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THE BLACKBERRIES OF NEW ENGLAND.

EZRA BRAINERD.

It is now somewhat over a year since Professor L. H. Bailey published his admirable revision of the Blackberries of Eastern North America. We have had time to consider, in a tentative way, to what extent his disposition of the species clears up the difficulties of our New England forms, and to get some preliminary notion of the number and range of our species.

The genus is especially interesting because of its economic value. Thousands of acres of blackberries are now under cultivation, and the improved varieties are a welcome addition to our table delicacies. At the same time no group of flowering plants has furnished so many stumbling-blocks to the botanists. These two facts have a logical connection. For, as Darwin long ago pointed out, those plants that reward most the efforts of the horticulturist to improve them, are the plants that vary most in the wild state, and consequently most perplex the systematic botanist. Indeed, in the history of the blackberry problem the horticulturist has in several instances recognized new species and varieties, and named them in advance of the botanist. "Bartel," "Snyder" and "Lucretia" are older names than *Rubus invisus*, *sativus* or *roribaccus*.

In the Old World the genus is noted for its multiplicity of forms. The English bramble, *Rubus fruticosus*, L., is the analogue of our blackberry; in Hooker's Flora of the British Islands it is divided into twenty-one sub-species, and under these twenty more forms are described as varieties. In Garcke's Flora of Germany we find thirty-eight species and twenty varieties. Our American blackberry is so

excessively variable, that in order to be completely understood, it may in time need to be presented under as many mental types. But we most sincerely hope that only experts—after years of study—will attempt it. Meanwhile we shall have accomplished much if we can seize hold of the dominant types. These are distinct enough and cover the forms ordinarily met with; and the many intergrading and aberrant forms, that occur here and there, are best understood when viewed in connection with certain well-defined landmarks.

Two general characters of the group should be noticed. First, that though the root is perennial, the growth above ground is biennial. During the first year the cane does not normally bear flowers—only leaves; its function is vegetative. The leaves at this time are best developed and most characteristic. They are usually 5-foliate; those of the second season 3-foliate. It is important that collectors should get specimens of the first season's growth when collecting flowering or fruiting specimens. During the second season the function of the cane is principally reproductive. It flowers and fruits, and in some species propagates by rooting at the recurved tip, and then dies. Now and then, however, a plant seems to have a confused notion of time; the two vital impulses seem to work simultaneously, giving rise to strange and abnormal forms. Sometimes the cane flowers at the close of the first season, the flowers with long pedicels appearing singly in the axils of the upper leaves, and the fruit ripening much later than usual. Other aberrant forms result from excessive leaf-vigor during the second season. This is more likely to occur when the plant grows in the shade; the racemes then have fewer flowers, and the pedicels are more or less subtended by leaves. In a remarkable freak of *Rubus nigrobaccus*, collected by Mr. Fernald at Alstead, N. H., August 7, 1899, this frondose impulse has transformed the sepals into lanceolate, laciniate leaves one or two inches in length. At the same time the pedicels and the axis of the raceme are lengthened, and the fruit reduced to a few drupelets.

The second general character to be noticed is the peculiar mixed inflorescence. The flower cluster is normally a raceme, but cymose to this extent, that it has a terminal flower that opens first of all. This terminal flower is sometimes aborted; but it generally produces a berry, that seems, in the upright species, to have a much shorter pedicel than the other berries of the cluster. Professor Bailey (*Evolution of our Native Fruits*, p. 332) seems to imply that this mixed inflores-

cence is confined to the dewberry, and may serve to distinguish it from the bush blackberry; but a little observation will show that blackberries and dewberries are alike in this respect. It may be further noted that occasionally the raceme is slightly compound, the lower pedicels developing into two- to several-flowered peduncles. This is common in *R. hispidus* and in *R. nigrobaccus*.

Of the principal forms of blackberries recognized by Professor Bailey in his revision, I find that thirteen occur in New England. Their distinctive marks will be given in the synopsis at the close of this article. But certain preliminary observations regarding range, habitat or synonymy may be of interest to students of the genus.

RUBUS NIGROBACCUS is the name happily coined by Professor Bailey for the common species of "highbush blackberry." The name by which it has been heretofore known, *R. villosus*, was originally given by the English botanist, Aiton, to our common dewberry, and is rightfully restored to that species. *R. nigrobaccus* is the plant that springs up so abundantly in wayside thickets and in clearings, before the stumps are sufficiently rotted for ploughing. It is, however, uncommon at elevations of over a thousand feet, at least in the mountains of Vermont. During a three days' ramble last August over the town of Woodbury (alt. c. 1500 ft.), not a single plant was noticed, though several other species of *Rubus* were abundant. Occasionally plants occur that produce white or amber-colored berries; this Professor Bailey has marked off as var. *albinus*. But it appears to be rather an abnormal state than a proper botanical variety. At least five stations are reported for Vermont. Two New Hampshire stations are reported in RHODORA I, p. 205.

