870, 340).

Plante velue. Feuilles ovales-oblongues, larges, très longuement petiolées.

Evidently a *hirsute form, with large, oval-oblong leaves on very long petioles.* The right hand specimen on sheet No. 15 of Sole's set of mints at the Linnean Society is perhaps this variety, in a slightly smaller state but having noticeably long petioles.

It would seem that var. *ellipticifolia* Loret (1880, 268) is nearly allied to var. *elongata*, being, according to its description, a luxuriant water mint with broadly elliptic-oblong leaves, *nearly as broad towards the apex as towards the base*, and with petioles that are *as long on the upper leaves as on the lower.* As leaves of water mints develop, their petioles usually become longer, and a water mint such as Loret's variety would present rather an unusual appearance.

(n) var. *major* Sole (1798, 25-26, fig. 11).

This well-known variety has usually been regarded as a luxuriant water mint with a distinctly attenuate leaf base. It is probable that Sole had luxuriance in mind when describing it. But close attention to his text, and examination of his specimens, indicate that this variety comprises several forms, and can be taken as synonymous with *M. aquatica* L. in an aggregate sense.

In his description Sole says of the leaves . . . *pointed, green, hairy, broad, ovate, elliptical, and oblong; for nature sports much in the habit of this plant according to the variety of soils and situations . . . at Twiford . . . with broad elliptical leaves almost smooth. . . . about Bath . . . exceedingly hairy, with ovate leaves . . . on our downs . . . procumbent, hoary, and its leaves acuminate.* The above words cover a wide range in leaf shape, and this is borne out by the specimens. There are three at the Linnean Society, all different from each other, and none agreeing with the figure. Two have leaves with rounded bases, whereas in the figure they are distinctly attenuate. At the British Museum there is a specimen that agrees well with the figure, and it is perhaps this one that Fraser (1927, 228) means when he refers to *type.* It is thus possible to select a type specimen to agree with the figure, and with the description in part, but to do so amounts, in my opinion, to a denial of Sole's concept of his variety, which is, more than anything, merely a strong, luxuriant plant.

I cannot, therefore, regard var. *major* as a precise form of *M. aquatica* L., and propose to relegate it to synonymy with this latter in its aggregate sense,

- (o) forma *cana* Fraser (1927, 228).

Fraser's specimens, at Kew, indicate that this form is a hirsute variant of var. *major* sensu Fraser. The leaves are *ovate-lanceolate, grey-white with matted pile on the under-surface*. The whole plant is generally rather hoary, and agrees with Fraser's description, and, apart from its hairiness, with Sole's figure of his var. *major* (*Mentha aquatica major*).

3. Forms whose leaf base is somewhat intermediate between rounded and attenuate

- (p) *M. dunensis* Strail (1887, 102).

Tige . . . couverte de longs poils étalés . . . Feuilles très velues sur les deux faces . . . elliptiques, aiguës ou subaiguës, arrondies à leur base et un peu décurrentes sur les pétioles, de 3 à 5 cent. de longueur sur 2½ de largeur, peu profondément dentées, à dents aiguës et écartées . . .

This "variety", originally described from terrain reclaimed from the sea, can perhaps be applied to certain forms from Braunton Burrows and similar habitats. It is a *very hairy* water mint, with *elliptic, subacute leaves, basally rounded or narrowed to the petiole, and with ± shallow but sharp and well-spaced serratures*. One would imagine that var. *grandidentata*, in a reduced state, would produce a form such as this, though this latter variety would not, according to its description (above), apply to examples with an attenuate leaf base. With regard to specimens from Braunton Burrows with a rounded leaf base, I must leave it to others to decide whether they are to be classed as *M. dunensis* or reduced forms of var. *grandidentata*.

- (q) var. *inciso-serrata* (Strail) Briquet (1891, 80).

M. inciso-serrata Strail (1887, 101).

M. aquatica var. *foliis inciso-serratis* Wirtgen, *Herb. Ment. Rhen.*, ed. 3, No. 37.

Plante robuste . . . Tige couverte de poils réfléchis . . . à rameaux ascendants allongés et florifères. Feuilles modérément ovées, vertes et hérissées sur les deux faces, très aiguës ou un peu acuminées au sommet, très convexes à la partie inférieure, très brièvement atténuées, subarrondies ou arrondies à leur base . . . serrature consistant de dents assez nombreuses, ± irrégulières, saillantes, formant des triangles hauts de 1.3-2 mm., ondulés ou dentés extérieurement, à sommets aigus ou légèrement étalés, séparés par une distance de 4-6 mm. Capitules ordinairement hérissées.

The chief character for this variety is clearly the deeply-cut (incised), salient serratures. Briquet's above description follows that of Strail closely, the latter describing the serratures as *profondément incisées-serrées, à dents très aiguës et irrégulièrement écartées*. The specimen in the Oxford herbarium, which was thus identified by Briquet and qualified with the word *forma*, corresponds quite well with the description though the serratures are rather more salient than they are deep. This also applies to Wirtgen's specimens at the British Museum, whose serratures are also more irregular in their depth. I possess an example from Kempford, Glos. v.c. 33 (C. C. Townsend), which has very irregular serratures, some of them gashes to a depth of 5 mm., and which can be loosely regarded as var. *inciso-serrata*. Such a water mint is extremely strange in appearance, and this variety is perhaps easy of identification. But the variation in serrature characters is unending.

