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VII. On the Addition of *Cystopteris alpina* (Desv.) to the Arctic Flora

William Sutherland M.A. ^a

^a Aberdeen

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various plants collected by the party. At Garpel Linn, near Beattock they met with the following:—*Habenaria albidia*, *Listera cordata*, *Lycopodium alpinum*, *Valeriana dioica*, *Hymenophyllum Wilsoni*, *Jasione montana*, and *Splachnum ampullaceum*. At Beld Craig they collected *Pyrola secunda*, *Asplenium viride*, *Veronica scutellata*, *Allosorus crispus*, *Lycopodium Selago*; besides several rare mosses and lichens. Some of the party picked near Loch Skene, *Woodisia ilvensis*, *Thalictrum alpinum*, *Saxifraga stellaris*, &c.

VII. *On the Addition of Cystopteris alpina (Desv.) to the Arctic Flora.*
By WILLIAM SUTHERLAND, M.A., Aberdeen.

In my frequent examinations of the Arctic plants brought home by Mr J. Taylor, I have always had doubts as to the propriety of consigning all his specimens of *Cystopteris* to that much-embracing species, *fragilis*. And now, after a careful examination and comparison of all the descriptions and figures, besides a few (cultivated) fronds of *C. alpina* (Desv.) within my reach, with the Arctic specimens, both dried and at present growing, I have no hesitation in stating that many of the dried, and perhaps all the living specimens, must be referred to the species indicated. Both the growing plants, and the fronds dried when gathered, were found by Mr Taylor, in Cumberland Straits, British North America.

As to the propriety, indeed necessity, of awarding *specific* honours to this *Cystopteris*, we believe there can be now no doubt. Mr Bentham, in his "Handbook of the British Flora," is the only authority we have found who has suspicions on the subject. He, however (probably from the alien character the species enjoys as British), but cursorily refers to it, and gives no characters to distinguish it from *fragilis*; while entertaining the very highest admiration and respect for the profoundly philosophic and logical character of Mr Bentham's mind, I cannot but think that had the plant been such as to call for more minute examination by him, he would have felt constrained to dismiss all doubts as to its specific claims. The case, I believe, to be far stronger than that of *Lychnis diurna*, and *L. vespertina*, where, with great judiciousness, he has recognised the probable existence of two distinct species. Sir William Hooker, in his "British Ferns," just published, considers this species as undoubtedly nearly allied to *fragilis*; but I think, truly distinct, in the more deeply pinnatifid, and more finely cut pinnules, the segments being oblong-linear, or cuneate entire, obtusely toothed. Mr Francis, an excellent authority, and the pioneer of the vast array of pteridologists who have recently, to a degree unprecedented in any other department of science, inundated the British market with their wares, speaks in equally strong terms:—"These marks clearly indicate this to be a distinct species, far removed from both the others, and in cultivation, instead of approaching the *fragilis* or *dentata*, it becomes yet more different, as the pinnules increase in length, but scarcely in width, as in the former cases."

Cystopteris alpina (Desv.), then, is a very elegant little fern, with fronds seldom exceeding six inches in height, herbaceous, and of a bright green colour, oblong-lanceolate, tripinnate, but often only subtripinnate, and erect in growth (*fragilis* not unfrequently reaches a foot in height, and then especially has a drooping, not an erect habit). The rhizome branches dichotomously, the one branch growing to the side and then throwing up a tuft of stipites, the other pushing onwards to continue this process; a much greater interval also exists between the points of divarication than in *fragilis*, which, as seen in pot cultivation, sends up its fronds more in a mass than *alpina*, where they run in more scattered groups; it is black, fibrous, and scaly towards the apex. Stipes slender, scaly towards the base, one-third the length of the frond, often

less, and altogether shorter, less brittle and juicy than in *fragilis*; *rachis* compresso-alate. While the majority of fronds are quite smooth, I have noticed one or two having a few very small scattered scales along with stipes and rachis, an observation which does not seem to clash with one of Sprengel's characters, *fronde tenerâ, glabriusculâ*. *Pinnæ*, about ten pairs, with a tendency to alternation rather than otherwise, except the first pair, which is opposite, not so markedly ovate as the pinnules, *i.e.*, slightly acute (though not always so), their midrib winged, so much so in some forms as to produce complete coalescence of all the pinnules but the first pair. *Pinnules* "ovate, obtuse, deeply pinnatifid, oblong or linear-cuneate, very obtusely bi-trifid, rarely entire" (*Hooker*). *Venation* straight, and corresponding to the divisions and toothings of the pinnules (not more or less tortuous as in *fragilis* and its forms). *Sori* small, circular, mesial, scattered, pale, not crowded, and perhaps never confluent as in other species. I have not as yet satisfied myself that there is really any constant character whereby its *indusium* may be distinguished from that of *fragilis*, while authorities seem to differ on the point.*

While the plant is of easy cultivation, it is said to suffer more from the accumulation of moisture about its roots than does *fragilis*, a circumstance quite credible, from its favourite stations on the Continent being high alpine rocks, where, indeed, it would seem to be by no means very rare. Mr Foster was the first to notice the plant as British in Symon's "Synopsis," 1793. No doubt can be entertained as to the genuineness of the Low Leyton (Essex) plants, where it was said to grow *apparently* wild, and that, too, in a part of Britain very little above the sea-level. The reconciliation of this fact, with its occurring nowhere on the Continent but at elevations of from 6000 to 8000 feet (the equivalent of the new arctic station), must, we fear, always remain a botanical enigma. Mr Moore, excluding cases where *fragilis* has been mistaken for it, considers that he has received fronds of the true plant from Derbyshire and Yorkshire, as also from the Lake District. It is somewhat curious to note that Sprengel in 1827 gives "*Anglia*" alone as the geographical range of this plant, not apparently having recognised it on the Continent. The otherwise recorded stations are, the Alps, the Pyrenees; in Greece, Mount Taygetes (Bory, Heldreich), and Taurus (Kotschy); to which list we have now to add Cumberland Straits, British North America, in Dr J. Hooker's "Province of Arctic E. America" (excluding Greenland). *C. fragilis* is found in all his five arctic provinces except the Asiatic. I have but one specimen from Greenland, collected at Disco by the late Dr Mellis of Alexandria, and it I must certainly refer to this species. It does not, of course, follow from this, or its not having been hitherto recorded, that *alpina* does not occur in Greenland; on the contrary, it is quite possible that it may do so, as also in Scandinavia, &c. But it must be confessed, that so scanty is the information (from its being easily overlooked), that it would be rather premature to discuss the history of its distribution, which may be as wide as that of *fragilis*, which in his laborious and most able essay "On the Distribution of Arctic Plants," Dr J. Hooker has shown to be very extended. In the meantime, therefore, it must be placed in the somewhat small list of plants common to Arctic America and the Alps of Europe, but not occurring in Arctic Europe, thus extending from Arctic America through Central Asia and Northern India to Central Europe, a supposition to which the Grecian stations lend some support.

* I may here mention that Mr Sim gives a form called *intermedia* (of which a frond is before me). It really seems judiciously named, for it certainly combines both the characters of *fragilis* and *alpina*.