A NEW SPECIES OF ANAPHALIS (COMPOSITAE) FROM MEXICO

A. J. C. Grierson

ABSTRACT. A new species, *Anaphalis aecidiocephala* Grierson, is described from Mexico and the reasons for placing it in this genus are examined against a background of uncertainty as to the generic limits within the subtribe *Gnaphaliinae*. On the assumption that it is correctly placed, a new combination, *Anaphalis concinna* (A. Gray) Grierson, is made to bring the apparent nearest relative of the new species within the same genus.

Anaphalis aecidiocephala Grierson **species nova,** pulcherrima, *A. concinnae* (A. Gray) Grierson affinis a qua habitu pumiliori et magis lignescenti, foliis minoribus obtusis deflexis, involucris subglabris differt. Plate 8.

Frutex nanus, caespitosus, circiter 10 cm altus. *Caules* copiose ramosi, dense albescenti-tomentosi, foliis deflexis obtecti. *Folia* oblonga, 2·5–5 mm longa 1·5–3 mm lata, crassiuscula, sessilia, ad apices obtusa vel subacuta, marginibus integerrimis revolutis, supra parce griseo-tomentosa, subtus densius albescenti-tomentosa, ab initio deflexa. *Capitula* subdioecia, disciformia vel discoidea, 1–8 ad apices ramorum sessilia. *Involucra* cylindrico-campanulata, 3–4 mm diametro, 5–6 seriata; phylla exteriora elliptico-ovata, 3–4 mm longa, 2–2·5 mm lata, ad bases crassiuscula viridentia, ad apices scariosa acuta, roseo-carminea, glabra vel margine parce ciliato-villosa; phylla interiora lineari-oblanceolata 6–7 mm longa 1–1·25 mm lata, obtusa, supra media patentia, albo-membranacea. *Capitula* subfoeminea flores foemineos circiter 25 et flores hermaphoditicos (vel masculos fungentes) 5, continentia; corollae foemineae cylindraceae 4 mm longae, carmineae, ad apices angustiores minute 5–dentatae; corollae hermaphroditicae tubulosae, 3·5 mm longae, carmineae, ad apices 5–lobatae, lobis ca 0·5 mm longis, acutis. *Capitula* hermaphroditica (vel mascula fungentes) 30–35 flores continentia, corollae 4 mm longae, carmineae. *Achenia* in capitula submascula 0·5 mm longa, obconica, omnia sterilia; in capitula subfoeminea achenia florium foemineorum fertilia, oblonga, 1·5 mm longa, 4–5 angulata, leviter compressa, minute puberula; achenia florium hermaphroditorum sterilia linearia, 0·75–1 mm longa. *Pappus* albus, uniseriatus, 4 mm longus; pili acheniorum foemineorum capillaceis, ad apices non incrassati; pili acheniorum hermaphroditicorum clavati, ad apices incrassati.
MEXICO. Oaxaca, Ixtlan, Comaltepec, Cerro de Humo Chico, 2 iii 1968, *T. MacDougall* 412 S (E, holotype): *ibid*, 10,000 ft, 6 i 1961, *T. MacDougall* s.n. (E).

The specific epithet alludes to the resemblance which a mycological colleague observed between the capitulum of this plant and the aecidium of the Uredineae.

This new species from the mountains of Oaxaca is in cultivation in this garden and has the potentiality, at least, of becoming an attractive proposition so far as alpine-gardening enthusiasts are concerned. Root tips from this cultivated material (voucher specimen: C. 9234) gave a chromosome count of $2n = c. 28$ which is the number that has been recorded for the majority of *Anaphalis* species.

The generic limits within the *Gnaphaliinae* are the subject of a certain amount of disputation and opinions differ as to which genus this new species should be ascribed: some, especially American botanists, have suggested *Gnaphalium* itself; others, mostly Europeans, have opted for *Helichrysum*, a genus which is virtually unknown from the American continent. I have placed it in *Anaphalis* only after careful thought and have been guided by the following considerations.

Subdioecism. Drury (1970) stated that *Anaphalis* "is in fact subdioecious. A species produces either predominantly hermaphrodite or predominantly female florets in a capitulum in contrast with the situation in *Gnaphalium* where the ratio ⚥/♀ per capitulum is constant for a species." This statement is rather too sweeping to pass unchallenged, for, as I have related elsewhere (Cey. Journ. Sci. in press), *Anaphalis* is not always subdioecious: the Ceylon species do have a constant ratio of sexes in the capitulum and show no evidence of subdioecism. This situation also obtains among some Sino-Himalayan species e.g., *A. adnata* DC.

