

# NEW OR NOTEWORTHY PLANTS FROM THE EASTERN UNITED STATES.

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By EDWARD S. STEELE.

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All of the species here offered as new, with a single exception, are based entirely upon my own collections made upon vacation trips or in one case upon a partly official one. They are all supported by copious material, which in most cases could have been increased indefinitely. The few notes made on previously known plants are based on personal field work.

Several of the species considered are inhabitants of a type of land widely distributed through the mountains of middle Virginia which might well be denominated "shale barrens." This land is made up of exposures of shale in different stages of disintegration, these at the point chiefly investigated consisting of the Romney formation of the Lower Devonian. In the valleys these are reduced to a heavy clay, originally covered with good forest and when cleared susceptible of tillage. But the declivities and uplands bear at most a low and open growth of oak and pine or frequently a still lower growth of scrub oak, kalmia, and other shrubs, in either case with admixture of herbaceous plants. The formations are so open that over large areas they can be penetrated on foot with no great difficulty. The barrenness is perhaps largely due to the constant washing away of the finer particles of soil, but in some cases it seems as if it must be chargeable to chemical composition. The plant covering, I should say, is mildly xerophytic, but there is no evidence of extreme drought. On the contrary, the vegetation here maintains itself through the season even on sunbeaten slopes as well as that on other soils similarly situated. The variety of plant life is very considerable, and together with many plants well known on other substrata, these barrens possess a number of species peculiar to themselves. So far as observed by me these, with the possible exceptions of one *Crataegus* and one rose, are all herbaceous or scarcely shrubby plants. The total number may not prove to be very great. Some of them were contained in Mr. Mackenzie's collections at White Sulphur Springs, Greenbrier County, West Virginia; a few more are described here, not, however, completing the list.

At the western end of the railroad tunnel at Millboro, Bath County, lies one of the most fascinating spots in which it has been my fortune to botanize. The geological formation is entirely of this shale. The tunnel opens into a recess in the mountain, and the road after following the side of this a short distance passes over a deep valley by what is known as the "Big Fill." The situation is sufficiently picturesque, but the fascination chiefly lies in the unique content of the plant covering. Here within an area of perhaps half a square mile, with much up and down, occur, besides an abundance of the until recently little known *Oenothera argillicola* and *Eriogonum allenii*, at least a dozen native species thus far unknown to northern manuals, six or eight of them entirely undescribed. Oddly enough a rare introduction occurs along the railroad at the same spot, together with a second (true *Lactuca scariola*) not very common in the East.

Not all of the dozen species referred to are peculiar to this substratum, but probably half of them are so. The *Oenothera argillicola* and *Eriogonum allenii* are very characteristic plants, yet they grow only in certain special situations, namely, on shale cliffs or cliff-like places and denuded clay banks. They are very fond of railroad embankments.

In 1910 I made good collections, chiefly of golden-rods and asters, in Garrett County, Maryland, from which a pleasing aster may be published at once. The country here is a hilly plateau with much good farming land. There is a wide difference between the flora of this region and that of the mountains farther south, due to altitude, latitude, and soil.

Collections made in 1909 in Wisconsin and Indiana in connection with a *Laciniaria* expedition enable me to set at rights one *Solidago* long imperfectly known and to introduce another wholly undescribed.

A visit to central Illinois in August, 1910, primarily for other purposes, admitted of considerable collecting and observation. The opinion already entertained was confirmed that the State of Illinois has never been thoroughly collected over in a modern sense. Besides the fine new golden-rod and evening primrose here presented, other critical material was obtained which awaits later disposition.

I take this opportunity to call attention to the botanical situation in the nearer West, in the hope of arousing some active interest in preserving the record of a unique and interesting flora fast passing away and perhaps also in the maintenance of some living remainders of the flora itself. In the Eastern States some native plants will become scarce, but few will become entirely extinct. The same can not be said of Illinois. The difference is due to two circumstances: First, the natural conditions admit of a well-nigh universal and highly destructive agriculture; second, many of the native species can not maintain themselves where the original conditions have been

altered. Illinois is a vast empire, and it must not be imagined that it is everywhere alike, yet it is true that over a large part of its area there is scarcely a foot of waste land. In the wooded country the cow takes what the plow omits. The drainage of low grounds is dispossessing the moisture-loving tribes which for a time were comparatively safe. The now universal practice of mowing the railroad rights of way (where these are not cultivated) is driving the ordinary prairie flora from almost its last refuge. The practice of mowing the roadsides also prevails in advanced communities, and, commendable as it is, it still further diminishes the botanist's resources.

In spite of all difficulties, I believe it is still possible to collect nearly every plant which belonged to the original Illinois flora. The mowing of the railroads is largely delayed to the latter half of August, and some tracts escape even into September. It is likely also that temporary reservations of select strips could be secured if our scientific institutions would take hold of the matter. The railroads which were built before the prairie had been broken are those which chiefly deserve attention. A very fine display of old prairie was observed in 1910 along the Wabash Railroad, especially between Decatur and Springfield. Besides this resort, there are occasional neglected cemeteries and schoolhouse yards which help a little. In broken ground, as the bluffs of the Illinois River, native plants find a certain amount of protection, as do also plants of a certain class on moist flats of streams.

What has just been said of conditions in Illinois is true or becoming true of the whole prairie region and, indeed, with qualifications, of all our better agricultural areas. Already in North Dakota Doctor Lunell speaks of the imminent danger of the loss of species.

The case is one which requires prompt action. Vegetable physiology can wait, but these plants must be collected now or never. Yet so slight is the local interest that the University of Illinois is at present offering no instruction in systematic botany, on the ground that there is no demand for it. It should be remembered, however, that the local demand for a study is much regulated by the presence or absence of an enthusiastic representative of the science. At the same time the great botanical establishments of the country are devoting a large part of their energies to the floras of lands which are not even dependencies of the United States. In 1909 I collected many undescribed species almost under the eaves of an institution which is engaged upon the flora of South America.

One cause of the present neglect is probably the absorbing interest of the young science of plant ecology and the narrow view taken by some of the ecologists. About all the use which the class of students referred to seem to have for taxonomy is to supply them a convenient means of labeling the plants whose adaptations they wish to study.

While this specialization is doubtless justifiable up to a certain point, the time will soon come when these physiological-ecological investigations must be supplemented by and brought into relation with phylogenetic considerations. When this stage is fully reached it is manifest that the knowledge of every type available will be a matter of vital concern, and even forms of no great floristic interest may prove to be of large historical value. To illustrate, I possess as a loan a single incomplete specimen of a *Laciniaria* from Illinois, with characters rare in that region and so related to species there and elsewhere as to throw a strong ray of light on the history of a group. It is very possible that this species will never be collected again. Recently, however, (in my 1909 collection) a single specimen of a related species has come to light. Not all forms, of course, have as much significance, but we can not afford to lose any of them. Taxonomy, if we mean thereby merely an arrangement for convenient reference, is of course merely ancillary; but if it means the orderly expression of phylogenetic relations it ceases to be a mere tool and becomes the embodiment of some of the highest aspirations of botanical science.

