

TRANSACTIONS
OF THE
Nova Scotian Institute of Science

SESSION OF 1916-1917.

(Vol. XIV Part 3)

A NEW EVENING PRIMROSE. *Oenothera Novae-Scotiae*.
— BY REGINALD RUGGLES GATES, Ph. D., F. L. S., some-
time Lecturer in Biology and Cytology in the University of
London, and Acting Associate Professor of Zoology in the
University of California.

(Read 13 November 1916)

The number of species of *Oenothera* was, until recently, supposed to be very limited. Although pre-Linnaean botanists described briefly a number of forms which they grew in their gardens, introduced from North America, yet Linnaeus recognized at first only one species, which he afterwards called *Oe. biennis*. He later described several other species, but the name *Oe. biennis* came to be applied generally to nearly all the forms in Eastern North America, and to those which had been naturalized in Europe as well.

The investigations of de Vries on mutation in *Oe. Lamarckiana* aroused new interest in the genus, and in recent years an intensive study of the group has produced a voluminous literature and has led incidentally to the recognition of a large number of forms which formerly passed under the name

*Oe. biennis*¹. It is certain that a great many more clearly-defined species remain to be described from the North American continent. But the characters of these plants are so numerous and they are so often imperfectly expressed in the wild condition, that adequate studies and descriptions can only be made from the plants by cultivating them, in which condition their characters are fully expressed. Many studies of this kind are now being made, with the result that our knowledge of the genus *Oenothera*, the distribution, variability and characters of the species, is rapidly becoming more accurate and detailed.

The majority of the forms occupying the middle and eastern part of the continent agree with *Oe. biennis* L. in having petals about 20-25 mm. in length, though forms with larger and smaller flowers also occur. North of this area, in a zone extending in a general sense from Maine and Nova Scotia to Manitoba and passing through northern Ontario, occur forms having smaller flowers. Certain of these forms, related to *Oe. muricata* L., have been briefly characterized elsewhere.² Here I wish to describe a species from Nova Scotia having small flowers as in *Oe. muricata* but clearly requiring delimitation as a distinct form. The description is as follows:

Oenothera Novae-Scotiae sp. nov.

Diameter of mature rosette (maximum) 48 cm., leaves smooth or slightly crinkled, elliptical or oblanceolate to nearly spatulate, relatively broad and rather broad pointed, about 25 cm. long and 56 mm. greatest width, margin obscurely repand-denticulate, narrowed below to petiole, midrib usually pink above and more or less pink beneath, leaf finely puberulent on both faces (Fig. 1).

¹ For a resumé of these forms and their taxonomic history, see Gates, *The Mutation Factor in Evolution*, with particular reference to *Oenothera*, chap. ii. MacMillan, 1915.

² *Op. cit.*, pp. 23-26.

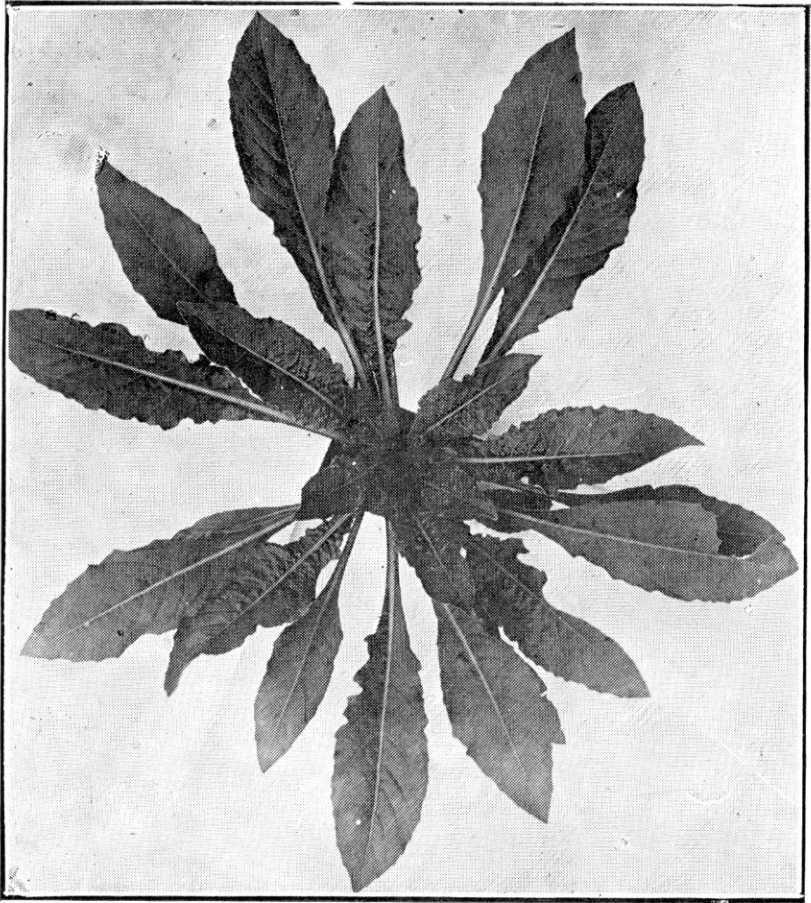


Fig 1. Rosette of *Oenothera Novae-Scoliae*.