Secondly, among those species that are subdioecious, the "predominantly female" condition is not disputed: there are always some hermaphrodite type of flowers among the females. But "predominantly hermaphrodite" is not always correct for there are some species in which the functionally male capitula contain exclusively the hermaphrodite type of flower eg., *A. aureo-punctata* Lingels. & Borza, *bicolor* Franch., *griffithii* Hook. f., *hancockii* Maxim., *larium* Hand.-Mazz., *likiangensis* Chang.

Out of about a dozen fragments of this new species that have reached Edinburgh from Mexico only two have contained female flowers; the capitula of the others consist exclusively of flowers of the hermaphrodite type which are functionally male. The ratio of sexes in the predominantly female capitula of this species (25♀:5⚥) is in accord with those generally found in *Anaphalis*; it must be noted, however, that in these capitula the hermaphrodite type of flower is neuter: the anthers are only half as long as those in the funtionally male flowers and they contain no pollen grains. This character has not been remarked upon before in this genus, nor is it known how widespread it may be therein. Among American species a similar sterilisation of the anthers is found in *A. margaritacea* (L.) DC. but not in *A. chilensis* Reiche.

The presence of flowers of two kinds, at least within the predominantly female capitula of *Anaphalis*, contrasts with the absolute dioecism of *Antennaria* where the capitula strictly contain either one sort of flower or the other, never an intermixture. In any case, habit is against this new species being placed in this largely rosulate genus. According to Beauverd (1910), the other classical genera of the *Gnaphalium* subtribe which display the subdioecious condition ("imparfaitement dioique") are *Leontopodium*, to which this new species, since it lacks the star-like outer bracts of this genus, clearly does not belong, and *Ewartia*, a small Australian and Tasmanian genus. The latter may also be discounted since, apart from being geographically remote, the dioecism here is somewhat different in that the achenes of the hermaphrodite type of flowers which occur in the female capitula are fertile whereas those of the hermaphrodite (functionally male) capitula are not.

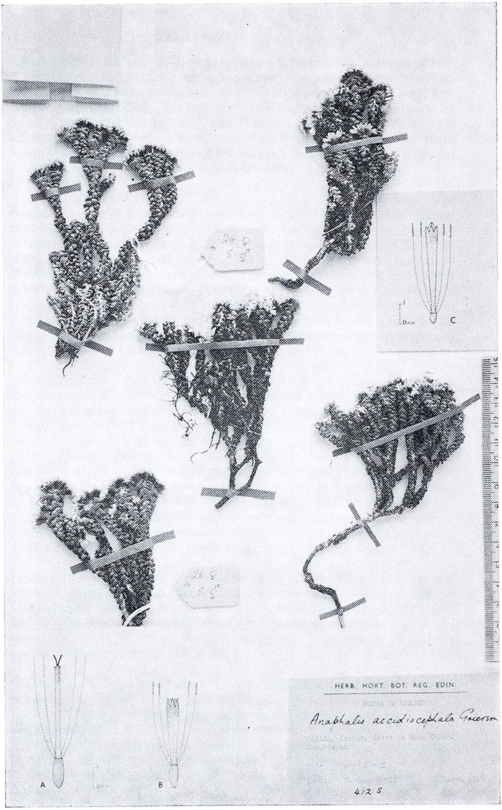

PLATE 8. Holotype of *Anaphalis aecidiocephala* Grierson. The two specimens on the left have predominantly female capitula, the other three have functionally male capitula containing, exclusively, the hermaphrodite type of flower.

Inset drawings show A, a female flower, B, a neuter flower from a predominantly female capitulum; and C, a functionally male flower.

Other genera. Two other Central American genera which were created by Kirpichnikov (1950) remain to be examined: *Gnaphaliothamnus*, based on *Gnaphalium rhodanthum* Sch.-Bip., and *Pseudognaphalium*, based on *Gnaphalium oxyphyllum* DC. The first of these is a dwarf shrub with numerous small capitula in dense corymbs, and *Pseudognaphalium* resembles the new species even less in being a medium-sized herb with clusters of pale Gnaphalium-like capitula. Neither of these genera is known to be, nor from the specimens available appears to be, subdioecious.