But even from an ecological point of view it can easily be shown that the study of this flora is urgent. The Illinois flora, ecologically considered, is intermediate in type between that of the wooded country and that of the subarid region farther west, and only by a careful attention to species can the different areas be accurately marked out. My own *Laciniaria* studies have shown that of a swarm of species of the *scariosa* type naturally inhabiting Illinois and Wisconsin not a single one reaches the western boundaries of Missouri and Iowa, while only a few are known to cross the Mississippi at all, though it is probable that a considerable number do. In like manner there is an almost if not quite complete replacement of species in passing from northern Illinois to southern Minnesota. I put it to the ecologists themselves whether any accurate phytogeographical results can be obtained where a hundred types are bulked in one.

What is needed is a systematic and thorough survey conducted by qualified persons. While the work of the stronger amateurs has been of immense value and while the efforts of amateurs whether stronger or weaker are to be earnestly encouraged, yet it is plain that these volunteer performances are insufficient. For one thing they are sporadic and fragmentary. But besides this only experts can make the requisite discriminations. Even collectors of experience often fail to recognize the new species in their own collections, particularly outside of a certain range within which their individual interest has been peculiarly awakened. They also pass by plants which are really of new species because they are confounded with species already collected.

It would be desirable also to establish preserves for native plants where unspoiled areas can still be found, and also to put to experimental test the possibility of restoring on agricultural ground primeval conditions of soil and flora. At least, it can not be too much to ask that such magnificent plants as *Silphium laciniatum* and *S. terebinthinaceum* and some of the Laciniarias of the *scariosa* type should be preserved in an adequate number of botanical gardens. The buffalo has been rescued from extinction, why not the compass plant?

*Anychia divaricata* Raf. Neogenyton 4: 42. 1825.

Plant of a dull green aspect or at maturity with some reddish brown, low, dichotomously intricate, at length horizontal-spreading, sometimes to a breadth of 20 cm. or more, but not humifuse, 4 or 5 cm. high, minutely hirsute; trunk 2 or 3 cm. high, bifurcating at the fourth or fifth manifest node or lower, one or two pairs or half pairs of weak spreading branches at and below the first bifurcation, or commonly none, the internodes short, especially toward the extremities; leaves oblanceolate, punctate-roughened, the margin entire and naked, acute and mucronate at the apex, the largest 2 cm. long, the outermost not exceeding 2 or 3 mm.; stipules ovate-lanceolate; calyx segments 3-nerved, the hoods somewhat apiculate; style entire, but with two stigmas; stamens 5.

According to Rafinesque, "Found from the Alleghany Mountains to Kentucky on hills."

First collected by the writer on Stony Man Mountain in the Blue Ridge, Page County, Virginia, August and September, 1901 (no. 242), where it abounds at an altitude of about 1,200 meters. It has since that time been collected by me in the same State, near Eagle Rock, Botetourt County, and on Johns Creek Mountain, Craig County (both as no. 3), in 1903; near Goshen, Rockbridge County, 1904; at Millboro, Bath County, 1906; at Augusta Springs, Augusta County, 1908; and in West Virginia, on Peters Mountain, near Old Sweet Springs, Monroe County, 1905.

The National Herbarium has further the following specimens:

VIRGINIA: Nottingham County, Massanutten Mountain, *Heller & Halbach* 1090;

Warren County, Cedarville, *G. S. Miller*, July 17, 1897.

NORTH CAROLINA: Polk County, Columbus, *E. C. Townsend*, June 30, 1897.

GEORGIA: Walker County, Pigeon Mountain, *Harper* 337 of 1900.

WEST VIRGINIA: Wyoming County, Baileysville, *E. L. Morris* 1254a; Morgan County, Berkeley Springs, *H. D. House* 1570.

MARYLAND: Washington County near Sideling Hill, *Shreve & Jones* 796.

PENNSYLVANIA: Bedford County, Hyndman, *John K. Small*, August 19-23, 1890 (2 sheets).

In contrast with this plant *A. polygonoides* is of an erect habit, bifurcates at about the seventh node, has several pairs of branchlets below, has the leaves longer and perceptibly, though minutely, spinulose-serrulate, has the style divided nearly to the base, and has but 2 stamens. The stipules are also somewhat narrower and the calyx segments more prominently nerved and more apiculate. It is also a blue green plant while the present species is dull.

Doctor Robinson in his paper on the identity of *Anychia dichotoma*<sup>a</sup> has correctly cited my Stony Man no. 72 under *Anychia polygonoides*, but wrongly my 242, which is of the present species. He nowhere in the paper even canvasses the possibility of *A. divaricata* being a good species. He doubtless failed to note the undivided style and the five stamens. The low branching and the spreading habit are also good characters and in well-developed specimens very conspicuous.

<sup>a</sup> *Rhodora* 6: 53. 1894.

In many large specimens the plexus of branches is very dense but in others here admitted it is very much thinned out. There seems to be a gradation from one to the other form.

This species is not to be confused with a plant, abundant in some places near Washington, which approaches *A. polygonoides* in habit but has the leaves and ultimate branches gathered into close clusters, giving the aspect of a "resurrection plant." This is not a condition due to drought, as it occurs early in the season and where moisture is not lacking. It has the habit of a miniature American elm. There are also similar specimens from Pennsylvania, West Virginia, and Kentucky. This is a true *Anychia*, having the style cleft, but I am not sure of its specific status. It may grade into *polygonoides*, but I doubt this.

*Anychia divaricata* has not been found near Washington and all the settled specimens are from the mountain country. It occurs on denuded ground, not objecting to a deserted field or a roadside, and is not particular about soil, occurring both on shale and siliceous ground, whether on limestone not known. It will endure drier and more sterile conditions than *A. polygonoides*, yet not seldom occurs in the same vicinity.

I leave it to Doctor Small, who is already acquainted with this plant, to transfer it to *Anychiastrum*, if he sees fit. These notes, representing my independent observations, will hardly be amiss.

