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TAXONOMIC NOTES ON SOME CANARY ISLAND AND NORTH AFRICAN SPECIES OF CYTISUS AND GENISTA

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Resumen. Se estudian en este trabajo algunos taxones canarios y norteafricanos de situación incierta, proponiéndose la siguiente combinación: *Genista segonnei* (Maire) P. Gibbs, comb. nov. Se validan asimismo los siguientes nombres: *Teline osyroides* (Svent.) P. Gibbs & Dingwall, *T. linifolia* subsp. *teneriffae* P. Gibbs & Dingwall y *T. linifolia* subsp. *gomerae* P. Gibbs & Dingwall. Se presta especial interés al estudio de la anómala anatomía foliar de *Cytisus battanderi* Maire.

Summary. Taxonomic and nomenclatural notes are given for several species within the *Cytisus-Genista* alliance. The application of the name *Genista tenera* (Jacq. ex Murray) Kuntze is clarified; a new combination *Genista segonnei* (Maire) P. Gibbs is proposed; the following combinations are validated: *Teline osyroides* (Svent.) P. Gibbs & Dingwall, *T. linifolia* subsp. *teneriffae* P. Gibbs & Dingwall and *T. linifolia* subsp. *gomerae* P. Gibbs & Dingwall. Attention is drawn to the anomalous nodal anatomy of *Cytisus battanderi* Maire.

The limits of the genus *Cytisus* versus *Genista* have been a longstanding although rather unnecessary source of taxonomic controversy, and an impressive number of species have been transferred at one time or another between the two genera. It now seems to be fairly widely accepted that there do exist two distinct centres of generic affinity, and that if a combination of characters is taken into account these can be readily recognised, viz.

Genista affinity	*Cytisus* affinity
Keel petals oblong - rectangular with a rounded apex.	Keel petals rather falcate-beaked with a more or less pointed apex.
Upper lip of the calyx deeply bifid.	Upper lip of the calyx scarcely bifid.
Leaves take three or one vascular traces; many species unifoliolate (fig. 1, a-c).	Leaves take one vascular trace accompanied by two lateral fibrous traces; many species trifoliolate (fig. 2, a).
Seeds usually without a conspicuous rim-aril.	Seeds usually with a conspicuous rim-aril.

The characters as tabulated above are given more or less in order of their constancy and hence diagnostic value. Various species show exceptional conditions to individual characters, or sometimes to several of them, but taken in combination there is usually little difficulty in deciding whether any particular taxon shows *Genista* or *Cytisus* affinities. Differences of opinion currently lie in the number of segregate genera which should be recognised in the *Genista*-alliance and *Cytisus*-alliance, and this is basically a problem of taxonomic approach, the «splitter» vs. «lumper» mentality, and it only marginally involves any real contention over the interpretation of systematic affinities.

The following notes refer to several species which seem to have been left on the wrong side of the *Cytisus* - *Genista* divide as it is currently interpreted.

1. «Genista virgata» and «Cytisus tener».

Some taxonomic and nomenclatural confusion exists in the literature with regard to the name *Genista virgata* as based on *Spartium virgatum* Aiton, a species originally described from Madeira. Another taxon from the Canary Islands (Tenerife) has been linked to this epithet by various authors as *Genista tenera* var. *sericea* O. Kuntze (with *Spartium virgatum* cited as a synonym) or *Genista virgata* var. *teneriffae* Burchard.

In fact, these taxa are two quite distinct species: the Madeira plants have unifoliolate leaves and uniformly pubescent standard and keel petals. The correct name for this species is *Genista tenera* (Jacq. ex Murray) O. Kuntze. The other species, which has a very local distribution on Tenerife,