Achenes. Beauverd (1913) pointed out that the achenes of *Anaphalis* are dimorphic. In the functionally-male capitulum the achenes of the hermaphrodite type of flower as well as those of the few female flowers around the margin of the receptacle are short, rudimentary and sterile. On the other hand, in the predominantly female capitula, the achenes both of the female flowers, and those of the hermaphrodite type of flowers are oblong but only those of the female are fertile, the others have ovules "non susceptible de fecondation". The achenes of this new species show a similar dimorphism: those in the functionally male capitula are shorter and obconical; the neuter flower achenes in the predominantly female capitula are similar in shape and length to those of the female flowers that surround them.

Pappus Structure. A sex-linked dimorphism is known in several genera of the *Gnaphaliinae* wherein the tips of the female flower pappus hairs are slender but those of the hermaphrodite type of flowers are swollen and clavate (see Beauverd, 1910 p. 210). This dimorphism is also present in some *Anaphalis* species eg., *A. margaritacea* (L.) DC., *cinnamomea* (DC.) Clarke, *chilensis* Reiche and in this new species, but by no means in all. *Anaphalis* pappus hairs are also variable in the form of their basal parts: the above author (p. 217) scored this genus as having the base of the hairs scabrid or pectinate. Those of *A. aecidiocephala* are almost smooth and only slightly scabrous and, elsewhere, one finds a range of variation from strongly ciliate in *A. cinnamomea* and *chilensis* to completely smooth in *A. nubigena* DC.

Involucre. A. aecidiocephala is uniform in its involucre form and the sex-linked dimorphism which one finds in *Antennaria* is completely lacking. Generally the phyllaries are white in *Anaphalis* but those of the Afghan *A. aurora* Rech. f. & Edelb. and the western Chinese *A. franchetiana* Diels are tinged with pink. However, in the spreading tips of the phyllaries this new species is characteristic of the genus.

Palynology. The pollen grains of *A. aecidiocephala* and various species belonging to possibly related genera (*Gnaphalium uliginosum* Linn., and *G. sylvaticum* Linn., *Anaphalis margaritacea*, *Antennaria geyeri* Gray, *Helichrysum ledifolium* (DC.) Benth., *Gnaphaliothamnus rhodanthum* (Sch. Bip.) Kirp. *Pseudognaphalium oxyphyllum* (DC.) Kirp.) were sectioned and subjected to electron microscopic examination in the hope of finding a basis in palynological evidence to guide the choice of genus. The results, however, have displayed a considerable uniformity in the structure of the exine of this group, all of them being similar to that of *Anaphalis margaritacea* and to

Craspedia richea Cass., which like the above species also belong to the tribe *Inuleae* (see Skvarla & Turner, 1966, figs 13 and 14.). They show different degrees of thickening of the foot-layer even within the same genus: *Gnaphalium uliginosum* has a thin foot layer whereas *G. sylvaticum* has a much thicker layer. The exine of *A. aecidiocephala* is similar to the latter and the disparity between it and that of the thin-layered *A. margaritacea* may be viewed as an example analogous to that of *Gnaphalium.*

Electron micrographs of these pollen grains were exhibited together with herbarium specimens of this new species at the joint B.S.B.I., Linnean Society and I.O.P.B. Conference at Manchester during September 1971.

Finally, if *A. aecidiocephala* is correctly placed in *Anaphalis*, then its closest apparent relative, at present known as *Gnaphalium concinnum* A. Gray, should be tranferred to this genus. It is a much more herbaceous perennial with stems up to 30 cm tall and larger leaves 1–2 cm long which are similarly deflexed. The capitula are similar in size, shape and coloration but, from the few specimens available, are only known in the female state, in which it has also been noted that the anthers of the hermaphrodite type of flowers contain no pollen. Specimens with functionally male capitula do not yet appear to have been collected.

Anaphalis concinna (A. Gray) Grierson **comb. nov.**
Syn.: *Gnaphalium concinnum* A. Gray in Proc. Amer. Acad. 15: 34 (1879).
Type: Mexico, mountains SE of San Luis Potosi, *Parry & Palmer* 423.

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