

OBSERVATIONS ON SOME SCOTTISH WILLOWS

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When staying at Dundee in August and September 1947 as a foreign guest to the Meeting of the British Association, generously granted by the British Council, I had the opportunity to join some excursions. My host, Mr W. Ogilvie of Carnoustie, interested in both Astronomy and Botany, accompanied me to Barry Links west of Carnoustie which proved an almost unique locality for the lowland species and hybrids of *Salix*. It is situated between the dunes. The lowest and dampest ground is covered with dense carpets of *Salix repens* (s.l.), nearer to the margins of the depressions grow various species of *Salix*. The most common species besides *S. repens* (s.l.) are *S. viminalis*, *S. nigricans*, *S. aurita* and *S. atrocinerea*; *S. caprea*, *S. purpurea* and *S. alba* being more or less scattered; and *S. fragilis* and *S. pentandra* rare. *S. daphnoides* and *S. dasyclados* are very probably planted or escaped from cultivation. The uppermost slopes of the dunes are covered chiefly with *Hippophaë*.

Any observations on willows must remain, of course, incomplete when based on leaves only. But my friend, Dr George Taylor, has encouraged me, nevertheless, to publish a short account which may not be quite useless, as a stimulus to a more skilful investigation.

Angus, and even Barry Links, is not at all a *terra incognita* in a salicological respect. That is made evident by the very careful collections of the late Mr and Mrs Corstorphine of Arbroath to which I had access through the kindness of Dr G. Taylor now in charge of their herbarium. But when compared with the neighbouring, almost classical, district of Perthshire, explored chiefly by F. Buchanan White, there seems still much to be done in Angus. Even since White's excellent Revision of the British willows (1890) and Linton's Revision (1913) were published, opinions on the delimitation of several species have changed. Progress is due especially to Enander (1907; 1910), Floderus (1931), Goerz (1922) and Camus (1904), so that even the account in White's *Flora of Perthshire* needs to be brought up to date in some respects.

It must be emphasised, however, that a good deal of this more modern progress was at least foreseen by White. He was still not aware of the decisive characters of some critical species, but he was in fact apparently able to distinguish them by his extremely careful observation, his practical experience and his eminent sense of natural grouping. For example, the now generally accepted identification of the British plant, formerly included under the name of *S. cinerea*, with the western European *S. atrocinerea* Brot. could not be established by White only on account of the lack of more ample continental material. Likewise the distinction of *S. coetanea* from *S. caprea*, established by Floderus on Scandinavian material, and even the distinction and clearer delimitation of *S. nigricans* and *S. phylicifolia*, due to Enander, were foreseen by Buchanan White.

The scope of these few lines is:—(1) to investigate how far the experience of a continental salicologist could be applied to British willows, (2) to call attention to certain differences in the range of variability of some willows on the Continent and in the British Isles, (3) to show the different tendency to hybridization between certain species on the continent and in the British Isles, which may perhaps be partly due to whether the flowering periods overlap or not.

Numbers quoted refer to dried specimens, duplicate sets of which have been deposited at the British Museum (Natural History) and at the Angus Herbarium.

SALIX NIGRICANS Smith emend. Enander. For citation of authors see Enander (1910) and Goerz (1922). This species is well known as being one of the most polymorphic of the genus. This fact is evident when glancing through the treatments by Seemen (1908), Toepffer (1915) or Goerz (1922). There has been much disagreement on the delimitation of this species, especially in respect to the ovary, i.e., whether a glabrous one is characteristic or whether varieties with hairy ovaries should be admitted within the range of variability. According to Enander glabrous ovaries only occur in *S. nigricans* and pilosity—even a scanty one—on the ovary always proves hybridization—in Scandinavia very frequently with *S. phylicifolia*, and in Central Europe with species of the *Capreae*, especially *S. cinerea*. Recently Grapengiesser (1943, 230) has rejected this opinion but his arguments do not seem to me to be conclusive.

There is still another character very useful in distinguishing *S. nigricans* from similar species in Scandinavia and in the British Isles, especially from *S. phylicifolia*. This is the bloom on the lower surface of the leaves, always present and going right up to the apex of the leaf in *S. phylicifolia*, but fading, when present at all, towards the apex in *S. nigricans*. These characters are very useful when dealing with sterile material and when considered together with the tendency of leaves in *S. nigricans* to turn black in drying. *S. phylicifolia* has glabrous shoots and is generally more glabrous than *S. nigricans*.