***Clematis viticaulis* Steele, sp. nov.**

Rootstock densely clad with slender fibers, these sometimes reaching 30 cm. long with little diminution of size; stems woody at least at the fruiting season, often several from one stock, flexuous-ascending, putting forth one or two branches from the corbel-like expansion of each node, thus forming a round, bushy head 35 to 40 cm. high; branches slender, flexuous, except the strong subbasal ones not further subdivided; stems and branches elastic, with a thin bark upon breakage splitting into strips, brown at maturity, finely puberulent with crisped hairs, the internodes short at the base, in the middle 4 to 5 cm. long, above reduced to 3 or 4 cm.; leaves numerous, with a thick petiole 2 mm. long or under, this puberulent like the stem but not brown; leaf blade rarely if ever lobed, from broadly lanceolate to narrowly ovate, the better developed 45 to 60 mm. long, 12 to 25 mm. broad, blunt but mucronate at the apex, rounded at the base; toward the extremities and on weak branches considerably smaller and rather less abruptly narrowed below; all the leaves glabrous above but with some short hairs on the veins beneath, firm in texture, the margin entire, somewhat revolute, five-nerved below, two nerves lost above the middle, strongly reticulate, the veins prominulous on both sides, especially beneath, the ultimate veinlets, however, obscure, the reticulation thus appearing less fine than in *C. ochroleuca*; flowers not seen, few, single at the ends of the principal branches, these never exceeded by their own subdivisions, hence the flowers never in a fork; fruiting heads on peduncles 1.5 to 2 cm. long, the cluster of achenes 7 or 8 mm. long, a little broader; achenes 12 to 18, rimmed as in *C. ochroleuca*, etc., oblique, the body 5 mm. long, copiously soft-pubescent, the hairs of the nucleal portion often longer and longitudinally placed, the tails 18 to 25 mm. long, their barbs silky, of a bright rusty yellow.

Type in the U. S. National Herbarium, no. 494534, collected at Millboro, Bath County, Virginia, altitude 500 meters, September 3, 1906, by E. S. Steele. It grows on disintegrating shale. Several specimens were preserved, of which four were mounted for the National Herbarium.

This plant was presumed to be the same as that known from Cates Mountain, White Sulphur Springs, West Virginia, but upon comparison was found to be quite different, though of the same group. The National Herbarium has four specimens of the Cates Mountain plant, all in the vernal stage. These have the leaves relatively small and rather more tapering at the base, but do not exhibit any decisive difference from *C. ochroleuca*. Another West Virginia specimen (not more definitely located, *F. V. Coville* in 1890) has ripe heads which are smaller and whiter tailed than those of

*ochroleuca*, the achenes seeming somewhat more oblique. Its leaves are none of them so large as is usual in *ochroleuca*. Granting that these represent a distinct species, *ovata*, the present species is still left standing quite apart. Its slender, woody stems, short internodes, and numerous branches and numerous small leaves distinguish it from either species. The fruit greatly resembles that of *ochroleuca* except that the tails of the achenes, though of the same color, are considerably shorter, the heads therefore smaller in outline.

***Arabis serotina* Steele, sp. nov.**

Plant 40 to 100 cm. high, glabrous throughout; stem slender, in strong specimens fairly stout below, never thick and soft, rarely collapsing in pressing, mostly purplish and minutely pale-flecked, the summit and the branches green, much branched even in small individuals, the branches long and slender, more spreading than ascending, rarely subdivided; basal rosette wanting at flowering time, a dense lateral tuft of small spatulate leaves with a dentate margin shown in one specimen; cauline leaves linear-oblongate or somewhat spatulate, entire or repand-denticulate, narrowly inserted (not clasping nor auriculate), the larger 5 to 7 cm. and perhaps 10 cm. long, the lower gone at flowering time; leaves of the inflorescence similar but smaller, mostly on the main axis, one to rarely three small ones on the stronger branches, the plant leafless with the ripe fruit; flowers in loose racemes, often occupying less than half the length of the branches; pedicels at flowering time 3 to 5 mm., in fruit 8 to 10 mm. long, often bent near the insertion, otherwise straight or somewhat curved; whole length of flower including stamens 4 to 5 mm.; sepals barely over 2 mm. long, the sides slightly excavate below, the blade-like upper segment elliptical-oblong, very obtuse; petals exceeding the sepals by 0.5 mm. or more; stamens decidedly exerted; silicles drooping either by the position of the pedicel or very often by their own curvature, when mature mostly 6 to 7 cm. long, 1.5 mm. wide; seeds a little larger and more broadly winged than in *A. laevigata*, including wing 1.5 to fully 2 mm. long, the radicle frequently distinguishable under a lens the whole length of one side and across one end.

Type in the U. S. National Herbarium, no. 494495, collected at Millboro, Bath County, Virginia, altitude 490 meters, August 21, 1907, by E. S. Steele. On lightly wooded slopes of crumbling shale. The exact locality is at the west end of the railroad tunnel, near Millboro station. Several other specimens of the same date were secured and others in a more advanced stage had been secured in September of the previous year.

This plant was at first taken to be *Arabis laevigata burkei* Porter, which it resembles in several particulars of the description, but Doctor Rose, who kindly compared a specimen with Porter's material at the New York Botanical Garden, thinks the two are not the same. In any case, it is out of the question to refer this in any way to *A. laevigata*. Even if we disregard the fact that it is in perfectly normal bloom the middle of August while *A. laevigata* blossoms in April and May, the differences are fully of specific worth. The most striking are in the small flowers of the present plant, its narrow nonsagittate leaves, its more slender and woody stems, and its numerous spreading branches.

***Euphorbia falcata* L.**

An abundant growth of this plant was found at the west end of the railroad tunnel at Millboro, Virginia, where so many native novelties occur. A few specimens were also met on the railroad near Mount Elliott Springs, Augusta County. It is a plant of the style of *E. peplus*. The determination was kindly verified at the Gray Herbarium.

***Oenothera canovirens* Steele, sp. nov.**

Stem 1 to 1.5 meters high, rather stout, woody, usually branching at the very base or somewhat above and also at the summit, the branches ascending, the bark downwardly splitting and scaling off, the surface clad with a dense cinereous puberulence interspersed with long, more or less flexuous, gray hairs, none tuberculate; leaves numerous and crowded, excurved-ascending, below 9 to 10 cm. long, at the base of

the inflorescence 6 to 7 cm., lanceolate-oblong, 12 to 14 mm. wide, curvately narrowed above but at last very acute, below narrowed by more rapid curves to a short, broad petiole distinguishable even in the upper leaves, closely repand-denticulate, regularly feather-veined, the midvein broad, in texture thick, somewhat succulent, the surface densely cinereous-pubescent, blue green; summit of axis and commonly several branches spicate, the young parts, including ovary and calyx, very canescent; whole length of flower 4 to 4.5 cm.; calyx segments on the point of spreading about 21 mm. long, separating commonly in pairs, the appendage terminal, subulate, at maturity fully 4 mm. long; petals triangular-obcordate, about 14 mm. long and 13 mm. wide, in fading very rufous at base; capsule truncate-lanceolate in section, somewhat curved, 3 cm. long, perhaps longer, tomentulose, also thickly beset with upwardly appressed, falcate hairs, the recurved tips of the capsule segments 2-lobed.

