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SOME NOTES ON THE TAXONOMY AND NOMENCLATURE

OF THE EHRETIA CYMOSA-COMPLEX

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Abstract: The differential characters for the 5 originally described species of the Ehretia cymosa-group, E. cymosa THONNING ex SCHUM. et THONN., E. zenkeri GUERKE ex BAKER & WRIGHT, E. divaricata BAKER, E. abyssinica R. BROWN ex FRENSEN and E. silvatica GUERKE proposed by various authors are reevaluated. The East-African taxa are separated as E. abyssinica var. abyssinica and E. abyssinica var. silvatica (GUERKE) H. RIEDL, comb.n. from E. cymosa with the varieties var. cymosa, var. zenkeri (GUERKE ex BAKER & WRIGHT) BRENNAN and var. divaricata (BAKER) BRENNAN. Especially the size of the flowers and their parts are reliable characters, while hairs, presence or absence of pedicels and others proved widely variable. The results of morphological investigations on the position of the inflorescence are in contradiction with one of BAKER's & WRIGHT's (1905) arguments for the specific rank of E. silvatica.

In spite of a considerable number of valuable contributions on Ehretia cymosa THONNING ex SCHUMACHER et THONNING and closely related taxa many problems in connection with this group still remain unsolved until today. This is partly due to the limited number of specimens available, partly also to differing personal interpretations of observed facts, but what seems to be most important is the impression, that evolution is still going on in various directions, and combination of various characters is still very free. A few personal observations may illustrate my point. Before going into details, however, it seems useful to give a short historical survey of the attempts of previous authors to deal with the taxonomy of the Ehretia cymosa-complex, and of the nomenclatural consequences of their approaches.

In 1827 (1828), THONNING published the binomial Ehretia cymosa for a plant from Guinea (present day Ghana according to CUFODONTIS 1961). The combination had been used before by POIRET (1811) and WILLDENOW ex ROEMER et SCHULTES (1819). Both these authors only took it for a variety of Ehretia laevis ROXBURGH. E. laevis s. cymosa has been overlooked by most authors such as BRENNAN (1954) and EXELL (1956). BRENNAN, l.c. refers to AIRY-SHAW, who gave his opinion "that E. cymosa WILLD. was published merely as a synonyme, though a doubtful one, and that ROEMER and SCHULTES did not intend to accept E. cymosa WILLD. as a species, probably copying the diagnosis from the Willdenowian herbarium". This is not correct. As the name of a variety proposed clearly by POIRET for the first time, it is of no consequence to a binomial on specific level. E. cymosa THONN. has to be retained as the correct name of the species in question contrary to EXELL's opinion whose new name E. thoningiana is illegitimate, therefore.

In 1814, H. SALT published a list of new names for Ethiopian plants he had collected proposed by R. BROWN, but as they never have been supplied with a description by this author, they are of no consequence nomenclaturally. Among these no-

mina nuda, there was one Ehretia abyssinica which was taken up by PRESENIUS (1838) and validated with the help of a diagnosis. The combination E. abyssinica has been used unanimously by botanists up to 1954, when BRENNAN reduced it to the rank of a variety under E. cymosa.

In 1894, BAKER published the diagnosis of a new species, E. divaricata BAKER, from Nyasaland, the present day Malawi, which likewise was regarded as a variety of E. cymosa by BRENNAN (1954).

In the following year, GUERKE proposed a new species closely related to E. abyssinica from German East Africa, now Tansania, which he called E. silvatica. It is now a fourth variety of E. cymosa according to BRENNAN.

In 1905, BAKER & WRIGHT published a manuscript species of GUERKE, E. zenkeri, from the Cameroons, the fifth variety of E. cymosa in BRENNAN's opinion.

Apart from the changes in status proposed by BRENNAN, there were no events worth mentioning from a nomenclatural point of view until 1954.

In 1956, EXELL used the names E. zenkeri and E. thonningiana (= E. cymosa) for what he considered to be separate species. He had obviously been unaware of BRENNAN's paper at that time.