To decide whether a species of the *Capreae* has to be considered as taking part in hybridization with either *S. nigricans* or *S. phylicifolia*, one has in the first place to examine the striae (Latin *vibices*, German "Striemen"), i.e., prominent longitudinal lines on the decorticated wood visible on wood as young as one year old in genuine *S. aurita* and *S. cinerea*, and on wood two to five years old in hybrids of these species with species lacking striae. Hybridization between *S. nigricans* and almost the only estriate species of the *Capreae*, viz. *S. caprea* itself, is extremely rare, and even *S. caprea* × *phylicifolia* (as which *S. laurina* Sm. has been interpreted in the past) is rather rare.

On Barry Links I was astonished to see that variability of *S. nigricans* is even greater than in Central Europe and partly in different directions. One must, of course, admit that when dealing with sterile material only, any suggestion must remain tentative. But in Central

Europe I never came across so many forms of *S. nigricans* with so slight—or nearly completely lacking—a bloom on the lower surface of leaves as in Scotland (no. 73, 77). At the same time a sort of pilosity on leaves and shoots, which cannot be regarded as being derived from crossing with a species of the *Capreae*, occurs much more frequently in Scotland (nos. 33, 46, 57). Theoretically, pilosity could even be derived from *S. arenaria* or *S. viminalis*, both of which occur very frequently on Barry Links. But the quality of the glossy, but rather coarse and not appressed hairs, not at all silky and smooth as they are in these two species, does not permit this suggestion.

Nearly glabrous forms of *S. nigricans*, which seem to extend the range of variability in the opposite direction, might be derived from hybridization with *S. phylicifolia*, but this has still to be proved by flowering material. I did not find any shrub of genuine *S. phylicifolia* at Barry Links.

S. VIMINALIS L. One of the most striking features was to see *S. viminalis* crossing much more freely than in Austria and adjacent regions. Further study is needed to explain this fact, which might perhaps be due to the flowering periods of the different species (which may overlap in more northern latitudes) or to a different genetic nature of the same species in different regions. The influence of *S. viminalis* is usually very easily recognized by the more elongated leaves being more or less entire and having more lateral nerves, and by the somewhat silky indumentum, especially in younger leaves. Very often the characters of *S. viminalis* are so predominant in its hybrids that the other parent can only be guessed at, especially when this is thought to be a member of the *Capreae*. Indeed, authors do not always seem to be very successful when trying to separate the different hybrids of *S. viminalis* with the *Capreae* (see the varieties of *S. stipularis* in White's (1890) and Linton's (1913) treatments). Triple or even more complicated hybrids may often occur, as all the hybrid combinations of the species within the *Capreae* are usually rather common and fertile. Here again estriate wood suggests *S. caprea*, especially when combined with a very thick and rather woolly indumentum on the lower surface of the leaves. When striae are present, small, short and more or less corrugated leaves indicate the influence of *S. aurita*, and in most of the other cases *S. atrocinerea* may be suggested as being the other parent.

A plant which I think is *S. atrocinerea* × *viminalis* or perhaps *S. atrocinerea* × *caprea* × *viminalis* (no. 9, 55) is rather frequent on Barry Links. But there occur also forms so near to *S. viminalis* that they might easily be taken for genuine *S. viminalis* if they did not show striae and slightly broader leaves, suggesting an ancestral influence of *S. atrocinerea* (no. 39).

S. DASYCLADOS Wimmer, 1848, *Flora*, Regensb., 31, 333; Andersson, 1867, *Botaniska Notiser*, 61; Floderus, 1931, *Sal. Fennoskand.*, 141; ? *S. acuminata*, *S. mollissima*, *S. Smithiana* auctorum p.p.

S. dasyclados has been usually included by British botanists in the series of hybrids between species of the *Capreae* and *S. viminalis*. The question whether it is a species or of hybrid origin is still open to discussion. In any case it must be stated that it has certain very distinct characters and seems to be much less variable than many good species. I include here a short description partly translated from Floderus (1931, 141).

Tall shrub or almost a tree with striae on the older branches. Shoots long, very vigorous, c. 4, rarely 7 mm., thick, densely covered with dark grey spreading intricate hairs. Leaves stipulate, with rather long petioles, very long, more or less narrow lanceolate, rather deeply serrate, with many lateral nerves, more or less glaucescent beneath, when young often blackening when dried and more or less glossy white pubescent; older ones becoming glabrous on the upper surface and more or less loosely grey pubescent. Peduncle of catkin short, with small leaves. Catkin thick. Bracts very broad, dark brown. Nectaries long. Capsules nearly sessile, pubescent. Style and stigmata very long.