RUBUS ALLEGHENIENSIS, Porter, was first described from the mountains of Pennsylvania, and is reported to be abundant in the Adirondacks. It is said in The Illustrated Flora to be "the characteristic High Blackberry of the mountains of the Eastern and Middle States." A specimen with immature fruit, collected by Dr. B. L. Robinson, at Jaffrey, N. H., July 7, 1897, has all the characters of the species that would appear at that stage of growth. I have distinct recollections of finding in past years certain bushes that bore long, slim, fine-grained, dryish fruit, markedly different from the oval, luscious fruit on neighboring plants. It is hoped that collectors in New England will be on the outlook for this species another season. Professor Bailey remarks that "in its typical form it is very well marked, and seems to be worthy

specific rank ; but in intermediate stations it seems to grade into the species," i. e., *R. nigrobaccus*.

RUBUS ARGUTUS, Link, is the oldest name of the plant described under *Rubus villosus*, var. *frondosus* in the Gray Manual and in Britton & Brown's Ill. Flora. As ordinarily found in western Vermont it is quite distinct from *R. nigrobaccus*, and though not so common it is of wider range, ascending to higher altitudes. But along the seaboard it passes by imperceptible degrees into that species.

RUBUS ARGUTUS, var. *RANDII*, Bailey. This distinct blackberry, detected first by Mr. Edward L. Rand in 1894, at Mt. Desert, Maine, proves to be common in New England. In habit it differs markedly from *R. argutus*. It affects shady thickets rather than the open ; the canes are short, recurving, with few weak prickles or none ; not stiff, strict and thorny as in the species. Last summer, in the mountain town of Woodbury, Vt., the fruit was abundant enough to be served at the hotel tables, and though small surely disproved the charge of being "dry and seedy." At lower altitudes the inflorescence, leaf-stalks and leaves beneath are softly pubescent ; the glabrous form of the mountain seems nearer to *R. canadensis* than to *R. argutus*.

RUBUS CANADENSIS, L. This plant was the first among American species to obtain scientific recognition. Linnæus, in his *Species Plantarum* of 1753 so christened a specimen collected by the Swedish traveller, Kalm, who several years before had made an extended visit to the French settlements of Lake Champlain and the St. Lawrence. The name, however, was misapplied by American botanists, and the species remained unrecognized until rediscovered in 1890, in the mountains of western Virginia, at an altitude of 3500 feet, and named *R. Millspaughii*, by Dr. Britton, in honor of the collector. It turns out to be a common species in the highlands of New England. In its best estate the canes are ten feet long and an inch in diameter at the base. With its thornless stems, large flowers and juicy fruit, it is by far the most stately and amiable of all our blackberries.

***Rubus sativus*.** This is *Rubus nigrobaccus*, var. *sativus*, Bailey, which we are confident should be regarded as a distinct species. As we find it in western Vermont it is farther removed from *R. nigrobaccus* than any of the four forms last mentioned. In pubescence it is quite like *R. argutus* ; it has almost the smoothness of *R. canadensis*, and is even more dwarf than var. *Randii*. It is peculiar in its reduced, leafy flower-cluster, and very broad leaflets. The name chosen by

Professor Bailey is most appropriate, as the species is the parent of some of our best garden varieties.

RUBUS NIGROBACCUS $\times$ VILLOSUS, Bailey. This hybrid Professor Bailey finds common in Central New York, and he has so named specimens from a large colony covering a quarter of an acre in Weybridge, Vermont. It has been found in four other towns in western Vermont. We find it difficult to accept this disposition of our Vermont plant, which has more slender bristles, and wider, more glabrous and more sharply toothed leaflets than are found in either of the alleged parents. The botanical status of this plant requires further investigation.

RUBUS CUNEIFOLIUS, Pursh, with leaves whitish pubescent beneath, is a southern species that barely enters New England in southern Connecticut. Specimens seen were from Stratford, East Haven, Killingworth and Milford.

RUBUS SETOSUS, Bigelow (Florula Bostoniensis, 1824). This plant seems to be not rare in the vicinity of Boston, but it has strangely failed of recognition in any edition of the Gray Manual. The stems are usually erect; but trailing forms are not infrequent even in the same colony. It varies also greatly in the width of the leaflet and in the abundance of its bristles. Wide-leaved, prostrate forms are easily mistaken for *Rubus hispidus*. The species appears to be widely distributed in New England.

There remain to be noticed, briefly, our four species of *trailing* blackberries, or dewberries.

RUBUS VILLOSUS, Ait. As noted above, this name must hereafter be applied to what for over a century has been incorrectly passing as *R. canadensis*. It is abundant in the lowlands of New England, in sterile soil; but rare in the mountains and in Maine, north of the coast. The species, though still a variable one, has been much simplified by the segregation of the two following.

RUBUS INVISUS, Bailey, is a plant every way larger than *R. villosus*. Specimens have been seen from Connecticut, Massachusetts and Maine. The Maine plant, collected by Mr. Fernald in Foxcroft, August 31, 1897, is more robust than the types from Ithaca, N. Y., which, through the kindness of Professor Bailey, I have been permitted to examine, has more oval and more sharply toothed leaflets, and may be deserving of varietal distinction.

