



NOTES ON THE GENUS *USNEA* DILL. EX ADANSON

Philippe CLERC*

Abstract: *Usnea quercina* Bystrek & Górzynska, based on heterogeneous type material, is lectotypified and becomes a synonym of *U. wirthii* P. Clerc. *Usnea wirthii* is new for South America. A distribution map of *U. madeirensis* Motyka (Syn. *U. silesiaca* Motyka) in Europe is given. *Usnea hesperina* Motyka (Syn. *U. elongata* Motyka, *U. schadenbergiana* Göpp & Stein, *U. subgracilis* Vain., *U. subplicata* (Vain.) Motyka) is new for Africa, Asia and South America. *Usnea hirta* (L.) F. H. Wigg. (Syn. *U. corrugata* Motyka, *U. foveata* Vain., *U. leprosa* Motyka) is new for Africa. *Usnea subscabrosa* Nyl. ex Motyka (Syn. *U. santae-annae* Motyka) is new for South America. The holotype of *U. marocana* Motyka (= *U. mutabilis* Stirt.) was found in LBL.

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Introduction

Motyka (1936–1938), in establishing his species concept in the genus *Usnea*, was influenced to a large extent by geographic criteria (Clerc 1994), i.e. the same species common to different continents was described as different taxa. Consequently many species with a worldwide distribution have been described several times under different names. Such names belonging to the same taxon were even sometimes included in different sections of Motyka's systematic arrangement, as shown in this article for *U. hesperina*.

In 1995 I had, for the first time, the opportunity to work in J. Motyka's herbarium in Lublin (LBL), as well as in those of E. Acharius (H-ACH) and W. Nylander (H-NYL) in Helsinki. Studying the original material of several taxa has had many taxonomic consequences, some of which are reported here.

Materials and Methods

All material has been studied with thin-layer chromatography (Culberson & Ammann 1979) with modified solvent B (Culberson & Johnson 1982). Anatomical measurements of the cortex (C), medulla (M) and central axis (A) were established according to the method given in Clerc (1984a).

Results

Usnea hesperina Motyka

Lich. Gen. Usnea Stud. Monogr., Pars Syst. 2: 383 (1938); type: Espagne (Spain), Iles Canaries, Tenerife, La Laguna, Monte Las Mercedes, Lomo del Boqueron, 740–780 m, dans la pente boisée en exp. SW, Laurisylva-Fayal-Brezal, sur les branches de *Laurus*, 12 ix 1986, P. Clerc (G—neotype, selected here); %C/%M/%A: 9-5/24/34; chemistry: usnic and protocetraric acids.

*Conservatoire et jardin botaniques, 1 ch. de l'Impératrice, Case postale 60, 1292 Chambésy/GE, Switzerland.

Usnea elongata Motyka, *Lich. Gen. Usnea Stud. Monogr., Pars Syst.* 2: 411 (1938); type: Chile, Maguallua, Jamuco, 1906, Morton Middleton (S!—holotype); %C/%M/%A: 10/16/47; chemistry: usnic and protocetraric acids.

Usnea hesperina subsp. *liturata* Motyka, *Lich. Gen. Usnea Stud. Monogr., Pars Syst.* 2: 384 (1938); type: Gallia, Morbihan, forêt de Camors, 1931, *Des Abbayes* (LBL!—holotype); %C/%M/%A: 11·5/19·5/37; chemistry: usnic and protocetraric acids.

Usnea schadenbergiana Göpp. & Stein, *60. Jahresber. Schles. Ges. Vaterl. Cult.*: 229 (1883); type: Ins. Philippinae, Siriban in Mindanao, *Schadenberg* (LBL!—holotype); %C/%M/%A: 9/15/52; chemistry: usnic, stictic, constictic, cryptostictic, menegazziaic and norstictic acids.

Usnea subplicata (Vain.) Motyka, *Lich. Gen. Usnea Stud. Monogr., Pars Syst.* 2: 558 (1938); *Usnea gracilis* var. *subplicata* Vain., *Ann. Acad. Sci. Fenn., Ser. A* 6: 7 (1915); type: Jamaica, ad ramos arborum, 1906, *Boergesen* (TUR-V 527!—holotype); %C/%M/%A: 11·5/13·5/50; chemistry: usnic and protocetraric acids.