Apart from the question of rank, there are no problems so far directly affecting nomenclature in this group. Let us consider the reasons, therefore, to separate the taxa mentioned at all and to assign to them either the rank of a species or a mere variety. In this connection, it is stimulating to compare the differential diagnoses of the three most recent treatments of the group, BAKER & WRIGHT (1905), BRENNAN (1954) and EXELL (1956).

According to BAKER & WRIGHT the branchlets and leaves of E. cymosa are perfectly glabrous, even in the axils of the nerves on the lower leaf-surface. The leaves are rounded at base. The terminal panicle has divergent, pubescent bran-

ches. The calyx is glabrous or slightly ciliate with long, acute lobes, about 1,8 mm ($3/4$ lin.) long, the white corolla is about 2,5 mm long. The style is divided in the upper third. In E. zenkeri, the branches of the vegetative part as well as of the inflorescence are densely pilose, the leaves are hairy only along the nerves on the lower surface, subacute at base. Inflorescence terminal. Calyx about 2-2,2 mm ("nearly 1 lin.") long, pubescent, with ovate lobes. Tube of corolla as long as calyx (1 lin.), the lobes slightly longer than the tube. Style as in E. cymosa. In E. divaricata, the branches are loosely hairy, the leaves hairy only along the nerves on the lower surface, with deltoid base. Branches of inflorescence pubescent. Calyx tube about 0,5-0,6 mm, lobes lanceolate. Corolla tube short, lobes about 3,3 mm (1,5 lin.). Style divided for more than one third. The branches of E. abyssinica are glabrous or loosely hairy, the leaves hairy only in the axils of the nerves on the lower surface, acute or rounded at base. Branches of terminal inflorescence more or less hairy. Calyx pubescent, 2,25 mm long, with ovate, acute, ciliate lobes. Corolla tube 3,3 mm long, lobes ovate-oblong, 5,6 mm long. Style with short arms. In E. silvatica, at last, branches are more or less pubescent, leaves pubescent beneath, obtuse at base. Inflorescences lateral in leaf-axils, with sessile or shortly pedicellate flowers. Calyx with deltoid-lanceolate lobes of 2,25 mm length. Corolla 6,7-9 mm long (3-4 lin.). No details are given of pubescence of calyx, division of style, and other characters mentioned for the other taxa.

For BRENAN, the distinctive characters of E. cymosa var. cymosa are the shortly pubescent or puberulous branches of the inflorescence, the presence of short pedicels and the length of calyx and corolla which agree with BAKER & WRIGHT. In var. zenkeri, the branches of the inflorescence are densely covered with long hairs, all other characters agree with the typical variety. In var. divaricata, the branches of the inflorescence agree with the type, the flowers are sessile or subsessile except the lowermost. The calyx is

2-2,5 mm, the corolla 4,5-5,5 mm long. In var. abyssinica, the branches of the inflorescence are pubescent, but a few longer hairs may be present. The corolla is 6-7 mm long. In var. silvatica, the branches of the inflorescence are densely covered with longer hairs. The calyx is 2-3 mm long (3-4 mm in var. abyssinica). No other characters are mentioned at all.

EXELL only treats the first two taxa in our sequence. For him, the flowers of E. cymosa (E. thonningiana according to him) are distinctly pedicellate while subsessile in E. zenkeri, the inflorescences minutely pubescent in E. cymosa, pubescent to tomentellous or shortly hairy in E. zenkeri. The leaves are nearly glabrous or rarely with a few hairs along midrib and principal nerves in E. zenkeri, but they may be nearly glabrous even there occasionally.

In THONNING's (1827) original description of Ehretia cymosa, the glabrous branchlets and pubescent inflorescence are mentioned, while none of the other characters used for separation by later authors are included. PRESENIUS (1838) only states that the leaves of E. abyssinica are glabrous with the exception of the axils of nerves on the lower surface, that the inflorescence bears a few hairs and that the lobes of the calyx are ciliate. GUERKE's (1895) description of E. silvatica is translated literally by BAKER who also gives authentic diagnoses of the two remaining taxa.

