# THE TAXONOMIC POSITION OF AGROCHARIS HOCHST. AND ALLIED GENERA

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ABSTRACT. The genus *Agrocharis* Hochst. is one of the few representatives of the Umbelliferae tribe Caucalideae found in tropical Africa. Although it is widely regarded as being congeneric with *Caucalis* L. evidence is adduced to indicate that it is clearly separable, especially in respect of fruit morphology and anatomy. The history and relationships of the genus *Caucalis* are also considered and it is concluded that it is probably monotypic.

## INTRODUCTION

The tribe Caucalideae of the Umbelliferae is distributed mainly in Europe, the Mediterranean region and SW and C Asia, with a few outlying members in the New World. Apart from the Mediterranean zone of N Africa, the tribe is poorly represented in the African continent: one species of *Daucus* (*D. hochstetteri* A. Braun ex Engler**) occurs in Ethiopia, a species of *Torilis* (*T. africana* (Thunb.) Sprengel) is found in Ethiopia and S Africa, although it is probably no more than a variant of *T. arvenis* (Hudson) Link, and a species of *Ammodaucus* (*A. leucotrichus* Coss. & Dur.) extends from the Canary Islands and NW Africa to Timbuktu.

Apart from these, a small group of endemic species has, however, been described from mainly tropical regions of Africa: *Agrocharis melanantha* Hochst., *Caucaliopsis stolzii* Wolff, *Caucalis incognita* Norman, *C. pedunculata* Baker fil. and *C. longisepala* Engler. With the exception of *Agrocharis melanantha* these species have not been taken into consideration in any recent accounts of the Caucalideae.

During a recent study undertaken at Reading in collaboration with Sharma (1971) the taxonomic status and position of these African species has been investigated, as part of a wider programme of research into the systematics of the Umbelliferae-Caucalideae (cf. Crowden *et al.*, 1969; McNeill *et al.*, 1969; Heywood, 1971 a, b). The purpose of this paper is to assess the status of the genus *Agrocharis* which in many recent works (e.g. Jacques-Félix, 1970) is included in *Caucalis*.

## THE GENUS AGROCHARIS HOCHST.

The genus *Agrocharis* was described by Hochstetter in 1844 (Flora 27, 1: 19) with a single species, *A. melanantha*, based on "*Daucus melananthus* Steud. in plantis ex itinere abyssinico Schimperi exsiccatis Un. it. nr. 1145". It was separated from *Daucus* by its fruits, petals and umbels, although without great precision.

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**The name *Daucus hochstetteri* A. Braun ex Engler is not widely known and is not recorded in *Index Kewensis* or in any of its supplements. It was published by Engler in Engler & Drude's *Vegetation der Erde* 832 (1921) in the following form "D. Hochstetteri A. Br. msc. (*D. abyssinicus* Hochst., non Fisch. & Mey.)".

Hiern (1877) transferred it to *Caucalis* and has been followed by most subsequent authors. He considered that there was no need for regarding *Agrocharis* as distinct from *Caucalis* and commented that "the conformation of the fruit is so closely that of *Caucalis* that such differences as there are can be sufficiently recognized by sectional or subgeneric segregation within the genus". It was also transferred to *Torilis* by Vatke (1876).

A second species, *A. gracilis* was described by Hooker from Fernando Póo (Clarence Peak, today Pico de Santa Isabel) but this has been considered by later authors as a synonym of *A. melanantha* (cf. Guinea, 1949 and Escarré, 1968, neither of whom even refer to Hooker's species although both of them collected *A. melanantha* in the *locus classicus* of *A. gracilis* and Escarré even cites the type!).

Today *A. melanantha* is known from Fernando Póo, the Cameroons, Ethiopia, Uganda, Tanganyika, Kenya, the Sudan Republic and from three localities in the Drakensberg, S Africa. It is found mainly in upland areas.

## The genus Caucalis

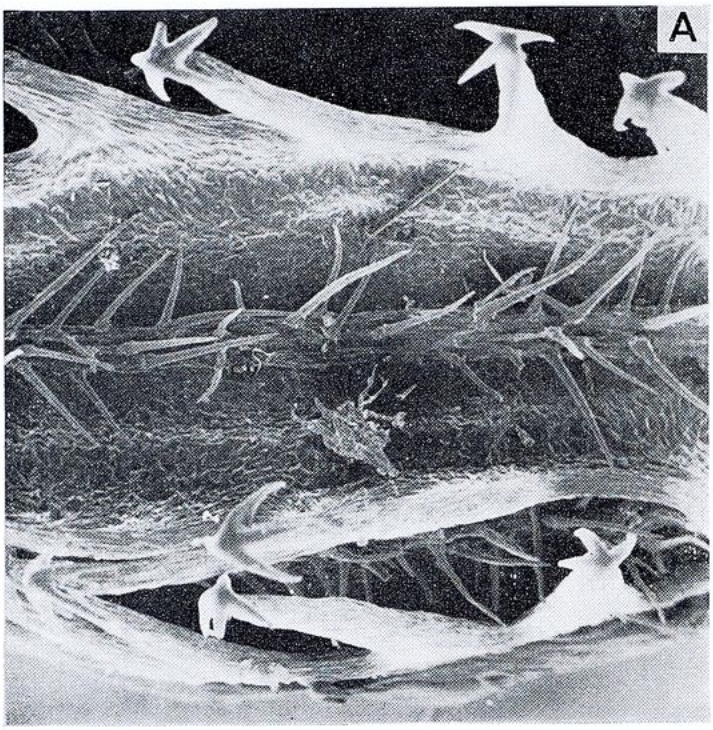
Before assessing the generic status of *Agrocharis* vis à vis *Caucalis* it is necessary to consider the position of the latter genus.

