

GROSSULARIA ECHINELLA, A SPINY-FRUITED GOOSEBERRY FROM FLORIDA¹

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While in Tallahassee, Fla., early this spring, the writer was invited by Dr. Roland M. Harper, of the State geological survey, and Dr. H. Kurz, of the State College for Women, to join them in a visit to Lake Miccosukee where a few weeks before they had found a wild gooseberry, at that time not yet in flower. The plant promised to be of great interest, for although the name "gooseberry" is often misapplied in the southeastern United States to the fruit of the various species of deerberry, or *Polycodium*, no true gooseberry had ever been reported from Florida.

On March 2, 1924, we made the 26-mile drive from Tallahassee to Dogwood Landing, on the east shore of the northwest arm of Lake Miccosukee, about a mile east of the main buildings of the Norias Club. A few hundred yards east of the landing, in the strip of woodland bordering the lake, we came upon the first plant, in full leaf and flower. It had been our expectation that it would prove to be the Georgia gooseberry, *Grossularia curvata*, a rare southern species, the type locality of which is on the slopes of Stone Mountain, Ga. The plant found, however, was recognized immediately as not *Grossularia curvata* but a species new to science, differing conspicuously from *curvata* in the coarse bristly gland-tipped hairs of the ovary, which develops into an exceedingly spiny fruit. This characteristic has suggested the species name *echinella*, which indicates the resemblance of the berry to a little hedgehog.

On March 27 Doctor Kurz and the writer again visited the locality. Unusually cold weather had prevailed and many of the gooseberry bushes were still in full flower. Some of the young green spiny fruits had already reached a diameter of five-eighths of an inch. On April 7 Doctor Kurz visited the place again and sent the writer fresh pollen from newly expanded flowers, and half mature fruits, the largest seven-eighths of an inch in diameter.

TECHNICAL DESCRIPTION

***Grossularia echinella*, sp. nov.**

Plant a shrub 0.5 to 1 meter in height, often forming patches several meters in diameter, the branches spreading and recurved, sometimes rooting at the tip; stems with spines at the nodes but devoid of bristles except occasionally on vigorous basal shoots; spines single, double, or triple, stout, dark reddish brown, sometimes turning gray with age, reaching a length of 1.5 cm.; outer bark of 1-year-old branches dull white to almost buff, splitting with the growth of the twig and exposing the inner dark reddish brown bark; petioles pubescent, usually a little longer than the leafblades but sometimes exceeded by them and usually bearing near the base a few large gland-tipped and often plumose hairs;

¹ Received for publication, Apr. 1, 1924.

leafblades 1 to 2 cm. long, sometimes smaller, on vigorous shoots of the season, longer, on strong basal sprouts sometimes reaching 3 cm., orbicular in outline, truncate to rounded at the base, 3-lobed, each lobe with a few rounded teeth, sparingly pubescent or nearly glabrous on both surfaces; peduncles 5 to 12 mm. long, pubescent and usually with scattered longer gland-tipped hairs, one-flowered or occasionally two-flowered; bracts usually 2, pubescent, entire; pedicels 1 to 5 mm. long, densely pubescent and often with scattered gland-tipped hairs like those of the ovary; flower 15 to 20 mm. in length, green to greenish white; ovary densely clothed with stout bristly hairs tipped with cup-shaped glands; calyx tube green, pubescent on the outside, sparingly pubescent on the inside toward the base, cylindrical, 3 to 4 mm. long, the lobes green to greenish white, linear, pubescent on the outside, glabrous on the inside, reflexed, 4 to 6 mm. long; petals about 2 mm. long, greenish white to green, each inrolled into a truncate tube with a spreading or revolute rim at the summit; stamens extending nearly 1 cm. beyond the petals; filaments greenish white to green, usually sparingly hairy; anthers purple, about 1.5 mm. long when dry, sometimes 2.5 mm. long when fresh, usually with a line of long white hairs (or occasionally a green and gland-tipped hair) on the back between the anther sacs; styles green, a little longer than the stamens, very sparingly hairy within, as well as beyond, the calyx tube; largest berry, not yet mature, 22 mm. long, 22 mm. broad, including the prickles, the body 16 mm. in length, 12 mm. in thickness, translucent, uncolored;² fruit prickles very numerous, vivid green, somewhat flattened, longer toward the middle of the berry than at the ends, reaching a length of 5 mm., the larger nearly 1 mm. wide at the base, each ending in a green cup-shaped gland. (See Pl. 1.)