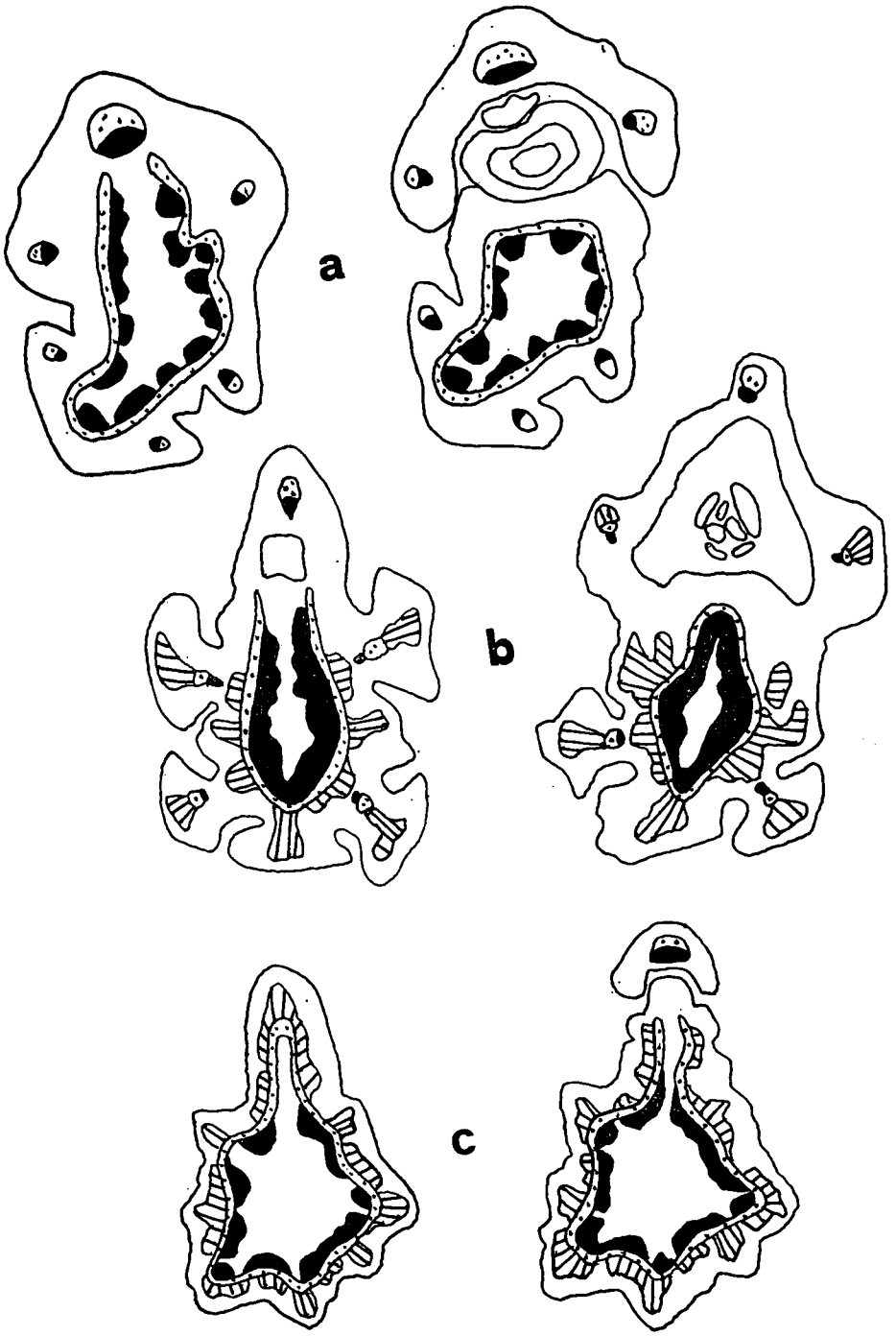

Fig. 1.—Nodal anatomy of three *Genista* species. a, *G. tinctoria* L.; b, *G. radiata* Scop.; c, *G. hispanica* L.

possesses mostly trifoliolate leaves and a virtually glabrous standard petal, and it should be referred to as *Teline osyroides* (Svent.) Gibbs & Dingwall.

Spartium virgatum Aiton (*Hort. Kew.* 3:11, 1789) is a superfluous replacement of *Cytisus tener* Jacq.; AITON cited this latter species, and his diagnosis agrees with *C. tener* as figured in *Icones plantarum rariorum* fasc. 4, t. 147 (1784). The text in which this species is briefly described was not published until probably 1787, but since the illustration in the *Icones* depicts a branch in flower, with a detail of three pods and a seed, it could just be accepted as validly published under Art. 44 of the International Code. However, the species was also described, with a crossreference to JACQUIN, by MURRAY in the 14th edition of the Linnaean *Syst. Veg.*: 667 which was also published in 1784. According to SCHUBERT (1945) (*) the Murray edition was probably published a month or so ahead of JACQUIN's *Icones* fasc. 4, so that the correct citation would seem to be *Cytisus tener* Jacq. ex Murray.

For his *Spartium virgatum*, AITON (*loc. cit.*) noted «native of Madeira, Mr. Francis Masson», but for *Cytisus tener* Jacquin observed «egregius Masson ex Tenerifa mihit». There is thus some confusion as to the origin of the MASSON collection on which this species is based, Tenerife according to JACQUIN and Madeira according to AITON. MASSON, of course, collected on both islands. The MASSON type specimen has not been traced but from a study of other macaronesian specimens it is clear that JACQUIN's unifoliolate species only occurs on Madeira and is absent from the Canary Islands. It must be assumed that the reference to Tenerife was an error perhaps based on mislabelled specimens. The epithet *tener* for a species which is endemic to the island of Madeira is unfortunate but its application is unavoidable.