My own observations mainly are concerned with E. abyssinica, E. silvatica and E. zenkeri. Isotypes of the two latter ones could be examined in herbarium W.

E. abyssinica does not offer any problems. The following specimens, all deposited at W, could be examined: Aethiopia, near Adoa (Schimper n. 307) and near Dscheladscheranne (Schimper 1907); at Ouedjerab (?) (Dillen. & Petit); northern Africa sine loco (Petit). This last collection is peculiar by its clearly lateral inflorescence. Otherwise, they all agree with the various descriptions by previous authors, though the branches of the inflorescence are glabrous or covered by a very few longer hairs.

For E. silvatica, the specimen n. 9067 collected by Holst from Usambara, is assigned as lectotype here, as an isolectotype is present at W, and it may easily be that the specimens mentioned by GUERKE have been destroyed by war-action in Berlin. Vegetative branchlets and branches of inflorescence are densely covered by longer hairs in this specimen in agreement with BRENNAN, but contrary to GUERKE and BAKER. Leaves are not pubescent below but longer hairs are present very loosely arranged along the midrib, sometimes a little more numerous on the primary side-nerve. The inflorescence is distinctly axillary and therefore lateral. Flowers are still very young, the calyces usually closed, lobes broadly deltoid-lanceolate to ovate, shortly ciliate along the margin. There are two more specimens at W, both collected by G. Cufodontis (n. 408 in fruit, 605 in flower) as a member of the "Missione del Centro di studi coloniali di Firenze nel territorio dei Borana, A.O.I." (February to June 1937). In both of them, hairs on young branches and branches of inflorescence are very few, while the lower surface of the leaves is densely pubescent. Very short pedicels are sometimes present in the lowermost flowers. Calyx and corolla agree with the descriptions in literature. The inflorescence is distinctly terminal in no. 408, while it is axillary in 605. Finally, there is a collection from lake Tana Basin, near the church of Kuddus Ghigâr (Quonzelâ) collected by the Missione del Tana under no. 1272 on February 23th, 1937, and identified as E. abyssinica by PICHI-SERMOLLI. It well agrees with type and descriptions of E. silvatica, though hairs are less numerous on branches and older inflorescences and especially rare on the lower leaf-surface.

The following characters proved reliable in the few specimens I could examine:

1. The branches of the inflorescence are glabrous (contrary to BRENNAN's description) or subglabrous in E. abyssinica, more or less densely covered with longer hairs in E. silvatica.

2. Hairs on the lower leaf surface are fascicled in the axils of the main nerves in E. abyssinica, either present everywhere or more numerous along the midrib and main nerves or nearly absent at all in E. silvatica.
3. Flowers are sessile or subsessile in E. abyssinica, as a rule, while short pedicels are present at least in the lowermost flowers in E. silvatica.
4. The lobes of the corolla are distinctly longer compared to the tube (equal or longer) but also in absolute measures in E. abyssinica, while they are always shorter than the tube in E. silvatica.

The position of the inflorescence involves some major morphological problems in a group in which branching follows a sympodial pattern and in which several cymes are united in a composite synflorescence resembling a panicle more or less. In most cases, the description of BAKER & WRIGHT is sufficient that the synflorescence as a whole has a terminal position in E. abyssinica and the other species mentioned apart from E. silvatica, where it is axillar. One specimen I could examine (Cufodontis 408) did not allow such a simplified interpretation, however, as was mentioned before.

Upon closer examination of the specimens under E. abyssinica even apart from Petit's collection with clearly lateral inflorescence we find several other hints that sometimes the axis has not finished longitudinal growth with the inflorescence produced, or that there were leaves present before in the axils of which one or the other branch of the inflorescence originated though it was later incorporated in the whole reproductive structure called synflorescence here, and developed synchronously with the other parts. The final direction of a branch is only a very unreliable indicator of its origin. It must be born in mind in that connection that the inflorescence is terminal for a particular shoot within the whole sympodial axis at any rate, and the question about position only can mean whether a new shoot forming part of the axis is produced before or after an inflorescence has appeared.