- (r) var. *nicaeensis* Briquet (1891, 97).

. . . Tige robuste, ± rameuse, rougeâtre, pourvue surtout sur les angles d'un indument relativement peu scabre . . . Pétiole velu, atteignant 2.5 cm. de longueur dans les régions moyennes de la tige. Feuilles ovées-elliptiques, allongées, ayant leur

plus grande largeur près de la base, à marges fort convexes en cet endroit, convergeant ensuite suivant une ligne \pm droite pour former au sommet une pointe aigüe ou un peu acuminée, arrondies ou très brièvement atténuées à la base, vertes et \pm poilues sur les deux faces . . . serrature consistant en dents assez régulières, nombreuses, formant des triangles hauts de 1-1.5 mm., droits intérieurement, presque tous nettement dentés extérieurement, à sommets très aigus, séparés par une distance de 3-4 mm. Capitules \pm velus . . . Cette variété est fort voisine de la var. *inciso-serrata* dont elle diffère surtout par sa serrature double.

Briquet regarded this variety as a near ally of var. *inciso-serrata*, the chief distinction from the latter being the *small, intermediate denticles* on the exterior surface of the serratures. The Oxford specimen, identified by Briquet, agrees with the description to a certain extent, but the double serration occurs only on the lower leaves, while on the upper the serratures are fewer (up to 4), and, apart from the question of immaturity, show no clear indication that double serration will develop. Frankly, I can see extremely little in this variety, double serration being a not uncommon feature of many forms of water mint.

- (s) var. *riparia* (Schreber ex Schweigger & Körte) H. Braun (1890, 422).

Stengel unterwärts wenig behaart oder kahl, oberwärts mit weisslichen zurückgekrümmten Haaren \pm bedeckt . . . Blätter länglich-lanzettlich . . . spitz aber kurz gesägt, beiderseits zerstreut, an den Hauptnerven etwas mehr mit Haaren bekleidet . . . an der Basis zum Blattstiele kurz zugeschweift . . . Blütenquirle meist kleiner als bei *M. aquatica* L.

This is apparently a subglabrous form, with *long-lanceolate, basally shortly-narrowed leaves, with short, sharp serratures*; and with *small capitula*. It would seem to be nearly allied to var. *ortmanniana* (above), differing in having much larger leaves. Possibly one is a luxuriant form of the other. This variety is included in this account as it is mentioned frequently in Continental literature, although not previously listed as a British form. Many herbarium specimens can be classed as this variety.

- (t) var. *acuta* H. Braun (1890, 422).

M. acuta Opiz (1852, 64), sine descr.

Stengel oberwärts dicht behaart, Blätter ziemlich lang gestielt, Blätter vor der Mitte der Lamina an in eine lange Spitze ausgezogen, Blütenquirle 2-3 cm. gross.

This variety is characterised by a *long, drawn-out, acute, leaf apex, and evidently has large capitula*. Braun regarded it as a minor variant of var. *riparia*, from which it differs in these two characters, and in having hairier leaves and stem. Specimens classifiable as var. *acuta* will fairly often be found, but there is every variation between a long, drawn-out, acute apex to the leaf and a short, blunt one.

The following three varieties, hitherto classed as water mints by Fraser and other authorities, are rejected as being, in my opinion, of doubtful status in this group.

- (u) var. *subglabra* Baker (1865, 248).

The only reference to a var. *subglabra* attributable to Baker appears in the above-cited essay "On the English Mints." But here it is unquestionably listed as a variety of *M. sativa* (*M. × verticillata* L.), nor is there any mention of a var. *subglabra* in the section dealing with water mints. A reputedly authentic specimen at Kew, bearing a label perhaps in Baker's hand, is a verticillate - not a capitata - mint, in fact *M. × gentilis* L.

(*M. arvensis* × *spicata*). In Syme's herbarium there is a specimen from Kincardine, which may be that referred to in Baker's text, and this is a subspicate form of *M. × verticillata* L. The above evidence would seem to indicate that, whatever Baker intended by this variety, it was not a water mint.

On the other hand, this variety has been very widely treated as a water mint in many British works, and many subglabrous forms of *M. aquatica* L. have received this varietal name in our national herbaria. Further, there is in Syme's herbarium an undoubted water mint named as var. *subglabra* in Baker's hand. Fraser (1927, 228, 232), it will be noted, refers to this variety both under *M. aquatica* var. *major* and under *M. × verticillata* var. *ovalifolia* (Opiz) H. Braun.