Even when one considers the confused state of classification of many Umbelliferous genera, largely stemming from reliance on poorly observed characters of the mericarps, it is surprising to find just how much of a dustbin taxon the genus *Caucalis* became during its history. It deserves to rank as one of the classic examples. Indeed when one considers the array of diverse species which have been at one time included in the genus, it is clear that they cover a large part of the tribe as recognized today. This is all the more surprising since the fruits of the type species, *C. platycarpos* L., are very distinctive both as regards their anatomy and micromorphology.

*Caucalis daucoides* L. (1753) non (1767) and *C. grandiflora* L. are today recognized as species of *Orlaya* Hoffm.; *C. orientalis* L. is an *Astrodaucus* (*A. orientalis* (L.) Drude); *C. latifolia* L. is correctly placed in the genus *Turgenia* Hoffm. of which it is the type-species. A group of species described under *Caucalis* have been transferred to the genus *Torilis* (as subgenus *Pseudocaucalis* Drude) with which they share a basically similar fruit structure and micromorphology (cf. Heywood, 1968). The species concerned are *Torilis leptophylla* (L.) Reichenb. fil., *T. stocksiana* (Boiss.) Drude, *T. tenella* (Delile) Reichenb. fil., *T. gaillardotii* (Boiss.) Drude, *T. chrysocarpa* Boiss. & Bal. and *T. erythrotricha* (Reichenb. fil.) Boiss. & Hausskn.

A further species, described from N America, *Caucalis microcarpa* Coulter & Rose, again differs markedly from *C. platycarpos* and was recognized by Koso-Poljansky (1916) as a separate monotypic genus *Yabea.* This separation is, in my view, fully justified, despite the almost universal ignorance of Koso-Poljansky's treatment by N American authors.

In addition to the tropical African species of *Caucalis* listed above, there is a further species, *C. mossamedensis* Welw. ex Hiern but nowadays placed in the genus *Angoseseli* Norman (*A. mossamedensis* (Welw. ex Hiern) Norman, syn. *A. mazzocchii-alemannii* Chiov., *Meringogyne mossamedensis* Wolff). Its fruits are quite unrelated to those of *Caucalis* or even of *Agrocharis.*



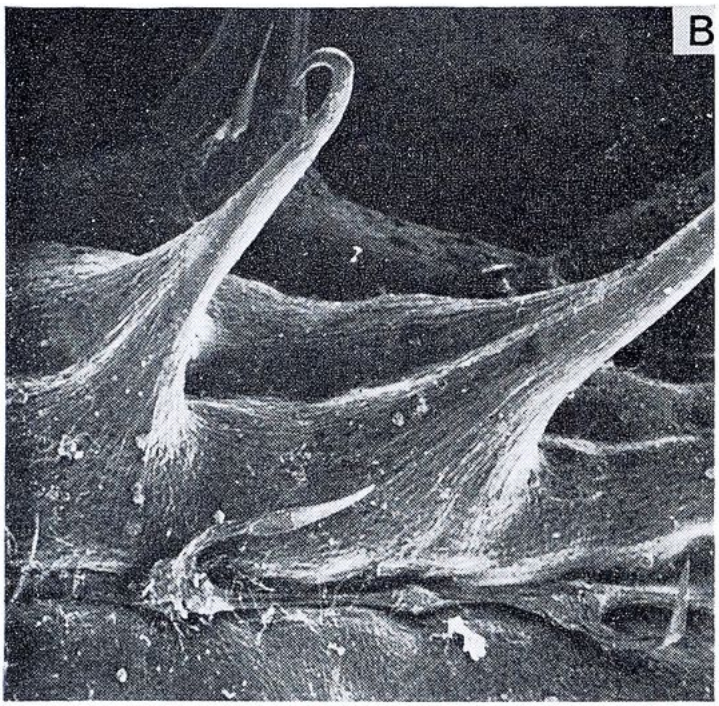




PLATE 5A, partial view of mericarp of *Agrocharis melanantha* Hochst. showing a primary ridge, in the middle plane, bearing forwardly directed hairs in 2-3 rows and secondary ridges bearing strong spines with glochidiate apices. Scanning electron micrograph X 64 taken on JSM-2 microscope; coating of gold/palladium; accelerating voltage 10 KV. 5B, partial view of mericarp of *Caucalis platycarpos* L. showing a primary ridge (foreground) bearing a swollen-based hair and prominent swollen secondary ridges bearing conical uncinate-aculeate spines. Scanning electron micrograph X 64 taken on JSM-2 microscope; coating of gold/palladium; accelerating voltage 10 KV.

