NOTES FROM THE
ROYAL BOTANIC GARDEN
EDINBURGH

VOLUME XXXII · NO. 2 · 1973

UMBELLIFERAE IN 1672 AND 1972

I. C. HEDGE

ABSTRACT. The tercentenary of the publication of Morison's *Plantarum Umbelliferarum* is remembered by a short discussion of this early botanical monograph. The present-day situation in the Umbelliferae is considered in the light of the appearance of *The biology and chemistry of the Umbelliferae*, based on the proceedings of a recent symposium.

PLANTARUM UMBELLIFERARUM 1672

It is appropriate 300 years after the publication of Robert Morison's *Plantarum Umbelliferarum Distributio Nova* to remember its author, to review the contribution that he made to taxonomic botany with that remarkable work and to compare some of the groups he recognized in the Umbelliferae with those of today.

Morison was born in 1620 at Aberdeen where he received his early schooling and where in 1638 he graduated from the University. His studies covered, in addition to the usual classical subjects, mathematics, natural history and even Hebrew because of his parents' wish that he should enter the ministry. However, his career was to be very different from, and a good deal more adventurous than, that of a Scottish minister. He grew up in the turbulent times of Charles I and his numerous violent collisions with parliament, of Cromwell, the Covenanters and eventually the Civil War. Morison's support of the loyalists led him to join some of his countrymen in active fighting against the Covenanters and in 1644 at the battle of the Brig of Dee, when the Covenanters carried the day, he was severely wounded. Like many of his royalist colleagues at this time he, on his recovery, left his homeland and the same year went to Paris. Here he continued his studies but now his interests were more specifically inclined towards natural history, particularly botany, and medicine. In 1648 he received the degree of M.D. at Angers. About 1650 he joined the household of Gaston, the Duke of Orleans, as physician and keeper, together with Abel Brunyer and Nicholas Marchant, of the duke's garden at Blois. Here he seems to have first thought about and developed his early ideas on the classification of plants; he also travelled and collected quite widely in France and was in contact with the leading French botanists of the day. He remained in this lucrative and botanically profitable position till the duke's death in