Type specimen No. 1,112,807, United States National Herbarium, collected March 2, 1924, a few hundred yards south of Dogwood Landing, east shore of the northwest arm of Lake Miccosukee, Jefferson County, Florida, by Frederick V. Coville.

In the somber surroundings of gray tree trunks, gray Spanish-moss (*Dendropogon usneoides*), and gray-brown leaf litter, the patches of this plant were conspicuous for the brilliant green of their new foliage. The only other shrub conspicuously green at the time the gooseberry came into bloom was red buckeye, *Aesculus pavia*, which also was in full leaf and nearly ready to flower. Although its stems are viciously spiny, the new *Grossularia* when in bloom is of graceful and pleasing appearance, the slender, elegant, pale green flowers hanging down singly from the broadly arching branches like aquamarines pendent from an emerald necklace.

The new species differs from its nearest relative, *Grossularia curvata*, in the white or whitish color of the 1-year-old twigs; the ovary densely clothed with stout gland-tipped hairs; the cylindrical, pubescent calyx tube 3 to 4 mm. in length and longer than broad; the green or greenish color of the calyx lobes; the inrolled tubular character of the petals; and the spiny fruit, which looks like a cocklebur, especially like the fruit of *Xanthium globosum*. In *Grossularia curvata* the 1-year-old twigs are dark reddish brown; the ovary bears sessile glands; the calyx tube is saucer-shaped, hardly more than a millimeter in length, much broader than long, and smooth or nearly so; the calyx lobes white; petals expanded and toothed; and fruit smooth. In the new species the filaments and style are only very sparingly hairy, in *curvata* densely and conspicuously hairy.

² Berries collected by Doctor Harper on May 10, though still hard, green, and unripe, had reached the astonishing diameter of 30 mm. (over 1 $\frac{1}{8}$ inches), including the spines, and the body of the berry 22 mm. (over $\frac{3}{4}$ of an inch).

In the new species the sepals when reflexed reach to the summit or sometimes to the base of the ovary, in *curvata* far beyond its base.

On the pollination of *Grossularia echinella* only a few observations were made. Isolated plants did not set as much fruit as plants growing in groups and therefore better situated for cross-pollination. Only a single insect was seen pollinating the flowers, a carpenter bee, *Xylocopa virginica*. To suck the nectar it alighted in an inverted position on the pendent flower, grasping the stamens and style with all its legs in such a manner that the anthers and stigmas were brought into contact with the middle of the underside of its body, a very effective position for the transfer of pollen from one flower to another and from one plant to another. The bee assumed its inverted perch instantly, without hesitation and without slipping, drew the nectar rapidly, and proceeded promptly to another flower. In maintaining a firm grip on its perch it must have been greatly aided by the long hairs on the filaments of the flower, a characteristic very unusual in the genus *Grossularia*, and occurring in no other of the more than 40 American species except *curvata* and *nivea*. Both of these, like *echinella*, have long protruding stamens which, if devoid of hairs, would furnish only a slippery hold to a pollinating insect.

The cup-shaped glands at the tips of the coarse hairs that densely clothe the ovary were not yet yielding an exudate either in the newly opened flowers or in the older withered flowers in which the hairs had begun their elongation into prickles, a condition that suggested, at the time of the first observation of the inflorescence, that the function of the glands was related to the fruit, not to the flower. This suggestion was confirmed by the observations made on March 27 and by those made by Doctor Kurz on April 7 and later, when some of the berries were half mature. As the fruit enlarges, the glands at the ends of the prickles give off a sticky and unpalatable secretion. The species presents therefore the apparent anomaly of a sweet and succulent berry well adapted to the dispersal of its seeds by fruit-eating animals, yet barred from this means of dispersal by its spiny covering and offensive exudate. A little consideration, however, discloses the fact that these obstacles, though effective against such animals as insects, rabbits, and squirrels, would present only an interesting conundrum to such wide-awake and investigative fruit-eating animals as mocking birds, catbirds, and thrushes, whose long bills would enable them to open the berries with ease, and whose digestive limitations would insure a wide distribution of the living seeds. The structures that appear at first, therefore, as a bar against seed dispersal provide in all probability a very special and very effective means of advancing the distribution of the species.