Type in the U. S. National Herbarium, no. 618797, collected along the St. Louis division of the Chicago, Burlington, and Quincy Railroad, about 2 miles south of Concord, Morgan County, Illinois, August 20, 1910, by E. S. Steele.

Found in good quantity on prairie soil, which had once been cultivated, but not for 30 years or more, yet had not recovered its original *Silphium* and *Laciniaria* flora. Doubtless one of a number of true prairie plants, such as *Monarda mollis* and *Helianthus grosseserratus*, which have the power of maintaining themselves on ground which has been plowed and again left to itself. *Oenothera biennis* was much more abundant on the same ground, probably also native.

*Oenothera canovirens* in habit resembles *O. biennis*, except that the branches are more erect. The latter species, as met in the field, either in Illinois or around Washington, is not "usually simple," as stated by the New Gray's Manual. The leaves of *O. canovirens* differ from those of *O. biennis* in number, position, size, form, texture, indument, and color, and in fact they are unique in their characters. In indument *O. canovirens* is perhaps most resembled by *Onagra strigosa* Rydb., but except in flowers and fruit there is not much comparison even in this regard, while the low, stout habit and unequal foliage lengths of the latter give it quite another manner. The narrowly oblong tendency of the leaves in *O. canovirens* is to be noted in contrast with familiar species. In the field a marked difference was observed in the position of the stamens of this plant after anthesis as compared with those of *O. biennis*, but I seem not to have made a note and the detail now escapes me.

***Oenothera parviflora* (?) L. Syst. Nat. ed. 10. 2: 998. 1759.**

Commonly bushy, 1 to 1.5 meters high, dividing at or moderately above the base into long upcurved-ascending branches, these with short-branches near the summit or undivided, the stems thinly appressed-puberulent and with rather copious longer hairs, many of these clearly tuberculate at the base, the tubercles red or green, inclined to be longitudinally narrow; leaves numerous, lanceolate or oblong-lanceolate, somewhat petiolate, the largest 12 to 13 cm. long and 16 to 20 mm. wide, reducible, however, to 9 cm. long and 14 mm. wide, acute and often more or less acuminate, unevenly repand, either distinctly or feebly denticulate, in the dry state rather thin and firm but with a suggestion of succulence when green, minutely strigose beneath with longer hairs on the midvein, above glabrate; calyx tube slender, from under 3 to 4.5 cm. long; body of full-grown bud 7 to 8 mm. long; calyx tube and segments nearly glabrous, some short stiff hairs near the summit, the segments separating singly; appendages pronouncedly infraterminal, rather horn-like, 1 to 4 mm. long; petals triangular-obcordate, reaching perhaps 11 mm. long, in dried specimens often seeming much smaller, a little narrower or broader than long, of a slightly greenish yellow; infructescence in strong plants becoming 20 to 30 cm. long, often more or less paniculate at the base, very woody, the capsules moderately tapering from near the base, the largest little exceeding 2 cm. long, glabrous, the excurved apices of the segments often 2-lobed, the valves distinctly feather-veined.

This species is very common in sandy or gravelly ground, found also on clay, in the vicinity of Washington. The most robust growth seen was in a sandy field on the



banks of the Potomac above Plummers Island, Montgomery County, Maryland, but it grows freely on the outskirts of the city, and at Tacoma Park, Hyattsville, etc. It has also been collected by me near Eagle Rock, Botetourt County, and on a shale cliff at Millboro, Bath County, Virginia. It is therefore likely to be distributed over a large part of Maryland and Virginia. Notwithstanding its local abundance, the National Herbarium contains little if any material outside of my own collections, collectors having perhaps taken it as an imperfect *biennis*. Doctor Greene noticed the plant independently. It is fair to assume that this is rare or wanting in other herbaria, whence its failure to find a place in the manuals.

This plant was long regarded by me as *Oenothera parviflora* L. In the original description the distinction from *O. biennis* turns upon the small flowers, as indicated by the name, and upon the stem being smooth and subvillose instead of scabrous, with the secondary difference of having the margin of the fruit summit 8-fid instead of 4-fid. In edition 2 of the Species<sup>a</sup> much fuller notes are given, including the statement that the stem is sprinkled with hairs; but without tubercles at their base. Now it is a fact that the present species often has the tips of the capsule segments distinctly 2-lobed, though this character is not uniformly maintained. But it is also true that the stem is normally supplied with tubercles, bright red or greenish, and evidence is wanting that these are ever entirely wanting below the inflorescence. On the other hand, again, if we accept the description in the second edition of the species as proof, the infraterminal position of the calyx segment appendages makes strongly for identification with *O. parviflora*, and there is no other discrepancy except that the leaf form of the latter and that of *O. biennis* are both given as ovate-lanceolate, whereas the leaves of my plant are decidedly narrower than those of *O. biennis*.

It was only at a late hour (through the monition of Mr. H. H. Bartlett, a thorough student of this group and independently acquainted with this species) that I became aware of Miss Vail's description<sup>b</sup> of supposed *O. parviflora*. There are several points in the description which suggest a species different from the present; the cauline hairs of my plant are scarcely spreading and are many of them tuberculate; the leaves do not tend much to be oblong and are not approximately denticulate above; the flowers often exceed the bracts, which are not divaricate, and the petals are delicate, not firm; the capsules are essentially glabrous. With present light I am not ready to offer a positive conclusion as to the status of the local plant.

***Solidago gillmani* (A. Gray).**

*Solidago humilis gillmani* A. Gray, Proc. Amer. Acad. 17: 191. 1882.

*Solidago racemosa gillmani* Fernald, New Gray's Man. 791. 1908.

Stems sometimes ascending from flat sand, then 50 to 60 cm. long, sometimes reclining on the sides of dunes, then much lengthened, sometimes to 110 cm., normally stout, but especially so in the low forms, purpled at least toward the base, glabrous to the inflorescence, here, with the branches, puberulent, especially toward the extremities; leaves of the sterile tufts 12 cm. long or under, the blade and petiole of about equal length, the latter margined and ciliate with delicate white hairs, the blades oval, the larger 18 to 22 mm. broad, the summit ovate or triangular-ovate, blunt, mucronate, the base somewhat more tapering; or, especially in the smaller leaves, the blade more oblong, the summit rounded, the whole leaf truly spatulate; lower stem leaves rarely 14 cm., often 8 to 10 cm. long, the proper blade much as in the basal tufts but relatively longer, 15 to 25 mm. broad; following leaves gradually reduced, sessile by a cuneate base, the uppermost lanceolate; both the basal and the stem leaves, except the upper, crenate-serrate, or sometimes the teeth acute; all the leaves thick, coriaceous, dull green, glabrous except the scabrous margin, coarsely reticulate, the lines strong, rather dark, impressed above, prominulous beneath; inflorescence rather

<sup>a</sup> Page 492.