*Caucalis capensis* (Thunb.) Lam. has not been identified, and finally *C. turgenioides* Stapf, a species described from Anatolia, has not yet been studied by me but is treated as a probable synonym of *Orlaya daucoides* in Davis's *Flora of Turkey*, vol. 4.

The above interpretations of genera separate from *Caucalis* have been confirmed by our recent studies on fruit anatomy and micromorphology at Reading (e.g. Heywood & Dakshini, 1971; Sharma, 1971; and Al-Attar & Heywood, unpublished), and in some cases by pollen morphology (Cerceau-Larrival, 1965, 1971) and phytochemistry (Crowden *et al.*, 1969). If, then, one excludes the tropical African species under consideration, it follows that the genus *Caucalis* is monotypic, containing only *C. platycarpos* L.

## Comparison of Agrocharis and Caucalis

Until the present study, the only author to consider the position of *Agrocharis* in any detail was Koso-Poljansky (1917) in the supplement to his major treatment of the Umbelliferae, *Sciadophytorum systematis lineamenta* (1916), in which he stressed the importance of anatomical characters of the mericarps and correctly interpreted these for many genera for the first time. It is surprising how widely neglected Koso-Poljansky's work has been by most later workers on the Umbelliferae.

Koso-Poljansky noted how different from *Caucalis* the genus *Agrocharis* was in fruit structure and commented that the genus *Torilis* was much more similar but differed by the shape of the endosperm. In common with all previous authors he did not describe the surface features of the mericarps accurately, especially the hairs on the primary ridges which our recent studies have shown to be characteristic for every genus of the Caucalideae so far examined by scanning electron microscopy (Heywood & Dakshini, 1971).

The fruits of *Agrocharis* are laterally compressed. The primary ridges of the mericarps are striate-filiform and bear 2–3 rows of semi-appressed hairs, lobed and swollen at the base, which are directed towards the stylar end. The vallecular ridges are prominent and bear a single row of strong spines which are mostly directed towards the base of the mericarp (except those at the stylar end) and glochidiate at the apex (Plate 5A). No other genus of the Caucalideae possesses such features. In *Caucalis* the primary ridges are somewhat depressed and bear a single row of sparse, semi-erect, flattened hairs with a prominent, swollen, tubercle-like base; the secondary ridges are very prominent, swollen and elevated, bearing uncinate-aculeate spines swollen at the base (Plate 5B). The hairs and spines on the mericarps of *Torilis* are again very distinctive and quite unlike those of *Agrocharis*.

The main features of the mericarp distinguishing *Agrocharis* and *Caucalis* are given in the accompanying table.

In addition to *Agrocharis melanantha*, the other *Caucalis* species described from tropical Africa, *C. incognita*, *C. longisepala* and *C. pedunculata*, were considered to see if they too should be transferred to *Agrocharis*. Very little material has been seen of *C. longisepala* but it appears very similar to *C. pedunculata* and may not be separable from it. The latter species differs from *Agrocharis melanantha* in many respects including fruit anatomy and

micromorphology as well as in pollen characters and in its inflorescence. It will probably have to be recognized as a new genus but further studies are in progress. Similarly *C. incognita*, although similar to *Agrocharis* in its pollen, differs in its fruit anatomy and micromorphology and may also have to be described as another new genus.

TABLE 1.

Comparison of mericarps of *Caucalis* and *Agrocharis*.

| CAUCALIS | AGROCHARIS |
|---|---|
| Primary ribs indistinct, somewhat depressed, bearing a single row of semi-erect flattened hairs strongly swollen at base. | Primary ribs filiform, bearing 2-3 rows of semi-appressed, forwardly directed hairs slightly swollen at base. |
| Vallecular ribs very prominent, cylindrical—swollen, bearing uncinate-aculeate spines. | Vallecular ribs broad but not swollen, bearing glochidiate-tipped spines. |
| Prominent bundles of sclerenchyma present in vallecular ribs. | No sclerenchymatous bundles in vallecular ribs. |
| Bundles of sclerenchyma in primary ribs lunate in cross-section. | Bundles in primary ribs slender, terete. |
| Endosperm deeply sulcate with the margins involute-recurved. | Endosperm sulcate with the margins directed towards the commissure. |
| Calcium oxalate crystals present in commissure. | Crystals absent. |

## CONCLUSIONS

From the above discussion it seems that the genus *Agrocharis* is not only distinct but may be monotypic. It would thus become the first endemic genus of the Caucalideae to be known from tropical Africa, although it is likely that the other African species of *Caucalis* discussed above will require separate generic recognition.

Phytogeographically the tropical African species of Caucalideae present an interesting problem. Their isolation from the main body of the tribe and their montane habitat suggests that they may be relics of an earlier migration. These points will be discussed fully in a later paper.

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