Usnea subgracilis Vain., *Ann. Acad. Sci. Fenn., Ser. A* 6: 7 (1915); type: Jamaica, in ramibus arborum, 1906, *Boergesen* (TUR-V 513!—holotype); %C/%M/%A: 12·5/16/43; chemistry: usnic and protocetraric acids.

Usnea hesperina is one of the most characteristic of the pendulous *Usnea* species, with: cylindrical branches that are never ridged or foveolated, and are distinctly and densely annulated close to the pale basal part; long and curved fibrils, with few to many pseudocypbellae that may turn into soralia (isidiate or not) especially near the apices; a mat cortex, a thin and compact medulla and a thick central axis. Unfortunately the holotype specimen could not be found in LBL. The neotype selected here fits very well with Motyka's concept and corresponds to the protocetraric strain, which is the only chemotype previously known to occur in Europe, North America, Cuba and Jamaica (Motyka 1936–1938; Clerc unpublished). The original material of *U. elongata*, *U. schadenbergiana*, *U. subgracilis* and *U. subplicata* fits very well within the morphological variation of *U. hesperina* as I know it from Europe, northern America and the Canary Islands. The second species diverges chemically with the stictic acid complex in the medulla. *Usnea hesperina* is then new for Asia (*U. schadenbergiana*), Africa (see selected specimen) and South America (*U. elongata*). A proposal will be made elsewhere to conserve *U. hesperina* against *U. schadenbergiana* and *U. subgracilis*.

It is worth mentioning that Motyka (1936–1938) put *U. hesperina* and *U. schadenbergiana* in sect. *Elongatae*, subsect. *Longissimae*, but *U. elongata* into sect. *Elongatae*, subsect. *Ceratinae*. Furthermore, both *U. subplicata* and *U. subgracilis* were placed in sect. *Glabratae*, subsect. *Ossoleucae*. This and other examples (Clerc unpublished) show that the systematic arrangement, as developed by Motyka, based on environmentally induced modifications of characters (e.g. colour and length of thallus, density of ramifications, shape of papillae) is strongly artificial and therefore does not reflect phylogeny within the genus. More work on *Usnea* species at world level is needed to infer a new hypothesis.

Selected specimen examined: **South Africa:** *Cape:* Wynberg distr. E slopes of Table Mt. along Sekeleton stream, on bark, 2000 ft, 6 xii 1953, *Almborn* (LBL as *U. promontorii* Mot.); chemistry: usnic and protocetraric acids.

***Usnea hirta* (L.) F. H. Wigg**

Prim. Fl. Hols. 91 (1780); type: Sweden, s. coll. in *Fries, Lich. Suec. Exsicc.* No. 150 (UPS), type. cons. prop. (Jørgensen *et al.* 1994b).

Usnea corrugata Motyka, *Lich. Gen. Usnea Stud. Monogr.*, Pars Syst. 1: 105 (1936); type: Abyssinia (Ethiopia), Podopolani, ad *Euphorbias*, 17 iv 1894, *Schweinfurth* (LBL!—holotype); %C/%M/%A: 2.5/42/11; chemistry: usnic and salazinic acids.

Usnea foveata Vain., *Ann. Acad. Sci. Fenn.*, Ser. A 27: 67 (1928); type: Fennia, Ik. (Russia, Leningrad Region), Sakkola, Kylmäoja, in *Betula*, 1917, *Räsänen* (TUR-V 377!—lectotype); %C/%M/%A: 2.5/39.5/16; chemistry: usnic acid.

Usnea leprosa Motyka, *Lich. Gen. Usnea Stud. Monogr.*, Pars Syst. 1: 106 (1936); type: (South Africa), Transvaal, Lydenburg, arboricola, *Willms* (H-NYL 36562!—holotype); %C/%M/%A: 4.5 38 15; chemistry: usnic and salazinic acids.