On Barry Links a group of large treelike bushes (no. 28).

Most characteristic are the very numerous lateral nerves, often nearly at right angles to the midrib. Some of the characters are apparently transmitted to hybrids, and cannot be explained otherwise than by the influence of *S. dasyclados*.

For further study of this still insufficiently known plant, it would be desirable to decide whether or not it is indigenous in the British islands and to collect more exact information on its distribution. By study of the type specimens on which the names tentatively cited above as synonymous are based an older valid name might possibly be found.

***S. dasyclados* × *purpurea*; × *S. Taylori* Rech. fil., hybr. nov.**

Frutex elatus ramis crassis atris, annotinis glabrescentibus vibicibus sparsis tenuibus sed distinctis, ramis hornotinis pilis intertextis pallide cinereis dense obsiti. Petioli 8-10 mm. longi. Folia subtus valde glabrescentia, pilis secus nervum medianum tantum diutius persistentibus. Lamina oblonga vel oblongo-linearis, supra medium latissima, latitudine $3\frac{1}{2}$ - $4\frac{1}{2}$ -plo longior, basi cuneata, apice acuminata, margine imprimis apicem versus crenulato-serrata, supra atro-, subtus pallide viridis. Nervi secundarii numerosissima, 25 usque ultra 30. Ad *S. purpuream* foliis valde glabrescentibus, supra medium latissimis, apicem versus imprimis serratis, colore et consistentia foliorum quoque accedit. Ad *S. dasycladon* accedit vibicibus, ramis crassis, nervis lateralibus numerosis, indumento, foliis multo longioribus et latioribus.

SCOTLAND, Angus, Barry Links near Carnoustie, among the parents, September 1947, *K. H. Rechinger* no. 19. Typus in Herb. Mus. Brit.

***S. ARENARIA* × *VIMINALIS*.** One bush at Barry Links (no. 49) about 1 m. high, showing exactly intermediate characters, differing from *S. arenaria* by taller growth, narrower, longer leaves (3.5-5: 1) with many more (10-12) lateral nerves, and tending by these characters towards

S. viminalis. The indumentum on the lower surface of leaves is extremely silky. Small narrow stipules as in *S. arenaria* are partly developed on the shoots. There is but one character which might suggest an influence of still another species, viz., that the lenticels on the three-year-old decorticated wood are not punctiform as in *S. repens* (cf. Goerz 1922) but more or less elongated and like striae. An influence of *S. atrocinerea* or *S. aurita* might be suggested by this.

S. arenaria × **atrocinerea** × **viminalis**; × **S. angusensis** Rech. fil., hybr. nov.

S. arenaria × *viminalis* similis sed frutex elatior: vibices numerosiores distincti; rami multo crassiores; foia proportione latiora, breviora (3-4: 1), supra sordide atro-virescentia. Ad *S. arenariam* habitu generali indumento sericeo et forma foliorum ramorum breviorum: ad *S. atrocineream* ramis crassiusculis atris rugosis praecipue autem vibicibus, colore foliorum paginae superioris, nervatura supra distincte immersa, stipulis latiusculis, ad *S. viminalem* forma ac indumento foliorum ramorum hornotinorum, nervis lateralibus numerosis (15-20) accedens.

SCOTLAND, Angus, Barry Links near Carnoustie, September 1947, K. H. Rechinger, no. 45. Typus in Herb. Mus. Brit.

S. ATROCINEREA × CAPREA × VIMINALIS. See Chassagne et Goerz (1931, 79). Barry Links (no. 55). Probably a new record for the British Isles.

S. ATROCINEREA × NIGRICANS. This hybrid occurs in many individuals at Barry Links (no. 23, 42, 58 ?). Most of them are very similar to *S. nigricans* (no. 23), that is, its coarse and silky hairy form, and differ from it by the possession of striae and by the duller green upper surface of the leaves. The interpretation of some other individuals nearer to *S. atrocinerea* is rather doubtful.

S. ATROCINEREA × VIMINALIS; × S. CHOUARDI Chassagne et Goerz (1931, 79).

Barry Links (no. 9). Already indicated from England; between Thirsk and Kilvington, North Yorkshire, leg. J. G. Baker as *S. ferruginea* (Billot no. 3678).

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