

**Title: Unusual Form of the Annual *Collinsia verna* Nutt. (Blue-eyed Mary) Observed in Will County, Illinois**

**Running head: Unusual Form of *Collinsia verna***

Article type: field note

Michael Ostrowski<sup>1\*</sup> and Mark Kluge<sup>2</sup>

<sup>1</sup>Lake Forest College, 1672 Cabot Lane, Glenview IL, 60026

<sup>2</sup>Northeast Chapter of the Illinois Native Plant Society

\*[ostrowskimr@mx.lakeforest.edu](mailto:ostrowskimr@mx.lakeforest.edu)

ABSTRACT

Many typically blue or pink flowered plant species have been observed to have rare white forms. A white form of *Collinsia verna* Nutt., which typically has a bi-colored blue and white flower, was recently observed in Will County, Illinois. This paper documents this unusual form, discusses its rarity, and examines previous historical descriptions of the species.

**Keywords:** taxonomy, white-flowered, coloration

**Botanical Nomenclature:** Wilhelm and Rericha (2017)

INTRODUCTION

*Collinsia verna* Nutt. is a distinctive annual species in the *Plantaginaceae*, easily recognized by its whorled inflorescence and bicolored corolla. Specifically, the upper lip

This article has undergone peer review and has been accepted for publication but has not gone through copyediting, typesetting, or pagination so there will be differences with print version. Until then, please cite this article as: Ostrowski, M. and M. Kluge. 2021. Unusual form of the annual *Collinsia verna* Nutt. (blue-eyed Mary) observed in Will County, Illinois. *Erigenia*. Accepted author manuscript. <https://illinoisplants.org/erigenia/issues/>

is cleft into two large rounded lobes that are white, while the lower lip is cleft into three lobes (Figure 1). The two rounded outer lobes of the lower lip are light blue to blue-violet, while the middle lobe is folded into a keel and hidden from view (Illinois Wildflowers 2021).

## RESULTS

### **Observation of Unusual White-Flowered Form of *Collinsia verna***

On April 22, 2021, in Homer Glen, Will County, Illinois, five individuals of *Collinsia verna* were observed to have a corolla with the lower lobes having the same white coloration as the upper lobes (Figure 2). These five specimens were growing within a population of several hundred of the typical blue lower lip form. The upper lip of the aberrant form still exhibited the orange-pink speckling that is typical of *Collinsia verna*. The authors examined the population carefully for other examples or any intermediate forms; no intermediate form was present in the area.

This population was found growing in close proximity (approximately 15 meters) to a small, dry streambed that feeds into a nearby creek. The habitat is open mesic oak woodland with scattered maples, located within a dedicated Illinois Nature Preserve. The topography is rolling with ravines separating upland areas. The soil in the uplands is Ozaukee Silt Loam, a common morainal till component in northeast Illinois. Within the creek floodplain the soil is Pella Silty

Clay Loam, typical of ground moraines and outwash plains (Hanson 2002). The observed plants were growing on a gentle slope in the transition from the upland to the floodplain, thus in one of these two soil types.

Associates of *Collinsia verna* at the observation site included *Asarum canadense*, *Dicentra cucullaria*, *Enemion biternatum*, *Erythronium albidum*, *Floerkea proserpinacoides*, *Galium aparine*, *Geranium maculatum*, *Mertensia virginica*, *Polygonatum biflorum*, *Trillium recurvatum*, *Viola pubescens*, and *Viola sororia*. *Mertensia virginica* is a dominant component of the floodplain flora. Since the white colored form of *Collinsia verna* was growing within a substantial population of the typical form, there was no distinction of associates observed between the forms.

White forms of customarily blue or pink flowered species have long been discussed in the literature (Moore 1941; Waser 1981). More recently, Wilhelm and Rericha (2017) have detailed several white-flowered forms of native species such as *Liatris aspera* f. *benkii*, *Monarda fistulosa* f. *albescens*, and *Phlox divaricata* f. *albiflora*, in the Chicago region. However, the authors could find no recent reference in the recent literature that acknowledged the existence of a white-flowered form of *Collinsia verna*. The historical literature is discussed below.

### Historical Descriptions

*Collinsia verna* was first described by Nuttall as the type for the genus (Nuttall 1817). Nuttall first observed the species in 1810 but then lost the specimens. During an 1816 trip he

again found the species near Gallipolis, Ohio and collected its seed. This facilitated propagating the plant in order to provide a detailed description of the species.

Rafinesque (1824) proposed to rename the type as *Collinsia bicolor*, described several new forms, and also proposed two new species: *Collinsia alba* and *Collinsia purpurea*. None of these proposals of taxonomy gained any traction within the botanical community as the standard references maintained Nuttall's name (e.g., Gray 1856; Robinson and Fernald 1908). For the purposes of this paper, only Rafinesque's *Collinsia alba* is of interest. Rafinesque described the plant he found between Letart Falls and the mouth of the Kanawha River - today in Mason County, West Virginia. The pertinent features of this plant were large flowers, totally white, and small leaves.