Usnea variolosa Motyka, *Lich. Gen. Usnea Stud. Monogr.*, Pars Syst. 1: 104 (1936); type: U.S.A., New Mexico, Hermit Peak prope Las Vegas, corticola, 1930, *Brouard* (LBL!—holotype).

Usnea hirta is a species of worldwide distribution with extensive morphological variability as shown by the numerous subspecies recognized by Motyka (1936–1938). In Europe, *U. hirta* is distinguished by deformed branches, a pale base, the usual absence of papillae, the minute and usually abundantly isidiate pseudocyphellae that may turn into soralia, a thin (2–5%) and glossy cortex and a lax medulla. The North American specimens represented by *U. variolosa* fit very well within the morphological variation of the European *U. hirta*. So far, *U. hirta* has been shown to have two chemical strains, one with usnic acid and murolic acid (Clerc 1987a) and the other with usnic, norstictic acids and usually fatty acids (murolic acid group?) (Halonen & Puolasmaa 1995). The holotype of the African *U. leprosa* has salazinic acid but morphologically differs little from *U. hirta*. Many European species that have been well circumscribed chemically, have more recently been shown to have much larger chemical variability outside Europe (Halonen *et al.* unpublished). Swinscow & Krog (1975) indicated five chemoraces for *U. leprosa*, although they probably misunderstood this taxon, which is not closely related to *U. undulata*. The East African galbinic acid chemorace probably does not even belong to *U. leprosa*. Except for the basal part, which is black in some specimens, *U. corrugata* is morphologically identical with *U. hirta*. One specimen collected in Ethiopia has norstictic acid and fatty acids of the murolic acid group. As a consequence *U. hirta* is considered here as new to Africa. The type specimens of *U. igniaria* Mot. (South America) and *U. inermis* Mot. (Australia) have not been examined by me but descriptions given by Motyka (1936–1938) and Walker (1985) leave few doubts about their resemblance to *U. hirta*.

Halonen & Puolasmaa (1995) discussed *U. foveata*, synonymizing it with *U. barbata* sensu Jørgensen *et al.* (1994b). There is no doubt, as already stated by Clerc (1987a), that foveoles are environmentally induced and that *U. foveata* is thereby only a phenotype of *U. hirta*. All diagnostic characters mentioned above are present, as for instance the thin (5%) and glossy cortex, which corresponds better with *U. hirta* than with *U. barbata* s. lat. Halonen & Puolasmaa (1995) mentioned the presence of some papillae on the thickest branches of the holotype specimen of *U. foveata* as an indication for *U. barbata* s. lat. However, species that are reported in the literature to have no papillae sometimes produce a few papillae, as Myllys (1994) showed for *U. glabrata* (Ach.) Vain.

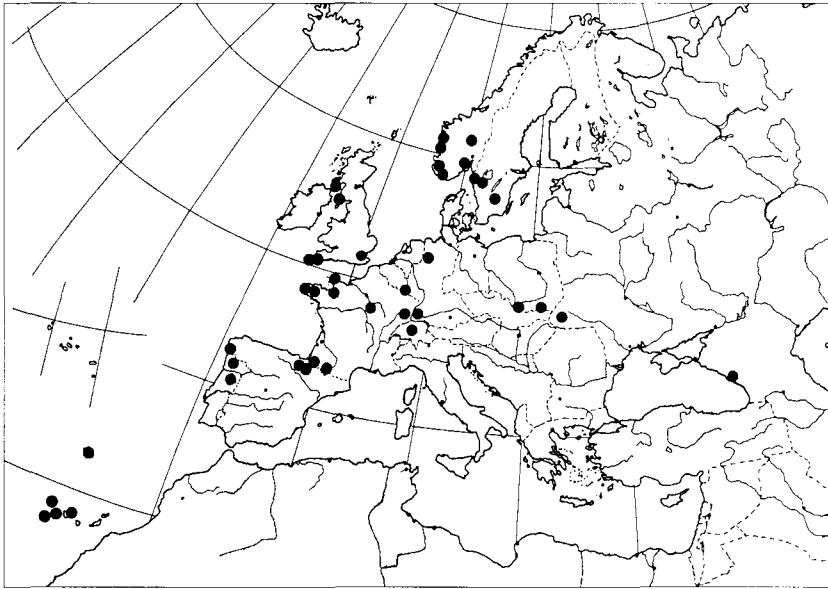


FIG. 1. Known distribution of *Usnea madeirensis* Motyka in Europe.