<sup>b</sup> In Macdougall, Vail, and Shull, Mutations, Variations, and Relationships of the *Oenotheras*, p. 71. 1907. (Carnegie Institution.)

heavy, paniculate by simple racemes distributed along the axis, the lower branches moderately lengthened, excurved-ascending; peduncles 3 to 8 mm. long, naked except at the summit or with one or two lateral subulate bractlets; heads campanulate, including disk 8 to 9 mm. long; tegules<sup>a</sup> not manifestly glutinous, the basal ovate, the others oblong, ovately narrowed to the apex, broadly green-keeled (the two green ridges nearly coalescent); florets 22 to 34, those of the disk 6.5 to 7 mm. long, the achenes with scanty delicate, strigose hairs; rays about 8, oblong, 3.5 mm. long, of a rather deep yellow.

The description is based chiefly on an abundance of fresh material from the dunes and flat sands about the head of Lake Michigan:

INDIANA: Dune Park, Porter County, *Steele* 167, 168, September 17, 1909; Pine, Lake County, *Steele* 177, September 20, 1909.

Other material, doubtless the same, is as follows:

INDIANA: Pine, Lake County, *E. J. Hill*, September 13, 1879 (Herb. Univ. Ill.); Millers, Lake County, *L. M. Umbach*, September 3, 1897 (Nat. Herb.).

MICHIGAN: St. Joseph, *Henry Gillman*, October 10, 1872 (Gray Herb.); South Haven, *L. H. Bailey*, September 24, 1880 (Nat. Herb.)

All the Gray Herbarium material referred to *S. racemosa gillmani* (including the Gillman specimen mentioned) was courteously loaned for comparison. The specimens perhaps all belong to the species here described, but no one of them is a normal plant. The Gillman example is broken off above and abnormally branching below, the base not shown. There are besides this a garden specimen "from Mr. Gillman's plant," specimens grown from Lake Superior roots sent by Boott, and a Kew specimen supposed to be from the same source; also a sheet from Tobermory, Bruce Peninsula, southwestern Ontario, collected by John Macoun (same in Nat. Herb.). The cultivated plant is greatly altered, the leaves of the sterile tufts being much elongated, and the panicle, in one case especially, much overgrown. The very imperfect Macoun specimens show also the exaggerated panicle, but lack the basal features.

Disregarding the Macoun plant, it seems nearly certain that all the material here in view is of the same species, in spite of the startling contrast between the garden specimens and the Indiana material, especially the flat sand form. The garden specimen from Gillman's plant is so much like the Lake Superior cultures as to leave no ground for a separation. At the same time the original Gillman specimen can, as regards its characters, be perfectly well understood as cospecific with the Indiana material, while its habitat is the same and location adjacent. But evidently the Indiana specimens represent the normal form of the species, and the type conception must therefore be as here defined. Nontypical features will then be: The elongation of the leaves of the sterile tufts (up to 20 and sometimes almost 30 cm.) and the sharpening of their apices, as shown in all the garden specimens, the deep, sharp toothing of the upper leaves, as shown in the largest Lake Superior specimen, the expansion of the panicle into a brush of slender branches, as shown chiefly in the specimen last mentioned, and in a measure the reduction of the thickness of the leaves. One of the Indiana plants, however, has the upper leaves pronouncedly serrate and there is considerable variation in the thickness of the leaves, the flat sand plant tending to have them thicker than the dune plant. The peculiarities of the garden plant being merely developmental do not require taxonomic notice.

Under this new light it is hardly possible to regard the lake sand plant as a subspecies; but in point of relationship *S. gillmani* is decidedly nearer to *S. randii* than it is to *S. racemosa*. From the latter it is separated by its more robust habit, fewer, broader, blunt, more coarsely and strongly reticulate leaves, and its rather larger heads with broader tegules, and by its arenicolous habitat. From *S. randii*

<sup>a</sup>I beg leave to introduce this term in place of the cumbersome "bracts of the involucre." Latin *tegula*, *tegulae*, a roof tile, from root *teg-*, to cover.

it differs in being a distinctly taller and heavier plant with a glabrous stem and with still thicker and more coriaceous leaves which tend to expand into a rhombic-oval blade instead of a narrower oblong one and which are more coarsely and strongly reticulate, and in its larger heads with broader, more oblong (less tapering) tegules. *Solidago randii*, further, often has the inflorescence glutinous which is not apparently the case with *S. gillmani*. The distribution of the one on coastal sands and of the other upon ledges or earth in rocky and mountainous regions certainly affords a strong presumption of specific distinctness.

It remains to justify the use of this name. Inasmuch as Gillman seems to have been the first to take note of the species, and since the name *gillmani* has come into use for the normal plant in spite of the misleading description, it seems desirable to perpetuate it. The risk of misapplication I regard as very slight.

***Solidago harrisii* Steele, sp. nov.**

Plant 30 to 80 cm. (said to be sometimes 150 cm.) high; stem assurgent, somewhat arcuate and flexuous, of ordinary thickness, smooth, finely striate; stem leaves not crowded, the larger mainly 10 to 20 cm. long, the blade broadly elliptical-ovate, 5 to 10 cm. long, 3 to 6 cm. broad, abruptly short-acuminate and laterally curved at the apex, below abruptly contracted into a broadly winged, cuneate petiole, "full" at the sinuses and commonly folded in pressing, the same less conspicuously the case at the base of the acumination, beneath, and less boldly above, showing two well-defined pairs of slender, rather prominent veins, a third pair less well defined, the intervals densely reticulate, each wing of the petiole with a pair of nerve-like veins carried down from above; succeeding leaves gradually smaller, becoming in the inflorescence lanceolate or nearly so with merely a narrowed base; leaves of the frequent sterile tufts numerous, similar to the lower stem leaves but often larger, their petioles, as also those of the lowermost stem leaves, frequently longer than the blades; all the leaves very coriaceous, thick, when young bright green and shining and with a suggestion of fleshiness, permanently lucid, slightly paler beneath, smooth except the hispidulous-scabrous margin; inflorescence pyramidal, one-sided, loose, the branches stiffly arcuate (not at all drooping), at least the branchlets and peduncles puberulent; heads near the extremity of the branches single, mostly, however, in racemules of three to five, these and the single heads secundly racemose, crowded but on the longer branches confined to the outer half; heads 5 to 6 mm. high; tegules coriaceous, the middle ones occasionally rather narrow and sharp, normally oblong or somewhat tapering above with a deltoid, ovate, or still more rounded tip, in the fresh state boat-shaped and with two green lines confluent under the apex, in the dry state still somewhat keeled and in variable degree blackish green above; rays about 5, 2 to 2.5 mm. long, elliptical in form, of a deep yellow; disk flowers 9 to 15; achenes strigose.