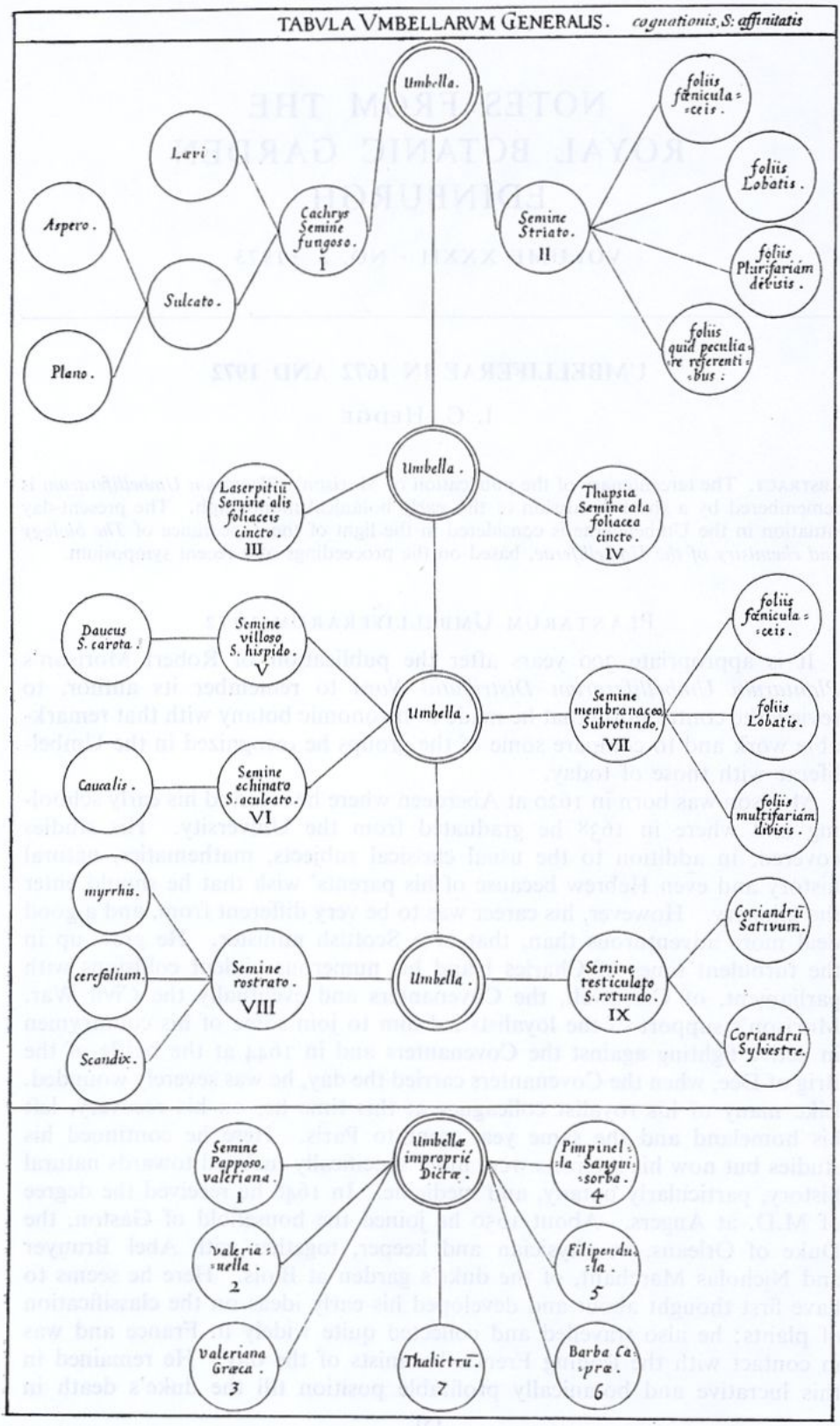

FIG. 1. Tabula 1 of Morison's *Plantarum Umbelliferarum* of 1672 illustrating diagrammatically the nine major classes that he recognized in the family; some of their subdivisions are also shown. At the foot of the figure are the 'Umbellae improprie dictae', plants previously included in the family but excluded by Morison.

1660. But before then he became known to Charles II, an unenthusiastic suitor of the duke's daughter and apparently a regular visitor at Blois. Charles was still in exile in France after the defeat, and eventual execution, of his father in 1649. On the restoration of the monarchy in 1660, Charles invited Morison to return to England. This he was delighted to do. He was initially appointed as physician, king's botanist and superintendent of the royal gardens; then, in December 1669 he was elected to the chair of botany at Oxford. Previously in the same year he published *Praeludia Botanica* which contains the basis of his system of classification and which must have been quite highly thought of when he applied for the Oxford chair. In 1680 he published his last major work *Plantarum Historiae Universalis Oxoniensis*. This was to have been the culmination of his life's studies but only a small part of the planned work was published in his lifetime. The first part contains detailed descriptions of herbaceous plants in five of the fifteen sections that he recognized for herbs. The second volume, edited after his death by Bobart the Younger, covers the remaining ten sections including the Umbelliferae.

Morison's life terminated abruptly as a result of a road accident in November 1683 when he was struck by a passing coach in the Strand; he was buried at St Martins in the Field. His name is commemorated in the small West Indian and South American genus of the Capparaceae, *Morisonia* L.

Prior to the publication of the *Historia*, there appeared in 1672 his *Plantarum Umbelliferarum Distributio Nova*. This was a detailed account of all the members of the Umbelliferae known to him. The family as such had been recognized before Morison's time both by Caesalpinus and Bauhin, who in the *Pinax* (1623) called it by its present-day family name. Morison's method of classifying the Umbelliferae follows the same general principles that he proposed in his *Praeludia* and which he later developed in the *Historia*: that generic characters should be based on fruit, and specific characters on stem, leaf, smell or colour. The result is that many of his groups in the Umbelliferae are fairly natural and, although not surprisingly different from those of today, they are nevertheless based on a similar method of approach—a quest for a natural classification. He recognized nine groups or 'genera' based primarily on characters of the 'seed' (by which he means fruit).

Schematically he illustrated these nine groups in explanatory diagrams like that reproduced as figure 1 which gives the overall breakdown of the family as he recognized it; the nine groups are indicated by roman numerals. Major subdivisions are also indicated on this figure. Subsequent lesser divisions are similarly arranged on seven other diagrams. At the foot of figure 1 can be noted a class called "Umbellae improprie dictae". These are the plants which previous authors had included within the family and Morison rightly excluded from it; they include the modern-day genera of *Valeriana*, *Valerianella*, *Thalictrum*, *Poterium*, *Spiraea* and *Tragopogon*. Morison's main groups, which correspond to modern sub-orders or tribes are based on fruit characters; the lesser divisions, which correspond to either groups of genera (as in 'semine striato' II), genera (as in 'semine rostrato' VIII) or species ('semine testiculato s. rotundo' IX), are based on leaf characters (II) or further fruit features (I).