***Usnea madeirensis* Motyka**

In Tav., *Revista Biol. (Lisbon)* 4: 131–134 (1964); type: Madeira, Paul da Serra, below Rabaçal and bica de Cana, on the branches, 1400 m, 15 v 1952, *Persson* (S!—holotype); %C/%M/%A: 12/12·5/50; chemistry: usnic and salazinic acids.

Usnea silesiaca Motyka, *Wydaw. Muz. Śląsk. Katowicach. Dział* 3(2): 19 (1930); type: Poland, Beskidy Śląskie, Grabowa, na buku (*Fagus*) w bukowym lesie, 16 viii 1928, *Motyka* (LBL!—holotype); %C/%M/%A: 11/9/60; chemistry: usnic and salazinic acids.

Because the main diagnostic characters were not given by Motyka (1930) in the protologue, the real identity of *U. silesiaca* remained unknown until the original material could be studied. *Usnea silesiaca* (shrubby morphotype) and *U. madeirensis* (pendulous morphotype) match very nicely in their main characters, with the exception of the habitus: extended black pigmentation in the basal part of the thallus with numerous annulations, soralia type (see Clerc 1987*b*, fig. E, and Clerc 1991, fig. 3), cortex thick (9–14%) and matt, medulla very thin (7–12%) and compact, with salazinic acid (Clerc 1991). *Usnea madeirensis* is therefore a later homonym of *U. silesiaca* and a proposal to conserve *U. madeirensis* will be made elsewhere.

Bystrek (1970) and Bystrek *et al.* (1981), respectively, discussed the distribution of *U. silesiaca* in Europe and around Lublin in Poland, mainly on the basis of specimens housed in LBL. My examination of the specimens collected in Poland revealed that only two of the Polish specimens actually represent the species discussed here (see Fig. 1 and selected specimens). It seems that *U. madeirensis* is now extinct in Poland (J. Bystrek and H. Wojcak, pers. comm.). It is a most threatened species in Europe (Clerc 1991).

Selected specimens examined: **Poland:** *Beskid Zachodni:* Runek koło Krynicy, na buku, 22 vii 1955, *Tatarkiewicz* (LBL). — **Ukraine:** *Karpaty Wschodnie:* Czarnohora, Pożyżewska, na świerkach i *Picea*, 1934, *Motyka* (LBL); Czarnohora, Pierwotny, las świerkowy na Pożyżewskiej, 1934, *Motyka* (LBL);

Usnea mutabilis Stirt.

Scott. Naturalist 6: 107 (1881); type: U.S.A., Alabama, Cedar villa, *Mrs Hawley* (BM!—holotype); chemistry: no substances demonstrated (label from M. Hale, 1977).

Usnea marocana Motyka, *Lich. Gen. Usnea Stud. Monogr.*, Pars Syst. 2: 359 (1938); type: Maroc (Morocco), Camp Monod, arboricola, 1912, *Mouret* (LBL!—holotype); %C/%M/%A: 6·5/29/29; chemistry: usnic acid and fatty acids of the murolic acid group.

As the original material in Bouly de Lesdain's herbarium was destroyed during the Second World War, Clerc (1994) chose a neotype for *U. marocana*. However when studying the original material of this taxa, J. Motyka kept a thallus in his herbarium, now in LBL. This specimen is now the only extant original material and can be considered as the holotype. The neotypification by Clerc (1994) is therefore invalid.

Usnea subscabrosa Nyl. ex Motyka

Lich. Gen. Usnea Stud. Monogr., Pars Syst. 2: 313 (1938); type: Portugal, 1877, *Newton* (H!—holotype); %C/%M/%A: 14/13·5/45; chemistry: usnic and protocetraric acids.