A few examples may illustrate my point: In the isotype of E. silvatica at W, the inflorescence is clearly terminal, not lateral and axillary, in what appears to be the main axis at first glance, while in the axil of the last but one leaf a juvenile shoot is developed which will continue to grow on and replace the inflorescence as termination of the axis in its time. The last leaf does not bear any axillary shoot in its axil. Each shoot seems to consist of several internodes before it is replaced by another. In Cufodontis 408, the axillary shoots only consist of a bud covered by a pair of juvenile leaves, though there are mature fruits in one fragment and most of the fruits have already been shed in the other. In one fragment of Cufodontis 605, the axillary shoot already has stretched and consists of several internodes with small leaves, though it is still in flower. In Pichi-Sermolli 1272, there are two inflorescences, one old with shed fruits and one young in the first stage of flowering. The old one has clearly been pressed aside by an axillary shoot that now forms the continuation of the main axis which is bearing the young inflorescence in a terminal position, while an axillary bud is already visible. In E. abyssinica, there is not much difference though the number of flowers is usually greater in the inflorescence which also seems to differ from E. silvatica in size and density as a whole. In a specimen of Schimper, no.307, from near Adoa, there are three branches bearing inflorescences of quite different size which seems to be correlated to the diameter of the branch. The largest one seems to hold a clearly terminal position. The distance between uppermost leaf and first branch of the inflorescence is very small, scarcely 1 cm. There is an axillary shoot present already, which holds a position at an angle of about 30° to the peduncle. The side branch lower down carrying the most advanced inflorescence shows quite the opposite case. The axillary shoot carries on the direction of the branch, the inflorescence is already slightly pressed aside. Here too, the angle may be about 30° . The second and thinnest branch in a position nearer to the apex bears

a still very young inflorescence the flowers of which all being still in bud. Young leaves are crowded at its base, and no axillary bud is present by now. Another specimen of the same collection no.307 is simple, there is a terminal fruiting inflorescence nearly sessile at the base of a petiole, but nevertheless a young shoot still hidden by its primary leaves is present as a bud in the axil of the uppermost leaf having attained normal average size - there are smaller leaves still higher up. In a specimen of Petit labelled "Africa bor. leg. Petit" without number the position of the inflorescence is clearly lateral, an axillary shoot having occupied its former position already. In a specimen from Quedjerab, leg. Petit & Dill., the large inflorescence is terminal, but there are small buds present in the axils of several of the upper leaves. In this plant it seems most remarkable that about three mature fruits are present along with numerous flowers just in the midst of blossoming.

In E. zenkeri, the inflorescence is much larger and looser than either in E. abyssinica or silvatica. It keeps a more pronounced terminal position than in both of them as there are no shoots or buds present in the axils of the upper leaves in the few collections accessible to me.

What follows from all this seems to be that E. abyssinica and E. silvatica certainly cannot be separated on the basis of position of the inflorescence which is a function of the time of development of buds present in the axils of the upper leaves that in its turn is extremely variable for external or internal reasons that cannot be clearly specified as yet.

It should be mentioned that in E. zenkeri short pedicels may be present or absent, and that they cannot be used as a differential character for this reason.

Taxonomic Conclusions

It is evident that all the taxa mentioned in this paper and regarded as subunits within the species E. cymosa by BRENNAN are related very closely. As I could not examine two of the five taxa I do not want to draw any definite conclusions for the West African plants, but from the evidence offered by various authors I tend to agree with BRENNAN and to regard them all as varieties of E. cymosa. There are two collections of Zenker in herbarium W under the name E. cymosa. Zenker 1483 from Yaunde, Cameroons, is mentioned already by BAKER as a member of this species but the reasons are not quite clear to me. The branches of the inflorescence are spreadingly hairy in part, appressed hairy in other parts. From the only corolla left I should think that measurements well agree with E. zenkeri. There are a few long hairs appressed to the surface of the leaves present on the main nerves of the lower side. The inflorescence also is similar to other collections of Zenker. Zenker 3771 from Bipinde only designated as Ehretia spec. on the original label has been identified as E. cymosa by AMSHOFF according to an identification slip. It has all the typical characters of E. zenkeri except the presence of short pedicels in all the flowers of the only inflorescence preserved. This seems to indicate that there are intermediates for one or the other character. One may take the hairs of the inflorescence of no. 1483 as intermediate between E. zenkeri and typical E. cymosa, or the presence of pedicels in all the flowers combined with the typical set of characters of E. zenkeri as a sign of genetic introgression, but for me these peculiarities of single specimens only constitute an argument in favour of BRENNAN's opinion.