UMBELLÆ ROSTRATÆ.

Octavum Genus Umbellarum.

CAPVT VIII.

A

Myrrhis
- *annua semine striato*
  - *aspero*
    - *oblongo, nodosa.* ☿ ϖ
    - *brevi, nobis. Nova æquicolorum, Col.* ☿
  - *lævi, nobis. anthriscus, Plinii Hist. Lugd.* ☿ ϖ
  - *lævi, tuberosa, nodosa, coniophyllon, nobis.* ☿ ϖ
  - *villoso, nobis.* ☿ ϖ
- *perennis sem. striato*
  - *Alba*
    - *major odorata.* ⊙
    - *minor*
      - *foliis*
        - *hirsutis.* ⊙ ϖ
        - *hirsutioribus.* ⊙ ϖ
        - *hirsutissimis.* ⊙ ϖ
  - *Lutea daucoïdes.* ⊙ ϖ

Explanation of symbols : ☿, annual; ⊙, perennial;
ϖ, characters not or badly described by previous authors.

B

Myrrhis
- annua semine striato
  - aspero
    - oblongo, nodosa ···· Myrrhoides nodosa (L.) Cannon
    - brevi ····· Anthriscus caucalis Bieb.
  - laevi ····· Chaerophyllum temulum L.
  - laevi, tuberosa, nodosa, coniophyllon ··· C. bulbosum L.
  - villoso ····· Athamanta cretensis L.
- perennis sem. striato
  - alba
    - major odorata ····· Myrrhis odorata (L.) Scop.
    - minor ·· Chaerophyllum aureum L.
      - var. hairy leaves
      - var. hairier leaves
      - var. v. hairy leaves
  - lutea daucoides ····· C. coloratum L.

FIG. 2. A. The heading at the start of Caput VIII dealing with the group characterized by 'semine rostrato' and keying out by an early version of a modern dichotomising key the species and varieties of '*Myrrhis*'; B. the same key with the present-day specific names added.

Morison's herbarium, arranged according to the *Historia*, is preserved in Oxford (OXF) and has been catalogued by Vines & Druce (*The Morisonian herbarium* 1914—which also gives a great deal of further information about Morison, his work and his contemporaries). By means of this catalogue and Richter's *Codex Botanicus Linnaeanus* (1840) it is usually possible to correlate Morison's polynomials or classes with present-day names. For example, at generic level, IV contains *Thapsia*, *Elaeoselinum* and *Artedia*; this is quite a natural grouping, the first two genera being in the tribe Laserpiteae and the last a genus that has been shuttled about in different parts of the family, Drude placing it in the Dauceae although it is clearly quite anomalous there. Group V contains only the carrots (*Daucus*). Group VIII includes *Chaerophyllum*, *Anthriscus*, *Scandix* (all allied members of the Scandicinae), *Athamanta* and *Cryptotaenia* (Apieae). In these three examples, Morison's classification is not greatly at variance with that of today. Group II, however, characterized by 'semine striato', and by far his biggest group, containing about forty currently recognized genera, is rather a mixed bag. Morison split it into numerous subdivisions but few of these bear much resemblance to those of today.

At the start of, or within, the chapters in which the individual 'genus' (i.e. the nine groups) is dealt with in detail, there are diagrams which are prototypes of modern bi-(or tri-) furcating keys to species and varieties. That at the start of 'genus' VIII, 'umbellae rostratae', is shown in figure 2A; it deals with '*Myrrhis*', (see figure 1—it does not include '*Cerefolium*' and '*Scandix*'). Morison recognized several new species in the *Umbelliferarum* and under '*Myrrhis*' three are described. The first is '*Myrrhis annua semine striato aspera oblongo nodosa*'. Linnaeus was later to cite this epithet in the *Hortus Cliffortianus* (1737) and then, in the *Species Plantarum* (1753), to call the plant *Scandix nodosa* L.; today we know it as *Myrrhoides* (*Physocaulis*) *nodosa*. Figure 2B shows the modern nomenclatural equivalents of Morison's 'taxa'. Four of these are species of *Chaerophyllum*, one each a species of *Myrrhis*, *Anthriscus*, *Myrrhoides* and *Athamanta*. The only relative stranger in this group is *Athamanta*, the others certainly having a lot in common as allied members of the Scandicinae. One interesting small point about Morison's use of symbols is that he uses what we know of today as the annual sign for perennials and a form of the hermaphrodite symbol for annuals (see figure 2).