Usnea santae-annae Motyka, *Lich. Gen. Usnea Stud. Monogr.*, Pars Syst. 2: 315 (1938); type: Brasilia, Matto Grosso, Santa Anna da Chapada, in 'cerrado' et in margine silve, 1894, *Malme* (S!—holotype); %C/%M/%A: 13/15·5/44; chemistry: usnic, protocetraric and fumarprotocetraric acids.

This very distinctive species (Clerc 1992) is known to occur in south-western Europe, Macaronesia and north-eastern North America. *Usnea santa-annae* is morphologically and chemically identical with this species and therefore *U. subscabrosa* is new for South America.

Usnea wirthii P. Clerc

Saussia 15: 33–36 (1984); type: France, Aude, forêt des Fanges à l'est de Quillan, *Abies*, *Fagus*, *Sorbus aria*, *S. aucuparia*, *Ilex*, *Quercus ilex*, 18 vii 1951, *E. Frey* (BERN!—holotype); %C/%M/%A: 7·5/26·5/32; chemistry: usnic and psoromic acids, ± unidentified fatty acid.

Usnea quercina Bystrek & Górzynska, *Ann. Univ. Mariae Curie Skłodowska, Sect. 3, Biol.* 17: 184 (1985); type: France, Gironde, La Haillan sur *Quercus*, thallus 'Lub 11', 1930, *Jeanjean* (LBL!—lectotype, selected here); %C/%M/%A: 8/32·5/19; chemistry: usnic and psoromic acids.

The holotype of *U. quercina* as designated by their authors is heterogeneous and consists of two thalli: the smaller thallus ('Lub 11') is *U. wirthii* with psoromic acid; the second thallus ('Lub 12') corresponds to *U. esperantiana* P. Clerc with salazinic and bourgeanic acids in the medulla (Clerc 1992). There are in the protologue no unequivocal elements (the central axis of the *U. wirthii* specimen is not yellow and no TLC had been done) that would allow one to distinguish which of the two specimens the authors meant to describe. Furthermore, one specimen given in the protologue (Portugal, Estramadura, Sintra, 1931, *Nilsson*) is *U. cornuta* Körb. and another one (F, Landes, Moliets, 1950, *Frey*) is a mixed population of *U. esperantiana* and

U. cornuta. All this shows that Bystrek & Górzynska (1985) had a somewhat fluid concept of their species. The name *U. quercina* has not been widely adopted, whereas *U. esperantiana* has become well-established (e.g. in Purvis *et al.* 1992). Therefore, in the interests of nomenclatural stability, I have chosen to lectotypify *U. quercina* on the element pertaining to *U. wirthii*.

I found in H a specimen of *U. wirthii* collected in 1932 by G. Looser in Central Chile (chemistry: usnic and psoromic acids), extending considerably the distribution of this very characteristic species, which is then new for South America. The psoromic acid chemotype is dominant in Europe (Clerc 1984*b*; Clerc & Diederich 1991; Purvis *et al.* 1992) whereas the norstictic acid chemotype is dominant elsewhere as exemplified by studies in British Columbia (Halonen *et al.* unpublished). Sometimes the axis and the periaxial medulla appear to lack the yellow pigment, as for instance in the lectotype of *U. quercina* (see above). However, the small size of the mature thalli (up to 4 cm), the superficial soralia (usually larger than half the diameter of the branch bearing them), the absence or near absence of isidiomorphs, the slightly swollen branches that are constricted at ramification points, the thin cortex and the lax medulla are diagnostic characters for *U. wirthii*.

Selected specimens examined: **Chile:** Aconcagua: Limache, 200 m, 10 iv 1932, Looser (H). — **Peru:** ruins of Machu Pichu, on twigs, 25 xii 1990, P. B. Topham (E).

I am very grateful to Prof. T. Ahti and Prof. J. Bystrek and their staffs for the facilities they granted to me in H and LBL, respectively. Particular thanks are due to the friends of the Botanical Garden of Geneva who made possible the visit to Helsinki. I wish to thank Helene Geser for technical support with TLC and Dr Loraine Kohorn (Duke University) for correcting the English of the manuscript.

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Accepted for publication 26 September 1996