Type in the U. S. National Herbarium, no. 615507, collected at Cumberland, Maryland, June 20, 1910, by Edward Harris, on cliffs and hillsides of the Hamilton and Clinton shales. Five other specimens of this date were furnished by Mr. Harris besides 5 of June 14, 2 of July 9-16, and 8 of August 10 of the same year; also one from the same locality by J. E. Harned, September 12, 1910.

The other collections known are:

WEST VIRGINIA: Clayey Mountain (north of Sweetsprings), *E. S. Steele* 305, September 14, 1903.

VIRGINIA: Millboro, Bath County, *E. S. Steele*, September 6, 11, 19, 1906; August 21, September 17, 1907; Augusta Springs, Augusta County, *E. S. Steele*, August 29, 1908.

At the first of these localities, the plant occurred on clay at the base of the mountain; at Millboro, on clay at the base of shale hills and also on slopes of crumbling shale; at Augusta Springs, on shale at the base of Great North Mountain. The Clayey Moun-

tain soil, though not duly investigated, is doubtless a shale product, bearing as it does at a suitable station the characteristic *Oenothera argillicola* and *Eriogonum allenii*. These plants were also in their favorite positions at Millboro, but they were wanting at Augusta Springs, as were several other plants characteristic of the shales farther west.

The seasonal development of the flowers is evidently early but very protracted. As reported by Mr. Harris, they had already begun to appear in 1910 by May 28, and on a western exposure tall plants were little in bloom July 20. At Millboro in 1907 many heads were still bright August 21.

*Solidago harrisii* was collected and distinguished jointly by Mr. Harris and Prof. George M. Perdew of Cumberland, Maryland, having, as it proved, been earlier noted by myself. By an understanding satisfactory to all it is described and named as here.

My 1905 collection was referred doubtfully to *Solidago boottii* and was sent out, I think, under that name. After collecting the same at Millboro I recognized the distinctness of the species and gave it a manuscript name.

The species is doubtless akin to *S. boottii* in its coriaceous leaves and tegules, stiff habit, and recurved branches. It differs greatly from it in its more robust though typically depressed habit, much broader and more lucid leaves, more ample panicle, etc. It has the habit of a depressed and stiffened *juncea*, but is not near that species. Its closest alliance is probably with *S. arguta*, the relation being most obvious in the broadly dilated and sharply serrate leaf blades, the very distinctive nervation of the petiole wings being also imperfectly anticipated in *S. arguta*. It differs from that species, however, in its lower stature and broader panicle, in its shorter and more dilated leaves with less forward-pointing teeth, and with firmer texture, brighter surface, and much more broadly winged petioles, and in its smaller heads and commonly thicker tegules. There are various forms of *S. arguta* presenting a lower and stouter habit, or thicker, coriaceous leaves, or coriaceous tegules, or some combination of these features, but none of these infringe at all upon the specific rights of *S. harrisii*. *Solidago amplexicaulis* may also be mentioned on account of its similarly broad and broad-petioled leaves, these dilated-clasping, however, as is not the case in *S. harrisii*. The two species are otherwise remote.

***Solidago moritura* Steele, sp. nov.**

Probably nearest *Solidago missouriensis*; spreading by running rootstocks and forming patches; stems assurgent at the base, more or less procumbent, slender, very smooth, even the inflorescence glabrous, finely striate; leaves numerous, all very narrow, oblanceolate-linear or above lanceolate-linear, the largest 10 to 13 cm. long and rarely 7 mm. broad, these situated about halfway up the stem, the lower a little shorter, the upper gradually reduced, 3 or 4 cm. long at the first developed branch, abortive branches in the upper axils; lower leaves insensibly narrowed into a long petiolar base, this upwardly slowly lost; all the leaves very sharply acuminate, entire or the larger with a few short, sharp teeth, glabrous save for the hispidulous margin, none triple-nerved, yet all showing below a fairly well-defined pair of straight lateral veins, merging above with the general strong reticulation; inflorescence very one-sided, soft and graceful, intensely yellow, based upon a penicillate-appearing cluster of slender, strongly ascending, branches, these bearing linear-filiform bracts, otherwise naked some distance before developing heads, the longest branches commonly 8 to 12 cm. long, sometimes reaching 20 cm. or reduced to 6 cm.; racemes secund, the lowest branchlets bearing commonly 2, but in strong plants sometimes 6 heads, a part occasionally abortive, all on filiform peduncles, the lateral subtended by filiform bractlets, the clusters soon succeeded by single heads on bracteolate peduncles, the lowest branchlets (including heads) 10 to 15 mm. long, the following successively shorter; heads oblong in section, including disk between 4 and 5 mm. long; tegules linear-oblong, slightly tapering, ovately narrowed, obtuse, golden but with a

moderately green looped midvein; florets not far from 20, 8 or 9 radiate; rays oval, scarcely 2 mm. long; achenes strigose.

Type in the U. S. National Herbarium, no. 648380, collected at Urbana, Illinois (Mount Hope Cemetery), August 10, 1910, by E. S. Steele. Only a single patch was seen, from which 18 stems were taken, perhaps as many more being left.

The species is named in allusion to the fact that it will soon be nearly or quite extinct. It has the advantage over some other species, however, that it completes its cycle early and produces seed prior to the ordinary railroad mowing time. The station is upon a high swell of ground and the plant need not be looked for in poorly drained situations.

*Solidago moritura* resembles *S. missouriensis* in the fundamental structure of the panicle, the presence of abortive branches, and the narrow tendency of the lower as well as the upper leaves. It differs in its weaker habit, its more slender and longer stems, its slender and pliable ascending (not recurved) branches, its long, filiform peduncles and bractlets and narrower tegules, and its much narrower and much less serrate leaves, and in the venation of its leaves, which want the sharp prominulous lines so noticeable in those of the latter species. Nor have I any information that *S. missouriensis* forms patches. By *S. missouriensis* I understand a species represented sparingly from Illinois but abundantly from the two tiers of States next west of the Mississippi, having the characters suggested by the comparison. An Illinois plant, of which several specimens were obtained on the same trip, has sometimes been called by this name, but is evidently either a form of *S. juncea* or a close ally of that species. The new species contrasts with everything of the *juncea* type by the non-expansion of its lower leaves, but in venation its leaves are better comparable with those of the form just referred to than with those of *missouriensis*. Our plant is also related to *S. serotina* and *S. rupestris*, as suggested particularly by the sharply acuminate leaves, but is shut off from them by the feeble development of the lateral pair of veins, also in a measure by its rather more xerophytic finish.