One further correction must be made: the unifoliolate leaves which take three vascular traces, and the morphology of the calyx and keel petals clearly refer this species to the genus *Genista*. The seeds do possess a distinct albeit minute aril but this is the case with several other *Genista* species (including *G. tinctoria*) and this character scarcely undermines the obvious *Genista* affinity. The first generic transfer to *Genista* seems to have been made by KUNTZE so that the correct citation is:

Genista tenera (Jacq. ex Murray) O. Kuntze, *Revis. Gen.*, 1: 190 (1891).
Cytisus tener Jacq., *Ic. Pl. Rar.*, 1 (4): t. 147 (1784); text 15 (1787); Murray in L., *Syst. Veg.*, 667 (1784).

(*) I am indebted to Dr. R. K. BRUMMITT (Royal Botanic Gardens, Kew) for drawing my attention to SCHUBERT's analysis of the dates of publication of JACQUIN's *Icones* and for additional bibliographic advice.

Spartium virgatum Aiton, *Hort. Kew.*, 3: 11 (1789) nom. illegit.
Genista virgata (Aiton) DC., *Prodr.*, 2: 149 (1825) nom. illegit.

The second species, which certainly does occur on the island of Tenerife, was originally described as *Cytisus osyroides* by SVENTENIUS, doubtless being referred to the genus *Cytisus* because of its distinctly arillate seeds and trifoliolate leaves. However, as noted by GIBBS & DINGWALL (1972) the corolla shape, particularly the oblong keel petals, and the fact that the trifoliolate leaves take three vascular traces from the stem (fig. 2, b) refer this species to the macaronesian centred genus *Teline* which is a generic segregate with *Genista* rather than *Cytisus* affinity. The combination was unfortunately not validly published in 1972 but is here validated by myself and the original co-author. A new record for this sparsely distributed species from collections by BRAMWELL is also given.

Teline osyroides (Svent.) P. Gibbs & Dingwall, *Bol. Soc. Brot.*, 45: 293 (1972) without basionym date, *comb. nov.*

Cytisus osyroides Svent., *Bol. Inst. Nac. Invest. Agron. (Madrid)*, 20: 201 (1949).

Genista tenera var. *sericea* O. Kuntze, *Revis. Gen.*, 1: 190 (1891).

Genista virgata var. *teneriffae* Burchard, *Feddes Repert.*, 8: 551 (1910).

TENERIFE: Caldera de Masca, Montaña del Guelge, 1.V.1945, *Sventenius* (Herb. Svent.); Montañas de Teno, Barranco de Masca; slopes below cliffs, frequent, 26.IV.1969, *Bramwell* 1388 (RNG); Barranco de Erjos, near El Escabonel, phonolite cliffs, *Bramwell* & *Humphries* 3200 (RNG).

The opportunity is also taken here to validly publish two other combinations in the genus *Teline*:

Teline linifolia subsp. **teneriffae** P. Gibbs & Dingwall *comb. nov.; Bol. Soc. Brot.*, 45: 299 (1972) *non rite public.*

Subspeciebus ceteris affinis foliolis 16 - 20 mm., petiolis 1,0 - 1,8 mm. et bracteolis 3 - 4,5 mm. differt.

Teline linifolia subsp. **gomerae** P. Gibbs & Dingwall *comb. nov.*; *Bol. Soc. Brot.*, 45: 301 (1972) *non rite public.*

Subspeciebus ceteris affinis foliolis major, c. 44 mm., petiolis c. 6 mm., et bracteolis 2,5 mm. differt.

