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On Sagina ciliata, Fr., and *S. apetala*, L. By F. BENEKEN*.

IN recent times Fries has placed *Sagina ciliata*, and Schultz *S. depressa*, as new species, beside the *S. apetala* of Linnæus. The *S. depressa* has indeed been since reduced as a variety under *S. ciliata*; but this latter is generally recognized as a good species. Spreading stem, peduncles curved like a hook and apiculate, mucronate outer sepals, are named as its distinctive characters, while to *S. apetala* are ascribed an upright stem, peduncles scarcely incurved and very short, mucronate outer sepals.

It is true that when specimens of these two species are seen side by side, one can scarcely doubt that a specific difference must be connected with such difference of habit. But we come to a different opinion when we carefully trace the development of these plants in the fields, when we observe them more closely in their natural habitats. A conviction is then attained that they belong but to one species, that station and culture alone have given rise to the so aberrant forms, and in the same field where in one summer we find *S. apetala* among the corn, in the next summer we find *S. ciliata* if the field be left in fallow.

It was in June of last year (1844) that I became aware of this alternation of the conditions. A field, in which I had collected *S. apetala* only the summer before, I found in fallow and covered with *S. ciliata*; I had before me the same plant, in habit, in all its characters, that I had seen half a year before in the rich collection of Dr. Eckart of Sondershausen, as the *S. ciliata*, an authentic specimen from Fries himself. The phenomenon surprised me the more that no trace of *S. apetala* was now to be found; and if any forms of aberrant habit occurred, they still exhibited the essential characters of *S. ciliata*.

This very circumstance, moreover the occurrence of intermediate forms, which had been previously observed by myself and Dr. Eckart in the neighbourhood of Sondershausen, awakened doubt as to the actual distinctness of the two species and the surmise that the *S. apetala* might be merely a form of that more perfect, fallow-field plant, produced by the peculiarity of its sta-

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tion. This suspicion became stronger and stronger the oftener I found how the *S. apetala* of the corn-fields was replaced by the *S. ciliata* in the bordering fallow fields, and the oftener I met with intermediate forms, which occurred in clover fields, sometimes nearer to one species, sometimes to the other. It became a conviction so soon as I was enabled to observe the plant in uncultivated habitats.

On roads and banks, in pastures and on sand-hills (here with *Alsine tenuifolia* and *Saxifraga tridactylites*), also in open places in woods (sometimes in dry sandy places, among *Myosotis versicolor*, *Aira præcox* and *caryophyllea*, sometimes in moist spots with *Veronica serpyllifolia*, *Ajuga reptans*, &c.), I again found the plant in great abundance and in the most varied forms. I here saw perfectly simple and erect plants from $\frac{1}{2}$ an inch to 1 inch high, with the characters of *S. ciliata*, and again the fallow-field form with branches extended on all sides, often prostrate, alternating with that delicate, slender plant which occurs in the corn. But none of these forms here displayed anything remarkable or strange, and I could most distinctly perceive the influence which the qualities of the soil and the local conditions exerted on the development of the plant, and how, with the variation of these conditions, different forms with altered characters appeared.

Everything about the plant shows itself changeable and unsteady. Not a single one of the distinctive characters given by authors is constant. This is true of the form of the plant, the direction of the fruit-stalk, the state of the parts of the flower and fruit, as well as of the distribution of the glandular and ciliary hairs.

In general the plants exposed to the light and sun exhibit a more crowded growth; the stems are brownish, the leaves a deeper green, and, like the internodes and fruit-stalks, shorter. In such crowded forms the curvature of the fruit-stalks is stronger, the flowers and fruits larger, and the mucros of the outer sepals distinctly formed. But all this is changed as soon as the plant passes into a shady or damp place. The green assumes a paler tint; all parts of the plant become elongated and more delicate; the curvature of the fruit-stalk is gradually lost, as is also the mucro of the outer sepals. The petals are not unfrequently altogether wanting in very starved specimens.

Apparently Linnæus had such starved plants before him when he described *S. apetala*, since while in this mostly no petals are to be found, they are not wanting in stronger plants, or only exceptionally in particular flowers; so that the *Sagina apetala* of Linnæus ought rather to be subordinated, as *forma apetala*, to the more perfect plant, as has already happened to *S. depressa*.

The petals are called obcordate by Reichenbach, lanceolate by Koch. The former statement is the more correct. Variations occur here also, although relatively rarely, and with one abnormal petal (obovate, entire or emarginate), I have always found the three others of the usual form. The examination of these is most easy at the time when the sepals are spontaneously recurved and assume their horizontal position; if the seed-vessel be now removed, the light which is admitted enables us to observe readily and conveniently. This is less easy during the proper flowering epoch, since the flowers are rarely so widely opened that one can see distinctly into the interior, and in removing the sepals, the petals are very liable to injury.

[The character of *S. ciliata*, Fr., as given in Koch's 'Synopsis,' is: "stem diffuse, leaves linear aristate *ciliate at the base*, flowers tetramerous, *peduncles hooked at the summit after flowering*, erect in fruit, *two outer sepals acuminato-mucronate*;" while the var. β . (*S. depressa*, Schultz) has the leaves very slightly ciliate at the base. As Mr. S. Gibson's paper in the 'Phytologist' (i. 177) shows, *S. apetala* is exceedingly variable with us, and it will be worth while to examine whether we have in this country so complete a set of transitional forms between *S. apetala* and *ciliata*, as the author of the foregoing paper has met with. *S. apetala*, *glabra*, Bab., and *S. apetala*, *lævis*, Gibs., both have mucronate outer sepals. It is not stated either by Mr. Babington or Mr. Gibson, whether any of the varieties have the peduncles reflexed just after flowering.

M. Jordan, in the "premier fragment" of his observations on French plants, describes a new species, *Sagina patula*, as distinct from *S. apetala*, in having the branches more expanded, the calyx applied to the capsule, the styles shorter, the peduncles glandular hairy in the upper part, its leaves more elongated and of a duller green, the seeds one-third larger, of a brighter brown colour and more delicately punctated; and it is not so slender in the various parts. *S. apetala*, L., he states to be of a brighter green colour, with incurved branches, sepals sensibly shorter than the capsule and quite expanded in the form of a cross at maturity. The petals are not so broadly ovate and are rather smaller. M. Jordan does not think that his *S. patula* is the *S. ciliata* of Fries, since the former has the capsule perfectly erect, the leaves usually very glabrous, and the peduncles glandular-pubescent. In the 'Flore de France' of MM. Grenier and Godron, we find Jordan's *S. patula* given as a synonym of Fries's *S. ciliata*, with the indication that authentic specimens of the two plants have been examined by the author (Grenier).—
—ED. B. G.]