There is a marked difference, however, in size of corolla and style between E. cymosa including var. zenkeri and var. divaricata on one side, and E. abyssinica and silvatica, the East African representatives of the group, on the other. If var. zenkeri may be regarded as typical for the small-flowered group, there are also marked differences in size and position of the inflorescence, thickness of branches of the inflorescence and maybe other characters as well. On the other hand, it has also much in common with E. abyssinica and E. silvatica. Certainly, these two are more closely related to each other than to any of the other taxa involved. This means that E. abyssinica may be regarded as a species separate from E. cymosa or as a subspecies of the latter that is geographically separated from the typical subspecies. It does not seem justified, however, to take it as a mere variety.

E. silvatica, on the other hand, may be species, subspecies or variety under E. abyssinica. Unfortunately, no ecological data are available to give any clues to the existence of an ecological barrier between the two. Geographically, they are found in close neighbourhood, but never growing at the same locality as known so far. Quite obviously, evolution is still going on, and we do not know where it will lead to. This means that we can observe a certain hierarchy which cannot be clearly defined from our present knowledge. To create a new taxonomic status certainly would be the worst thing to do under prevailing circumstances. In E. silvatica a comparatively small number of reliable characters, mainly type of hairs and length of corolla-lobes, serves to separate it from E. abyssinica. These characters may be genetically linked, moreover, so that no intermediates are possible. I propose to maintain the rank of variety for it following BRENNAN, while E. abyssinica will be kept as a distinct species. The following new combination is necessary in this case:

Ehretia abyssinica R. BROWN var. silvatica GUERKE) H. RIEDL,
comb.n.

Syn.: E. silvatica GUERKE, Engl.Bot.Jahrbücher 19, Bei-

blatt 47: 46 (1895)

E. cymosa THONNING ex SCHUMACHER et THONNING var. silvatica (GUERKE) BRENNAN, Mem. New York Bot. Garden 9, 1: 5 (1954).

In this way, we need not introduce subspecies as a category new for this particular group. For E. abyssinica, the original status as a species of its own is restored as there are not sufficient arguments in favour of a subspecies, and too many and important differences for a mere variety.

E. divaricata may be a link between the two groups taxonomically as it is geographically, and may indicate a former contact between the two species, E. cymosa and E. abyssinica. As I did not see any specimens, I cannot prove this possibility for the time being.

Zusammenfassung

Die von den verschiedenen Autoren angegebenen Unterscheidungsmerkmale zwischen den fünf ursprünglich als Arten beschriebenen Taxa der Ehretia cymosa-Gruppe, E. cymosa THONNING ex SCHUMACHER et THONNING, E. zenkeri GUERKE ex BAKER & WRIGHT, E. divaricata BAKER, E. abyssinica R. BROWN ex FRESENIUS und E. silvatica GUERKE werden einer kritischen Prüfung unterzogen. Die ostafrikanischen Pflanzen werden als E. abyssinica var. abyssinica und var. silvatica (GUERKE) H. RIEDL, comb.n. von E. cymosa mit den Varietäten var. cymosa, var. zenkerii (GUERKE) BRENNAN und var. divaricata (BAKER) BRENNAN unterschieden. Vor allem die Größe der Blüten stellt dafür ein verlässliches Merkmal dar, während Behaarung, Vorhandensein von Pedicellen, usw., sich nicht als konstant erwiesen. Morphologische Untersuchungen zur Stellung des Blütenstandes widerlegen ein Argument BAKER's für die spezifische Selbständigkeit von E. silvatica.

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