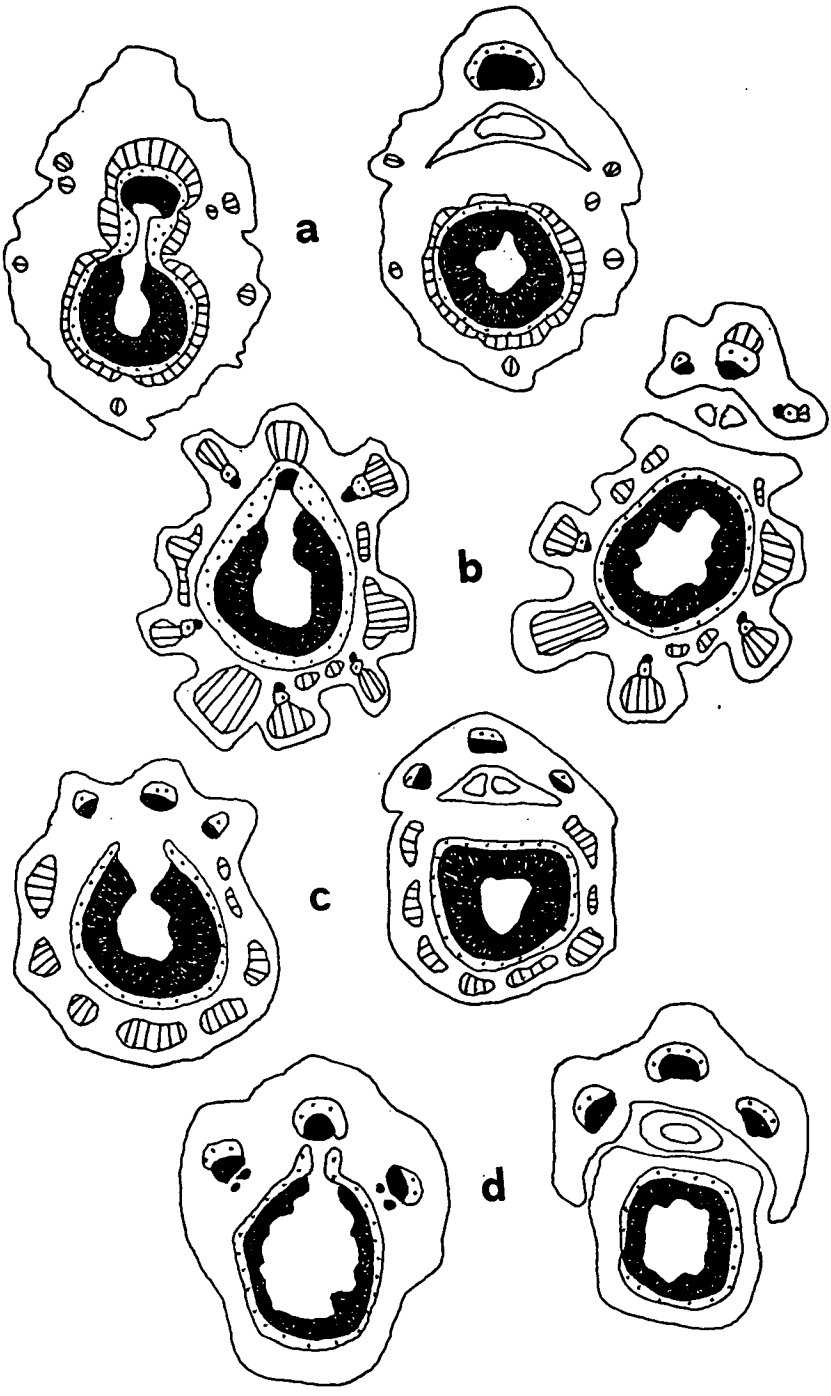

Fig. 2.—Nodal anatomy of *Cytisus, Teline* and *Genista* species. a, *Cytisus patens* L.; b, *Teline osyroides* (Svent.) P. Gibbs & Dingwall; c, *Genista segonnei* (Maire) P. Gibbs; d, *Cytisus battanderi* Maire.

2. **Cytisus segonnei** Maire.

This species was described from North Africa (Djebel Kest in Morocco) by MAIRE originally as *Adenocarpus segonnei*, presumably on the basis of the deeply cleft upper lip of the calyx and the small, petiolate, suborbicular trifoliolate leaves which are similar to those of *Adenocarpus complicatus*. The resemblance to *Adenocarpus* is only superficial, however, and MAIRE subsequently transferred this species to the genus *Cytisus*. Unfortunately, the affinity to *Cytisus* appears to be equally superficial since *segonnei* has a number of characters which are typical of the genus *Genista*, viz. deeply bifid upper lip to the calyx, oblong keel petals, and leaves which take three vascular traces (fig. 2, c). No specimens with mature legumes have been seen but immature pods which have been subjected to clearing suggest that the seeds do not possess a conspicuous aril, and if this proves to be the case it further supports the *Genista* affinity. On balance, this species should clearly be referred to the genus *Genista* and the combination is made below.

Genista segonnei (Maire) P. Gibbs *comb. nov.*

Adenocarpus segonnei Maire, *Bull. Soc. Hist. Nat. Afr. Nord,* 23: 174 (1932).

Cytisus segonnei (Maire) Maire, *Bull. Soc. Hist. Nat. Afr. Nord,* 27: 217 (1936).