It is likely that, whatever his original view, Baker came to regard *M. aquatica* L. and *M. × verticillata* L. as essentially the same sort of mint, differing only in the form of the inflorescence. This was Smith's view (1825, 78-82), also that of Fries. The latter's var. *suavifolia*, cited by Baker as a synonym of var. *subglabra*, is placed under a capitulate-verticillate division of *M. aquatica* L., and this section would seem to comprise subspicate forms of *M. × verticillata* L. On such a basis it would be possible to regard var. *subglabra* as applicable to both groups. The two are, however, differentiable both morphologically and cytologically, and as var. *subglabra* was originally described as a variety of *M. sativa* L. it is scarcely possible to retain it also as a variety of *M. aquatica* L.

(v) var. *lobeliana* Becker (1828, 222).

Stengel krausshaarig oder häkerig, fast einfach; Blumenköpfe alle achselständig, auf Gipfel ein einzelner kleinster. Mentha cardiaca Lobel, obss. p. 271, fig. 4, ic. p. 508, fig. 1.

This variety has come down to us, chiefly through Briquet and Fraser, as a small-leaved, thinly hairy form of *M. aquatica* L. Becker places it under his *hirsuta*, which can be taken to imply *M. hirsuta* Huds. One may question whether the word *alle* may not more correctly refer to a verticillate mint, perhaps a subspicate form of *M. × verticillata* L. or of *M. × gracilis* var. *cardiaca* (Baker) Briquet. The small terminal capitulum is sometimes found in forms of these two hybrid groups, surmounting an otherwise multiverticillate inflorescence. Further, there is, in Becker's text, the clear reference to *M. cardiaca* Lobel. This - Cardiac Mint - has been known as a medical herb from pre-Linnean times, and is no doubt the *M. cardiaca* of Gerard and Baker. Whereas the ancient *icones* may not always accurately represent the plants they purport to be, in the case of Becker's references they have every appearance of being *M. cardiaca*. This evidence would seem to indicate that var. *lobeliana* was merely another name for *M. cardiaca* Lobel, Gerard, et alior. It is quite likely that Becker regarded this hybrid mint as essentially the same sort of mint as *M. aquatica* L., differentiation in those days being often shallow in this genus.

Briquet (1891, 83) who apparently examined Becker's specimens, described one of these as the true var. *lobeliana*, and this was evidently a water mint. At the same time Briquet says that under this varietal name Becker, according to his herbarium, included many forms - whether all are water mints or not I do not at present know. Briquet's statement that the original description can be applied to all varieties of *M. aquatica* is a somewhat debatable point - one with which I am disinclined to agree. Braun, who no doubt also saw Becker's specimens, classes this variety under his *M. paludosa* Sole (*M. × verticillata* L. var. *paludosa* (Sole) Druce), a treatment with which Briquet disagreed, but one which appears to be rather nearer the truth according to Becker's text. The whole matter is very confusing, and a great deal must depend on Becker's specimens. At any rate for the time being, I would question the inclusion of this variety in the water

mint group, and would suggest its kinship to the *M. cardiaca* of the ancients as its more correct status.

(w) var. *obscura* Wimmer & Grabowski (1829, 178-9).

Caule, calycibusque violaceo-purpurascens, foliis purpurascens vel violascens. (Saepe caulis hirtus, folia subglaberrima complicata.)

From the above description, this mint is undoubtedly a colour form, and it must be regretfully pronounced that Fraser's description bears no resemblance whatsoever to that of the original joint authors.

This plant is classed as either a *variety* or a *form* under the authors' *M. aquatica* var. γ *gracilis*, which is described as *Foliis ovali-oblongis breviter petiolatis, caule elongato sub-simplici, verticillis multis, capitulo parvo*, which quite adequately describes *M. \times gracilis* Sole, or perhaps its var. *cardiaca* (Baker) Briquet (= *M. cardiaca* Ger., Baker, et alior.), especially the strict, subspicate form (Graham 1950, 278). I do not know whether their *gracilis* was the same sort of mint as Sole's but from the description it would appear to be at least highly likely. Its place under *M. aquatica* L. is perhaps another example of earlier authors believing a capitate and a verticillate mint to be essentially the same. From the above evidence, var. *obscura* can scarcely be regarded as a variety of *M. aquatica* L., but would appear to be a deeply-coloured form of *M. \times gracilis* Sole, or of its var. *cardiaca*.

SUMMARY

Mentha aquatica L. should be regarded as one form only of an extremely polymorphic group, known in the aggregate as Water Mint. Many forms have received distinctive names, but their retention is not recommended on scientific grounds, as their existence gives rise to a taxonomic chaos. Further, there would appear, according to present knowledge, to be no justification on a cytological basis, though in this respect it is advisable for more chromosome counts to be taken. So great is the range of variation in most characters, and so gradual is any combination of characters, that all the named varieties and forms should, in my view, be abandoned, and the whole group be regarded and determined under the single binomial *M. aquatica* L., though for herbarium purposes the different forms may, if desired, be separated under varietal names. Only one reservation should be made, i.e. in respect of var. *nemorosa* Fr., correct assessment of which must await the appearance of an original specimen.

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