After the diagrammatic keys and introductory preamble there follows detailed information about the characters of the plants—habit, leaf shape, flower colour, fruit shape, smell, root, habitat, flowering times, synonyms, distribution and uses.

There is also at the end of the work a series of drawings of individual fruits (mericarps), some leaves and a few entire plants. None of these is signed and there is no indication in the text as to who the artist was. The drawings are all complementary to the text, where they are referred to, and in many cases are quite easily recognized species or genera.

Not surprisingly there were many characters which Morison did not use in his system of the Umbelliferae. There is no apparent mention of bracts, bracteoles, vittae, stylopodia or internal fruit structure. But for the time, his system is remarkably natural and the presentation (other than the fact that it is in Latin!) readily understandable and neatly systematic. The

number of species dealt with is quite large—about 170*—but naturally most of them are restricted to Europe; very few (3) are north American.

Of the three subfamilies in the Umbelliferae—Hydrocotyloideae, Saniculoideae and the Apioideae—the vast majority of Morison's genera, as is so on a world basis, come within the Apioideae. The only European genus of the Hydrocotyloideae that Morison was likely to encounter was *Hydrocotyle* but he does not deal with it among his Umbelliferae and, in fact, in his herbarium, *Hydrocotyle* is placed in a class along with *Ranunculus* and *Anemone*. A similar exclusion of a common European umbel is *Sanicula*, a member of the Saniculoideae. Although he placed *Astrantia* of the same subfamily in his group II, *Sanicula* is not dealt with and, in his herbarium, is placed on its own near *Circaea* of the Onagraceae. The only other obvious exclusion is *Eryngium* which in his herbarium is in a class 'Plantae capitatae spinosae non papposae' between *Echinops* and *Dipsacus*.

Although after Morison's death, there were, in the manner of the time, a considerable number of derogatory or slanderous statements about him and his work, it is remarkable how today his *Umbelliferarum*, 300 years after its appearance, stands out as an original, imaginatively presented monographic treatment. The general lay-out, the diagrams, the early style of bifurcating keys and the realistic illustrations all combine to give this impression. Undoubtedly it was a pioneer work far ahead of its time that put at least the classification of the Umbelliferae on a much firmer scientific basis than anything earlier. It has a strong claim to be regarded as the earliest botanical monograph.

Umbelliferae in the 1970s

In recent years, the Umbelliferae has received considerable detailed attention both from botanists of varied disciplines and from phytochemists. It is also a large, varied, almost world-wide, and natural group of plants. It was therefore an excellent choice of family on which to base a symposium covering a wide range of current botanical and chemical research. The meeting, held at Reading between the 21st and 24th of September 1970, under the auspices of the Linnean Society, attracted a large and cosmopolitan gathering of umbelliferous aficionados.

The published results of this symposium† make interesting and varied reading not only for the specialist in the family but also for anyone interested in current botanical trends. After introductory accounts surveying the family in the Old and New Worlds, there are papers on floral biology, breeding systems, inflorescence structure, pollen morphology, developmental anatomy, stomata patterns, chromosomes, fruit morphology and family relationships. These occupy just over half the total contents of the book and are followed by papers on such phytochemical topics as acetylene compounds, flavonoids, serology, coumarins and the chemosystematics of the Saniculoideae; Hegnauer reviews the overall chemical patterns and

* About 430 species of Umbelliferae are described in *Flora Europaea* (1968).

† The biology and chemistry of the Umbelliferae. Ed. V. H. Heywood. Suppl. 1 to the Botanical Journal of the Linnean Society vol. 64, 1971, pp. 438. Academic Press, London. £8.50.

relationships of the family. The volume ends with an essay on the ethnobotany of the Umbelliferae. Although it is inevitable that in such a broad-based work something has to be left out (for instance there is little mention of the family as it occurs in Africa, C Asia or the Himalayas nor is there anything in the taximetric line), the overall coverage of current research is both comprehensive and well-balanced.