At the present time the new species is known only from the type locality, on the north side of Lake Miccosukee, Fla. *Grossularia curvata* occurs in northern Georgia, northern Alabama, Louisiana, and eastern Texas. It may be questioned why a shrub so vigorous, so well protected against grazing animals, and so well adapted to dissemination by fruit-eating birds as *Grossularia echinella*, has such a limited geographical range, a strip of country about a mile in length and only a few rods in width. The manner of occurrence of the bushes in this area indicates that the establishment of the species here is of comparatively recent date. The plants occur in a definite center of abundance, with many individual bushes forming thickets, and farther away individual younger plants more widely separated from each other. The situation is exactly what would be expected if seeds of this species had been first introduced into this locality a few decades ago from some other and older center of distribution. The present known area of the species appears to be an advance colony, not a remnant, and it is to be expected that another and parent area will sometime be

discovered.³ That the plants have not come from seeds scattered by birds from some foreign species cultivated in the neighborhood of Lake Miccosukee is evidenced by the fact that *Grossularia echinella* is very different from any of the species of Asia, Europe, or the mountains of northern Africa, the only parts of the world besides North America in which Grossularias are native.

The spininess of the fruit is the most remarkable characteristic of *Grossularia echinella*. Of the six other species of gooseberry native in eastern North America, *cynosbati*, *oxyacanthoides*, *hirtella*, *rotundifolia*, *missouriensis*, and *curvata*, only one, *cynosbati*, has spiny fruit, and that species is not closely related to the present species, as shown by their very different flower structure. Even in *cynosbati* the prickles of the fruit are comparatively few, in *echinella* they occur in hundreds. It is only in some of the Pacific coast species, such as *menziesii*, *hesperia*, and *hystrix*, that such dense spininess occurs, and the flower structure of all such spiny-fruited Pacific coast species shows that none of them is closely related to the new one.

Grossularia echinella is closely related to three other American gooseberries: *G. curvata*, of the southeastern United States; *missouriensis*, of the middle and upper Mississippi Valley region; and *nivea*, of the plains of eastern Washington and Oregon, western Idaho, and northern Nevada, a species which, though now stranded far from the others geographically, presents evidence of close genetic relationship with them, especially with *Grossularia curvata*. None of these species, however, has spiny fruit. But in *curvata* the ovaries are densely covered with sessile glands, and the elevation of these glands on stalks, a tendency which often appears in *Grossularia* and also in the related genus *Ribes*, provides a reasonable explanation of the evolution of the gland-tipped prickles of the new species.

In its geographic distribution *Grossularia echinella* is of special interest because it is the southernmost of our Atlantic seaboard species of this genus, growing in Florida, at an elevation of only about 200 feet above sea level, and in the principal region of production of the Satsuma orange. It may therefore be regarded as an almost subtropical representative of a north temperate genus. The cultivation of our present garden gooseberries in the latitude to which they are adapted, the Northern States, is now discouraged by forestry experts because the gooseberries, like the currants, are carriers of a blister rust that threatens the destruction of the white-pine forests. The danger is so seriously regarded that more than a million dollars has already been expended in the eradication of gooseberries and currants in the white-pine region. Should it be judged desirable that the agricultural range of the cultivated gooseberries be extended farther south than it is now possible to grow them, and that an attempt be made to establish gooseberry culture beyond the range of the white-pine forests, the new species offers a southern climatic adaptation which it may be possible to combine with the edible qualities of the garden gooseberries through hybridization. The culture of gooseberries in the southern coastal plain would carry no menace to the pine forests of that region because the hard pines are immune to the blister rust of the white pine, and, furthermore, the gooseberries in that region would not even have the disease because there are no white pines from which to contract it.

³ The prediction of a parent area has come true sooner than was expected. Doctor Kurz visiting Lake Miccosukee again on April 27 found that about a mile farther from Dogwood Landing the new species was running rampant as the dominant shrub of the forest belt and extending beyond it into the upland along the slopes of small streams emptying into the lake.

PLATE 1

A.—Flowering branch. Natural size.

B.—Portion of a stem showing the cracked outer bark, and the stout nodal spines projecting backward. Natural size.

C.—Petal viewed from the inside of the pendent flower. Note the tubular form of the petal, brought about by the inrolling of the margins. A portion of a filament is shown beside the petal. $\times 4$.