***Solidago sciaphila* Steele, sp. nov.**

Stem 45 to 80 cm. long, typically stout but with more slender states, soft, smooth except for a scanty puberulence high in the inflorescence, striate, pale green or lightly purpled; leaves numerous, commonly ample but chiefly in breadth; lower leaves petioled, 10 to 15 cm. long, the blade either elliptical-obovate (this form including the largest states but also small ones), or not seldom rather rhombic-ovate, occasionally oblong, mostly 2.5 to 6 cm. broad, the apex forming in the rounder leaves a very obtuse angle and always a rather broad one, mucronate, below at first curvately narrowed, then cuneately decurrent on the petiole and extended as a margin quite to the base, there pilose-ciliate; succeeding leaves with the petioles successively shorter and soon replaced by a cuneate base, not greatly reduced in size up to the fifth or sixth, still 5 to 7 cm. long at the base of the inflorescence, thence gradually reducing as foliaceous bracts to the summit; all the leaves thin, not hard yet with a somewhat parchment-like finish, glabrous except the weakly hispidulous margin, or occasionally with scattered appressed hairs beneath, pale above, more so beneath, there lightly feather-veined and rather densely but not heavily impressed-reticulate; inflorescence loosely thyrsoid, in weak specimens composed of small axillary clusters, usually ample, the branches more or less lengthened, either uniformly or irregularly, or longer toward the base and thence gradually shortened, in vigorous specimens descending in reduced axillary clusters below the middle of the stem, normally occupying one-third or two-fifths of the stem, the ultimate racemules few-headed, symmetrical; heads campanulate, about 6 mm. long; tegules except the basal linear-oblong, elliptically rounded and obtuse at the summit, the medial ridges light green, forming a more or less distinct loop above, the green part showing a scurfy roughening or puberulence; flowers 15 to 17; rays about 5, elliptical-oblong, scarcely exceeding 2 mm. long, pale; achenes minutely strigose.

Type in the U. S. National Herbarium, no. 608749, collected at Kilbourn, Sauk County, Wisconsin, from shady cliffs of the Wisconsin River, August 26, 1909, by E. S. Steele (no. 42). Fourteen specimens, 10 of this date and number, were preserved, and 4 of no. 51, August 27. The plant is found in both the upper and the lower "Dells," in clefts and on shelves, and even in thin soil on top of the rock, but nowhere in the blaze of the sun and often in much shaded and damp situations.

The nearest relationship of *S. sciaphila* is doubtless with *S. gillmanii*, the likeness being most manifest in the forms with less expanded, rhombic-ovate leaves. The two species may well be conceived as having come from a common stock, *S. gillmanii* having adapted itself to endure strong insolation though with a good moisture supply, for it is not believed that even the dune sands are ever dry to any great depth; *S. sciaphila* having taken on the capacity to subsist without strong sunshine and perhaps with less soil moisture than *S. gillmani*, for there can hardly be much water in these clefts. The two agree in loving a siliceous substrate and enjoying the scent of fresh water. The occurrence of *S. sciaphila* on rock can not by itself be taken as proof of specialization, for common *S. nemoralis*, likewise *Vasiphora fruticosa*, and other ordinary plants, appear in crevices of the same rocks, though in exposed situations, while a dwarf state of *Lycopus communis* (or a species very close to that) becomes an abundant inhabitant of moist cliffs along with the genuine cliff dweller *Sullivantia sullivanti*. In the want of evidence to the contrary, however, the presumption is strong that our plant is, like *Sullivantia*, entirely confined to these situations. The difference in the adaptations of *S. gillmani* and *S. sciaphila* appears outwardly in the paler aspect, softer wood, thinner and much larger leaves, and the leaf-like bracts of the latter. Other details of specific difference could be pointed out if necessary.

***Aster choralis* Steele, sp. nov.**

Forming patches by its slender, red purple rootstocks; stems percurrent, 75 to 100 cm. high, slender, leaning and somewhat arched, of a bright red purple, smooth save for a scanty puberulence high in the inflorescence; stem leaves sparse, excurved-spreading, the lower (wanting at flowering-time) 9 to 11 cm. long, with a slender margined petiole about as long as the blade, the following with shorter and broader petioles, these soon giving way to a cuncate basal segment and at least in the inflorescence lost entirely; base of the lower petioles little broader than the insertion; leaf blades oblong-ovate to ovate-lanceolate, apparently none cordate, distinctly acuminate, the margin incurved-serrate in the middle, firm, of medium thickness, dark green and scaberulous above, beneath paler, sparingly puberulent, rather distinctly feather-veined, densely reticulate; inflorescence little compounded, ovoid with an acutely conical summit, loose below, above more crowded; branches slender, usually somewhat curved, between spreading and ascending, the longest 12 to 20 cm., rarely 28 cm. long, only occasionally with secondary branches; peduncular branchlets fairly numerous, occupying the outer half of the longer branches or a larger part of the shorter ones, mainly 1 to 6 mm. long and bearing a single head, the longer with 1 to 5 bracteoles, the uppermost of these marked like a tegule; involucre campanulate, in the fresh plant well filled out below, 3 mm. high, in the pressed plant appearing 3.5 mm.; tegules in about 4 series, broadly linear with a deltoid or somewhat ovate apex, the lozenge-shaped green marking very heavy for the size of the head; rays oblong-oval, 4 mm. long, of a pale blue, near lavender; achenes with delicate strigose hairs.

Type U. S. National Herbarium no. 648481, collected at Oakland, Garrett County, Maryland, altitude 780 meters, September 19, 1910, by E. S. Steele.

A single patch of some 40 stems was found, from which 18 specimens were taken. The exact locality is the steep slope at the rear of the hotel south of the railroad station. The exposure is northern but the ground not shaded.

The affinity of *Aster choralis* is doubtless with *A. schistosus* and *A. lowricanus*, notwithstanding the roughness of the leaves, as testify the leaf form and texture,

the tegule characters, and the smooth stem. The leaf surfaces suggest *A. cordifolius*. Its smooth willowy stems set it widely apart from any species of the *undulatus* type. Besides the differences in leaf surface, it is a much more slender plant than *A. schistosus*, with no comparison in size of heads, and is a much lower plant than *A. lowrieanus* with smaller heads, while it differs from both in its wiry, arcuate stems and heavier tegule tips.