MOROCCO. Anti Atlas; rocailles greseuses du Mont Kest, au dessus de Tanalt, 1600 m. s. m., 8.IV.1935, *Maire* (G); rocailles du Kest a Imdrighis, 1400 m. s. m., 2.V.1934, *Cluy* (RAB); Dar Cheik, M. Hassim des Aït Toudma, V. 1935, *Gattefosse* (RAB).

3. **Cytisus battanderi** Maire.

This species from Morocco (High Atlas) presents another interesting evolutionary situation and also a rather more difficult taxonomic problem. Although *Cytisus battanderi* has the typically *Cytisus*-like falcate keel petals and conspicuously arillate seeds, it is a rather unusual species within this genus because of its tree-like habit with flowers in erect racemes, and deeply divided calyx upper lip. Moreover, it has a very anomalous nodal anatomy for the genus *Cytisus* in that it has leaves which take three vascular traces (fig. 2, d).

PELLEGRIN (1908) first drew attention to the correlation between nodal anatomy and taxonomy within the Genisteae, and he noted that within the *Cytisus* - *Genista* group species of *Cytisus* uniformly have leaves which take a single vascular trace accompanied by two lateral fibrous traces, whilst within *Genista* some species have leaves which take three vascular traces (subgenera *Genista* and *Spartocarpus*; infra-generic classification according to GIBBS, 1966) whilst other species have leaves which take a single trace, unaccompanied by any fibrous traces (subg. *Phyllobotrys*). Several authors (WATARI, 1934; TAYLOR, 1938) have published data which appear to conflict with this correlation but GIBBS & DINGWALL (unpublished studies) have confirmed and amplified PELLEGRIN'S original survey (*).

In our studies on nodal anatomy in the *Cytisus* - *Genista* group we looked at a number of species not included in PELLEGRIN'S original work:

1. All species of the genus *Teline* (as recognised by GIBBS & DINGWALL (1972) including *T. osyroides* discussed above) which we found to be uniformly three-trace taxa, with the lateral traces deriving from the cortical bundles.

2. Three species of *Cytisus* from North Africa: *Cytisus platycarpos* Maire, which has the typical single trace with two fibrous traces; *Cytisus segonnei* (ie. *Genista segonnei* as discussed above) and *Cytisus battanderi* which has three vascular traces which pass directly from the central stele.

It seems probable that the ancestors of the present-day Genisteae possessed a tree-like habit and largish petiolate, trifoliolate leaves with conspicuous stipules. Such species would also have a three-trace nodal anatomy (the usual situation in the Papilionoideae) and these traces would arise directly from the vascular stele (ie. no cortical bundles). A further subdivision of the lateral traces would allow a vascular supply to pass to the large stipules. Dense racemose inflorescences, elongate several- to many-seeded legumes and seeds with a conspicuous rim-aril are also likely characters of this ancestral group.

The only extant taxa which retain a number of these characters are

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(*) The only species for which our results disagree with the study made by PELLEGRIN is *Cytisus patens* L. This is a somewhat anomalous species with a deeply bifid upper calyx lip and as a consequence it has been variously classified. PELLEGRIN described it as a three-trace species and transferred it to *Genista* subg. *Teline*. However, we have found it to have the characteristic *Cytisus* nodal anatomy of a single trace accompanied by two fibrous traces (fig. 2, a) and this correlates with the falcate keel petals. *Cytisus patens* should be retained in the *Cytisus* alliance, probably grouped with species of *Cytisus* sect. *Chronanthus* (or in the segregate genus *Chronanthus*).

species of the genus *Laburnum* (and closely allied *Hesperolaburnum*), *Petteria ramentacea*, and *Cytisus battanderi*. At a further stage of evolution, within the *Genista* alliance, species of *Teline* are presumably relatively little modified from this ancestral stock but they do possess the *Genista*-type keel petals and xeromorphic ridged stems with pockets of photosynthetic tissue in the furrows and cortical bundles in the ridges. In the *Cytisus* alliance the group *Chamaecytisus* (*Tubocytisus*) likewise are presumably fairly basic taxa but here the number of vascular leaf-traces has been reduced despite the retention of large, petiolate, trifoliolate leaves.

Thus *Cytisus battanderi* seems to be a very distinctive species within the genus *Cytisus*, but whether its combination of anomalous characters is sufficient to warrant generic segregation is another question. MAIRE recognised its isolated position by referring *C. battanderi* to a distinct section, sect. *Argyrocytisus*, and this was implicitly recognised as a distinct genus by HEYWOOD (1968) but without formal description. Whatever taxonomic view is adopted however, it is biologically more important to realise that *Cytisus battanderi* is a species which has retained a number of «primitive» characters within the context of evolution in the *Cytisus* - *Genista* complex.

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