With twenty-two papers to choose from, it is rather invidious to mention individual contributions but those of Rodriguez and Theobald are of special interest. The first, containing a massive amount of anatomical data, discusses the relationships of the Umbellales and raises the question of the antecedents of the group. By applying a large number of criteria, anatomical and otherwise, the author concludes that the Nyssaceae-Cornaceae and Araliaceae-Umbelliferae alliances are two related groups which have originated from a common area near the Escalloniaceae. He shows how it is possible to marshall a large amount of information from widely differing sources in order to speculate fairly scientifically on evolutionary happenings. Theobald's paper considers the tribe Peucedaneae from a comparative anatomical and developmental viewpoint. Several pertinent and stimulating observations emerge from his study that are equally applicable to the family as a whole. Apart from showing the artificiality of the tribe, he demonstrates how by over-emphasising fruit characters it is very easy to end up with generic mis-alliances. He points out that the only real differences between the tribes Peucedaneae, Ammineae, Smyrnieae and Coriandreae centre on characters of dorsal flattening and wing formation of the fruit. He suggests that the evolution of these features as a dispersal mechanism may well have developed in many independent lines from less specialised types. This of course is to throw doubt on the value of some of the characters used to form the basis of the current taxonomic hierarchy in the family.

The chemical information presented covers a broad range of investigation and complements the preceding section of the book surprisingly well. The authors, in general, have taken care (or the editor has made sure) that their papers cater both for the pure phytochemist and the botanist. As occurs in other families, their findings are a mixture of confirmation of the reality of some taxonomic groups and a contradiction of others. *Turgenia latifolia*, once included in *Caucalis*, is shown to be chemically clearly distinct from it; *Torilis*, as currently circumscribed, is chemically uniform. On the other hand, *Heracleum* and *Pimpinella* share similar coumarin patterns yet on gross morphological and fruit characters, they have very little in common.

Although the presentation of the papers is excellent it is a pity that for reasons of time, space or money, it was not possible to include at least some condensed versions of the discussions that followed the lectures given at Reading. Another omission is a chapter appraising the proceedings and discussions of the symposium; this the general reader would have welcomed.

If one were to attempt a summation survey what then would emerge? Some of the more general points would be scepticism about the validity of many of the classically accepted characters of the family, doubt about the tribal hierarchies and a realization of the dearth of much even basic biological information. One particular aspect that emerges is that the scanning electron microscope really can contribute to a better understanding of the taxonomy

of the family. This is clearly shown by the beautifully illustrated work of Cerceau-Larrival on pollen and the paper by Heywood & Dakshini on fruit structure of the Caucalideae.

Undoubtedly, symposia devoted to particular plant families are a very worth-while exercise but at the end of the day one may well ask what progress has been made. Knowledge *per se* is always gained, together with a firmer appreciation of just how limited that knowledge is, but from a strictly taxonomic viewpoint are the modern techniques available to present-day botanists bringing us closer to a satisfactory classification of the family as a whole? Drude's *Pflanzenfamilien* account of 1897–98, outdated and in many ways far from ideal, is still the only world-wide treatment available. It was the basic classificatory reference work for this symposium and, with minor modifications, for the great majority of the numerous Floras currently being written throughout the world. The symposium made it quite clear that taxonomic advances are being made, if only slowly, but that a new, updated equivalent of Drude is what is really needed. Yet with upwards of 300 genera and an ever-increasing amount of facts to sift and digest who is going to even think of starting such a gigantic task? Drude put considerable emphasis in his classification and supra-generic keys on the occurrence of crystals in the mericarps, a character one hears very little of today. Today stomata patterns and fine structure of pollen grains, two characters unknown to Drude, are sometimes given considerable weighting. There are many other available characters but, even more than in other families, different weighting will result in very different classifications or conclusions. And, of course, evidence from some of the more recent disciplines may be contradictory. To cite one example from this volume, the Echinophoreae on the basis of pollen structure is said to be one of the most advanced tribes in the family yet the evidence from flavonoid patterns indicates it to be one of the most primitive! Obviously we've progressed since Morison's *Umbelliferarum* but equally there's a long way still to go.

The Umbelliferae has clearly received much skilled and often imaginative biological work. This is quite evident from this beautifully produced, well-indexed volume. Unlike some proceedings of symposia, this is in no way an ephemeral publication. It is likely to remain a major source of information on the family for a long time to come. One hopes that its appearance will stimulate yet further activity in this most fascinating plant family.