RUBUS ENSLENI, Tratt., has been identified by Professor Bailey with the *R. villosus* var. *humifusus* of Torrey. With its slender stem

and single flowers on long pedicels it is easily recognized. But it should be noted that in this, as in the two preceding species, the stem is sometimes erect,—recurving if prolonged. The type specimens of Trattinnick were evidently erect; those of Torrey, prostrate. We find eight specimens of this species in the herbaria of the New England Botanical Club, and of Judge J. R. Churchill, — all collected in eastern Massachusetts.

RUBUS HISPIDUS, L., when no longer confused with *R. setosus* is a well-marked species. It seems to be widely distributed in New England. Some authorities describe the fruit as red or purple; but I find it when ripe to be as black as that of its fellow species. The old verbal paradox still holds good, that blackberries are *green* when they are red.

The following synopsis of the blackberries of New England has been carefully prepared, in the hope that it may prove of service in determining the species:—

- I. BLACKBERRY PROPER. Canes erect or ascending. (Sometimes prostrate in *R. setosus*.)
 - A. Plants tall, usually over three feet.
 1. Armed with stout prickles.
 - a. Canes long and curving; new growth glandular pubescent; racemes long, leafless, with divergent pedicels; fruit oblong. *R. nigrobaccus*.
 - b. Fruit long, narrow, tapering; drupelets numerous and small; branches reddish; gland-tipped hairs abundant. *R. allegheniensis*.
 - c. Canes strict, shorter; new growth finely pubescent, slightly if at all glandular; racemes shorter, often with leafy bracts at base of lower pedicels; fruit roundish; petals broad. *R. argutus*.
 2. Prickles wanting, or if present few and small; leaflets glabrous, on new canes long acuminate. *R. canadensis*.
 - B. Plants low, usually less than three feet.
 1. Prickles stout and numerous; leaves white beneath. *R. cuneifolius*.
 2. Prickles slender; leaves green beneath.
 - a. Prickles short, few or wanting.
 - (1) Racemes very short, few-flowered, leafy; pedicels and leaves beneath softly pubescent; leaflets broad, terminal one on new canes often orbicular, slightly cordate at base, abruptly pointed. *R. sativus*.
 - (2) Racemes loosely few-flowered, leafy; lower pedicels remote, long and ascending; leaflets glabrous with irregular teeth. *R. nigrobaccus* × *villosus*.
 - (3) Racemes short; usually with a rather large simple leaf at base; leaflets glabrous or pubescent, with sharp and unequal teeth, on new canes ovate, acuminate. *R. argutus* var. *Randii*.
 - b. Usually beset with slightly retrorse bristles, yellowish when young; leaflets glabrous, acute, from ovate to narrowly obovate. *R. setosus*.

- II. DEWBERRY. Stems trailing, but in the first three species occasionally erect, recurving to the ground if elongate.
- A. Leaflets oval or ovate, acute or pointed, dull, usually somewhat pubescent beneath; pedicels long and ascending; prickles stiff.
1. Branches few- to several-flowered.
- a. Leaflets large, thin, coarsely and simply toothed, terminal one usually rounded at the base; flowers and fruit large; stems stout with tall branches. *R. invisus.*
- b. Leaflets firm, sharply and somewhat doubly toothed; plant every way smaller. *R. villosus.*
2. Branches 1-flowered (sometimes 2-flowered); leaflets thin; stems slender, with few minute prickles. *R. Enslenii.*
- B. Leaflets obovate, blunt, glabrous, shining; pedicels in flower short, divergent; flowers and fruit small; stems slender, with small, weak bristles. *R. hispidus.*
- (Trailing forms of *R. setosus* may be looked for here and may be separated by the acute, dull leaves and larger flowers.)

THE RELATION OF CERTAIN PLANTS TO ATMOSPHERIC MOISTURE.

ROBERT G. LEAVITT.

ORCHIDS. In making some tests of absorption by orchids, in the interests of the scientific side of practical gardening, I was surprised to find little or none of the power of condensing water-vapor which is popularly ascribed to the aërial roots of epiphytes. Not the public alone, but gardeners universally, and botanists pretty generally, regard air-plants as capable of "feeding upon the air." The highest authority, too, may be cited in support of such an opinion. Thus Sachs¹ says, "The walls [of the velamen] are capable of imbibing, and are able to absorb, not only rain and dew but even the vapor of the atmosphere." Kerner,² the popularity of whose Natural History of Plants gives his opinions wide vogue, is explicit in the assertion that "the power of condensing aqueous vapor, and other gases as well, is of the greatest importance to these plants." He repeats and amplifies this at considerable length.

The doctrine of vapor-absorption goes back to the experimental work of Unger³ (1854) and Leitgeb⁴ (1864). The contrary view was expressed, after experimentation, by Duchartre⁵ (1856). He says that "the leaves do not breathe in the vapor of water diffused in

¹ Phys. of Plants, Eng. Tr., 1887, p. 25. ² Natural History of Plants, Vol. I., p. 222.

³ Physiologie der Gewächse, 1855, p. 307. ⁴ Denkschr. d. Wiener Akad., 1864, p. 215.

⁵ Quoted, Bull. de la Soc. Bot. de Fr., 1895, s. 3, t. II, p. 99.



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