Fig 2. *Oenothera Novae-Scotiae* in bloom.

Mature plant (Fig. 2) about 3 ft. high, branching from near the base or from higher up, lower branches with a collar at their base, stem and branches reddish (usually bright red) to near the top, also bearing numerous long hairs arising from red papillæ. Stem-leaves about 15 cm. long and 35-40 mm. broad, finely puberulent, tapering at both ends, short-petioled, broad, margin repand-denticulate, midribs pink above, and also below except near the base. Bracts more or less curled, very short petioled, lanceolate with rounded base and acute, narrow point.

Flowers small, buds green, cone 15 mm. long, squarish, sepal tips terminal, approximate, spreading at the extreme ends, petals 15 x 15 mm. (minimum length of petals at end of season 8 mm.), hypanthium 40 mm. long, 2.5 mm. thick, ovary 16 mm. long, bud cone and hypanthium bearing very scattered long hairs and numerous short ones; ovary reddish and with numerous rather small hairs of the longer type arising from red papillæ. Petals obovate to truncate, lemon yellow, opening out flat and half-closing to a vertical position next day, not overlapping but with spaces between the petals, style short, surrounded by the anthers, stigma lobes stout, reaching 10 mm. in length; capsules green with scattered small red papillæ bearing hairs, cylindrical, tapering near the top, about 4 cm. long.

Diagnosis:

Folia radicalia plana aut leviter corrugata, elliptica, oblanceolata aut subspatulata, modice lata, circa 25 cm. longa et 56 mm. maxima latitudine margine repando-denticulato, utrinque subtiliter puberula, angustata ad petiolos, costis fere utrinque puniceis. Caulis et rami subrufi, multis longis pilis rubro-tuberculatis instructi. Folia caulina untrinque acuta, breviter petiolata, circa 15 cm. longa et 35-40 mm. lata, bracteæ plus aut minus crispæ. Spica densa. Petala flava, circa 15 mm. longa et 15 mm. lata; hypanthium 40 mm. longum; ovarium 16 mm. longum; antheræ stigmata attin-

gentes. Alabastræ rarissimis longis et multis brevis pilis instructæ, obsolete quadrangulares; apices sepalorum, terminales, approximati.

The main distinctive features of this segregate from *Oe. muricata* are (1) the broad, nearly smooth leaves of the rosette having relatively narrow, pale pink midribs, (2) the red stems with leaves tapering at both ends and bracts somewhat curled, (3) the green buds and small flowers.

The plants from which this species is described were grown at the University of California in 1916 from seeds collected on the North Mountain road above the reservoir near Middleton, Annapolis County, Nova Scotia, in September 1914. A type specimen is preserved in the Herbarium of the University of California, No. 193440.

As a part of my cultures in 1916, one thousand seeds of this species were germinated by placing them between blotters in a germinating incubator. The air in their seed coats had previously been replaced with water by putting the seeds in water under a bell jar and exhausting the air with an air-pump. In one month 836 of the seeds in the blotters had germinated, or 83.6%. Examination of the remaining seeds showed that 127 of them, or 12.7% of the whole number, were empty or contained quite small embryos. Thus almost complete germination was obtained. Of the seedlings which germinated, 424 were planted in soil in a greenhouse, and 370 of these were afterwards transplanted outdoors and grown to maturity. They were a very uniform lot, showing very little variability. A few, however, differed in having smaller rosettes with white midribs, and some of these produced dwarfed plants. It is probable that these dwarfed individuals received less water under the conditions of irrigation, and that they were therefore not genetic dwarfs. This point will be tested another year by growing their seeds. The only other variations noted were in width of leaves and in smoothness or slight crinkling of the leaves.

There is no evidence that the 12.7% of empty or nearly empty seeds represented a class of zygotes which was being eliminated, although it is possible this may have been so. The pollen was also examined at the end of the blooming season, and three flowers from as many different plants gave respectively 41.7%, 25.9% and 29.5% of bad pollen. Occasional 4-lobed grains (as in *Oe. gigas*) were also observed. Thus we find again a wild species producing a considerable amount of sterile pollen and non-viable seeds. Yet the flowers are close-pollinated and there is no reasonable basis for assuming this sterility to be the result of crossing.

The distribution of this species remains to be determined. It probably occurs widely in western Nova Scotia, but many species of *Oenothera* are found to be quite local in distribution. Another form in the *muricata* series, from Middleton, has been figured elsewhere³.

In conclusion, the writer would be grateful for *Oenothera* seeds sent him from any part of Canada. Seeds should always be collected from individual plants separately, and should be accompanied by notes on the exact location and habitat. It is desirable to collect seeds separately from several individuals in a locality, to obtain a knowledge of the range of variation. By this means it will be possible ultimately to reach a thorough understanding of the variability and evolution of this remarkable genus from the systematic point of view.

A portion of the expenses of these cultures was defrayed by a grant from the Elizabeth Thompson Science Fund.

New York Botanical Garden.

³ *Op. cit.*, p. 23, figs. 4, 5.