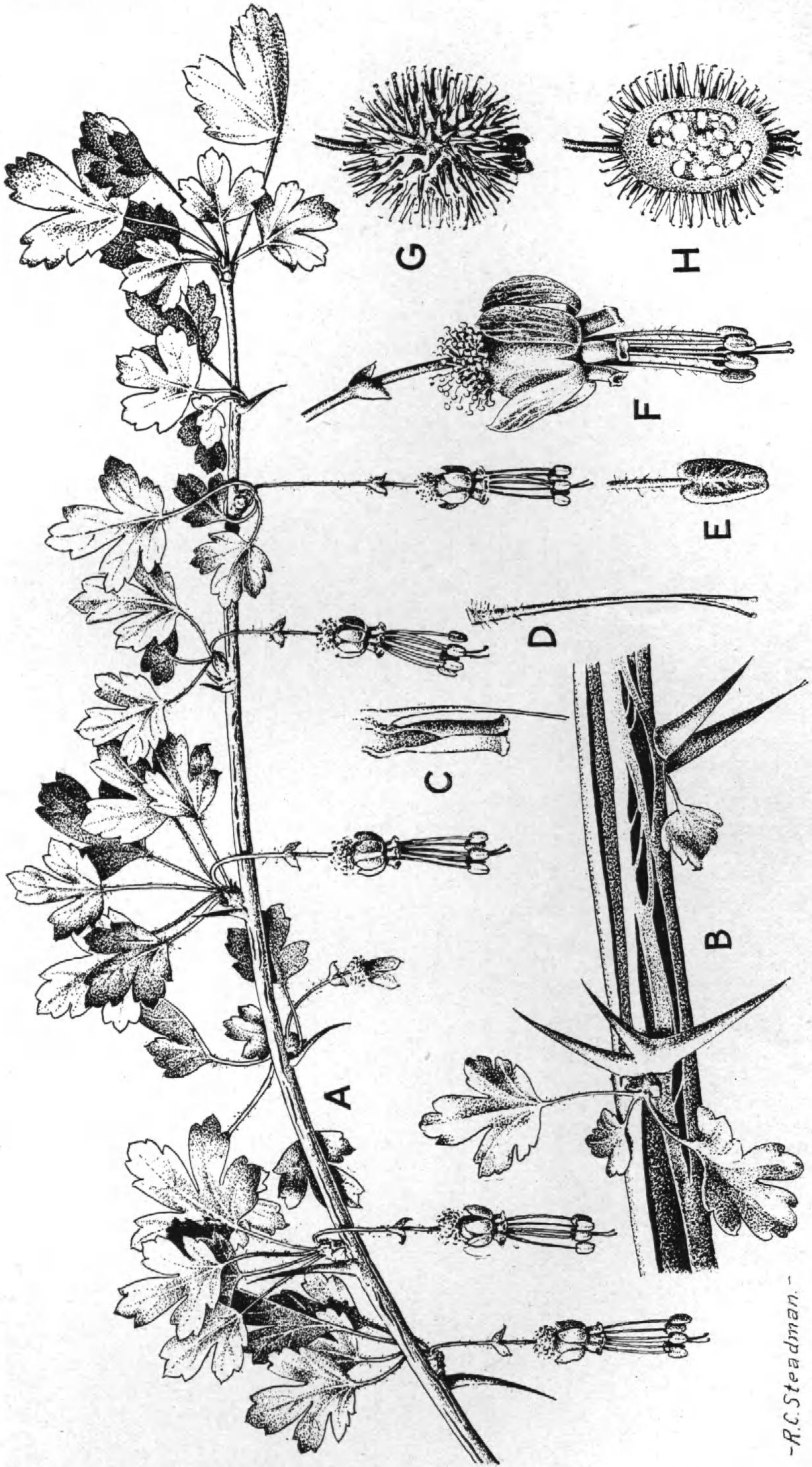
D.—Style. $\times 2$.

E.—Anther, from the back. $\times 4$.

F.—Flower, with pedicel, bracts, and portion of the peduncle. Note the hairy filaments, the tubular petals, the reflexed sepals, and the gland-tipped hairs of the ovary, which develop into the prickles of the fruit. $\times 2$.

G.—Immature berry, picked April 7. Natural size.

H.—Lengthwise section of an immature berry. Natural size.



-R.C. Steadman.-