This is a pretty plant, and, growing as it does in companies, may be named as here in allusion to the choral dance.

*Aster schistosus* Steele, sp. nov.

Spreading by very slender branching rootstocks and forming small colonies; plant when best developed exceeding a meter high, mainly much lower and on dry bluffs sometimes flowering at a height of 15 cm.; stems assurgent, soon nearly erect, somewhat flexuous, lightly fluted, glabrous except for a few hairs in the inflorescence; leaves of the sterile tufts and some of the lower stem leaves with an ovate or sometimes oblong-ovate, moderately cordate blade on a margined petiole exceeding its own length; following leaves with the blade scarcely or not at all cordate, ovate, or ovate-oblong to ovate-lanceolate, sharply acuminate, the petiole in large specimens rather long and narrowly winged, widening toward the base or more often toward the blade, at length giving way to a broadly cuneate or oblong petiolar segment, this change in dwarf specimens taking place very promptly; margin of the blade serrate in the middle with appressed or sometimes slightly salient teeth; all the leaves rather thick, or when large thinner, not very firm, glabrous except the hispidulous margin; dull green above, beneath paler, pinnately veined, densely reticulate with dark lines, these in the dry plant obvious also above; inflorescence in large specimens ample, pyramidal or dome-shaped, the axis percurrent, zigzag, the branches mostly straight, the longer floriferous only on the outer half, the shorter for their whole length; branchlets mainly 1 to 2.5 cm. long, usually with a single developed head, but not seldom with minute abortive lateral heads, bearing several minute, subulate bracteoles; heads few or moderately numerous, 8 to 9 mm. high, the involucre broadly campanulate; tegules strict, of about 6 lengths, the lower oblong, the upper linear, the tip deltoid, scarcely thickened, the back white with a green line expanded above into a rhombus terminating with the tegule; rays 12 or 15, linear-spatulate, 8 or 9 mm. long, deep blue; achenes glabrous.

Type in the U. S. National Herbarium, no. 494524, collected at Millboro, Bath County, Virginia, September 17, 1907, by E. S. Steele. Six other specimens of this date were preserved, besides 10 of September 15, 1907, and 8 of September 16, 1906. All were from the region at the west end of the railroad tunnel.

The leaf form of this plant suggests affinity with *Aster prenanthoides* and *A. tardiflorus*, especially the latter, on account of the lack in both of a basal dilation of the petiole. The strict involucre, however, and the nonacuminate, diamond-marked tegules exclude it from this group and point unmistakably to relation with *A. lowrieanus* and its allies, with which also the leaves well accord. The middle stem leaves greatly resemble those of *A. lowrieanus lanceolatus*. Comparing with what seems to be the typical form of *lowrieanus*, viz, a rather low plant with ample broad, conspicuously cordate leaves, *A. schistosus* is stouter and stiffer with much drier, much smaller, and much less conspicuously cordate leaves and somewhat larger heads. The subspecies of *A. lowrieanus* are so much more tall and slender with so much smaller heads that in spite of the resemblance in leaf form mentioned above the relation is externally not at all close. No form of *A. lowrieanus*, as far as known, has a colony-making system of rootstocks. In *A. schistosus* this feature is quite noteworthy, notwithstanding the fact that the groups are small, only 5 flowering stems having been traced by me as belonging to the same system. The rootstocks are very slender and thread their way through the shale gravel of dry hills instead of the moist humus or mud of low meadows

where *Aster puniceus* and the like spread so vigorously. For comparison with *A. chorialis*, see that species.

While a shale is not a "schist" in a geological sense, *schistosus*, as a Latin word, describes with sufficient accuracy the substratum upon which this species grows, and hence may well serve as its name.

***Silphium reniforme*** Raf.; Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 342. 1841.

This plant, referred in Small's Flora to North Carolina, proves to be a locally common Virginia species also. I first met it in 1903 on shale ground about a mile from Eagle Rock, Botetourt County. In 1906 and 1907 I found it common about Millboro, Bath County, on shale, sometimes on shale clay. The largest specimens seen were on the latter in a golden-rod and aster field, where it exceeded a man's head in height. It was seen also from a train on the Chesapeake and Ohio Railroad at a point between Covington and Allegheny. I think I saw a specimen on siliceous rock near Millboro, but it is doubtful if it ever wanders far from an argillaceous base.

The description is as in Small's Flora. The species is an obvious ally of *S. terebinthinaceum*, from which it differs in its lower leaves being spreading instead of erect, much smaller, and usually as broad as long or broader.

***Helianthus laevigatus reindutus*** Steele, subsp. nov.

Often small but becoming fully as high as the type, more disposed to branch and sometimes quite bushy; lower internodes shortened, often several only 2 to 3 cm., or in stronger plants 4 to 5 cm. long, at least one or two of the lowest more or less densely papillose-hirsute, decreasingly so commonly up to the fourth or fifth; lower surface of the lower leaves, often as far up as the branches, very scabrous, higher becoming smooth, the upper surface little if at all roughened.

Type in the U. S. National Herbarium, no. 494565, collected by E. S. Steele at Millboro, Bath County, Virginia, September 1-17, 1906. On hills of crumbling shale and shale cliffs, common. Thirteen specimens, collected different days, were preserved.

This very pronounced form seems to prevail to the exclusion of the type on the shales of Bath County. A specimen clearly the same was obtained from the shale at the base of Great North Mountain, Augusta Springs, Augusta County, in 1908. A specimen collected by Heller and Halbach (no. 1185) from Elliott's Knob (Great North Mountain), the substratum not stated, has the lower surface of the leaves considerably scabrous. Other material collected by myself on siliceous ground of the same region is smooth.

*Helianthus laevigatus* is a familiar plant among the brush on stony ground of the Virginia mountains. As seen by me, it is not usually much branched, nor is the subspecies by any means always so. The internodes should be long, except one or two of the lowest. The stem should be essentially smooth, as also the leaves, except the margin. The tegules in both the type and the subspecies are very frequently prolonged into a slender rigid, revolute-margined, almost acicular tip.

The supposition is at least plausible that this subtype is a direct transformation of *H. laevigatus*, due to the special influences of the shale substratum. I hazard the guess that in spreading over the shale where the plant covering is exceedingly imperfect it found an indument on the base of the stem and the lower surface of the leaves advantageous as a protection from the reflected light and heat. In other situations, the vegetation is generally well closed up (except in deep shade, where this plant does not grow) and the want was not equally felt.