The difficulty in assessing Rafinesque's descriptions is that few of his specimens survive. His personal herbarium of a reported 50,000 specimens was partly destroyed by rats. Nearly all of the remaining specimens were later discarded by Elias Durand who eventually purchased the collection (Merrill 1949). Pennell (1944) recounted that, of sixty new species described by Rafinesque in the Scrophulariaceae (in which *Collinsia* was formerly classified), only eight specimens survived. No specimen of Rafinesque's *Collinsia alba* is extant, so its precise relationship to the plants observed in Will County must include an element of uncertainty. Pennell (1935) stated that it "was evidently a depauperate, wholly white-flowered form of *C. verna* Nutt." The plants observed in Will County were not at all depauperate, and other than the

white corollas, had the habit and proportions of the typical form.

Newsom's (1929) comprehensive treatment of the genus *Collinsia* relegated all of Rafinesque's designations to synonymy. Newsom further stated, "Variations in corolla color I am entirely disregarding, because if such were considered, innumerable varieties would have to be made." Pennell (1935) echoed the treatment of Rafinesque's *Collinsia alba* as a synonym. This philosophy has held through all modern treatments of *Collinsia verna* (e.g., POWO 2021).

## DISCUSSION

The lack of attention in the literature concerning all-white forms of *Collinsia verna* can be partly attributed to the form's apparent rarity. It may be postulated that the white form results from a combination of recessive alleles. *Collinsia verna* reproduces by a combination of outcrossing and selfing (Kalisz 1989). It is known that insect pollinators discriminate against white phenotypes when white flowers are rare in populations (Waser and Price 1983; Clegg and Durbin 2000). There is research that indicates a lack of pollination drives delayed selfing in *Collinsia verna* (Kalisz et. al. 1999). It would seem that selfing would mitigate pollinator discrimination against the white form, but confirming this will require long term observations. It is not clear what other reproductive factors may contribute to the observed rarity of this form within a large population of the typical species.

Future investigation will include determining if examples of the white form will persist at

this site in the following growing season. It proved impractical to obtain a collecting permit before the plants senesced in 2021. The authors will pursue the future collection of a specimen for deposit in the Morton Arboretum herbarium (MOR), should the white form reappear in 2022.

#### ACKNOWLEDGEMENT

Assistance with the manuscript provided by Kathleen Marie Garness. Two anonymous reviewers provided helpful suggestions to improve the manuscript.

#### LITERATURE CITED

Clegg, M.T. and M.I. Durbin. 2000. Flower color variation: A model for the experimental study of evolution. *Proceedings of the National Academy of Sciences* 97:7016-7023.

Gray, A. 1856. Manual of the Botany of the Northern United States, Including Virginia, Kentucky, and All East of the Mississippi: Arranged According to the Natural System. George P. Putnam & Co., New York.

Hanson, K.D. 2002. Soil Survey of Will County, Illinois. Natural Resources Conservation Service. [https://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/illinois/IL197/0/will\\_IL.pdf](https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/illinois/IL197/0/will_IL.pdf) Retrieved 19 August 2021

Illinois Wildflowers. 2021. Blue-Eyed Mary - *Collinsia verna*. [https://www.illinoiswildflowers.info/woodland/plants/be\\_mary.htm](https://www.illinoiswildflowers.info/woodland/plants/be_mary.htm). Retrieved 2 May 2021

Kalisz, S. 1989. Fitness consequences of mating system, seed weight, and emergence date in a

winter annual, *Collinsia verna*. *Evolution* 43:1263-1272.

Kalisz, S., D. Vogler, B. Fails, M. Finer, E. Shepard, T. Herman, and R. Gonzales. 1999. The Mechanism of delayed selfing in *Collinsia verna*. *American Journal of Botany* 86:1239-1247.

Merrill, E.D. 1949. Index Rafinesquianus. The Arnold Arboretum of Harvard University, Jamaican Plain, Massachusetts.

Moore, D.M. 1941. White-flowered forms of some Arkansas wild flowers. *Journal of the Arkansas Academy of Science* 1:25-27.

Newsom, V.M. 1929. A revision of the genus *Collinsia* (Scrophulariaceae). *Botanical Gazette* 87:260-301.

Nuttall, T. 1817. Description of *Collinsia*, a new genus of plants. *Journal of the Academy of Sciences of Philadelphia* 1:189-92 and Plate IX.

Pennell, F.W. 1935. The Scrophulariaceae of Eastern Temperate North America. Monograph Number 1. The Academy of Natural Sciences of Philadelphia.

Pennell, F.W. 1944. How Durand acquired Rafinesque's herbarium. *Bartonia* 23:43-46.

POWO: *Collinsia verna*. 2021. <http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:801656-1> Retrieved 20 August 2021.

Rafinesque, C.S. 1824. On the genus *Collinsia*, and two new species of it. *The Cincinnati Literary Gazette* 1:84-85.

Robinson, B.L. and M.L. Fernald. 1908. Gray's New Manual of Botany: A Handbook of the Flowering Plants and Ferns of the Central and Northeastern United States and Adjacent Canada. Seventh Edition. American Book Company, New York.

Spigler, R.B. and S. Kalisz. 2013. Phenotypic plasticity in mating-system traits in the annual *Collinsia verna*. *Botany* 91: 597-604.

Waser, N.M. and M.V. Price. 1981. Pollinator choice and stabilizing selection for flower color in *Delphinium nelsonii*. *Evolution* 35:376-390.

Wilhelm, G. and L. Rericha. 2017. Flora of the Chicago Region: A Floristic and Ecological Synthesis. Indiana Academy of Science, Indianapolis.



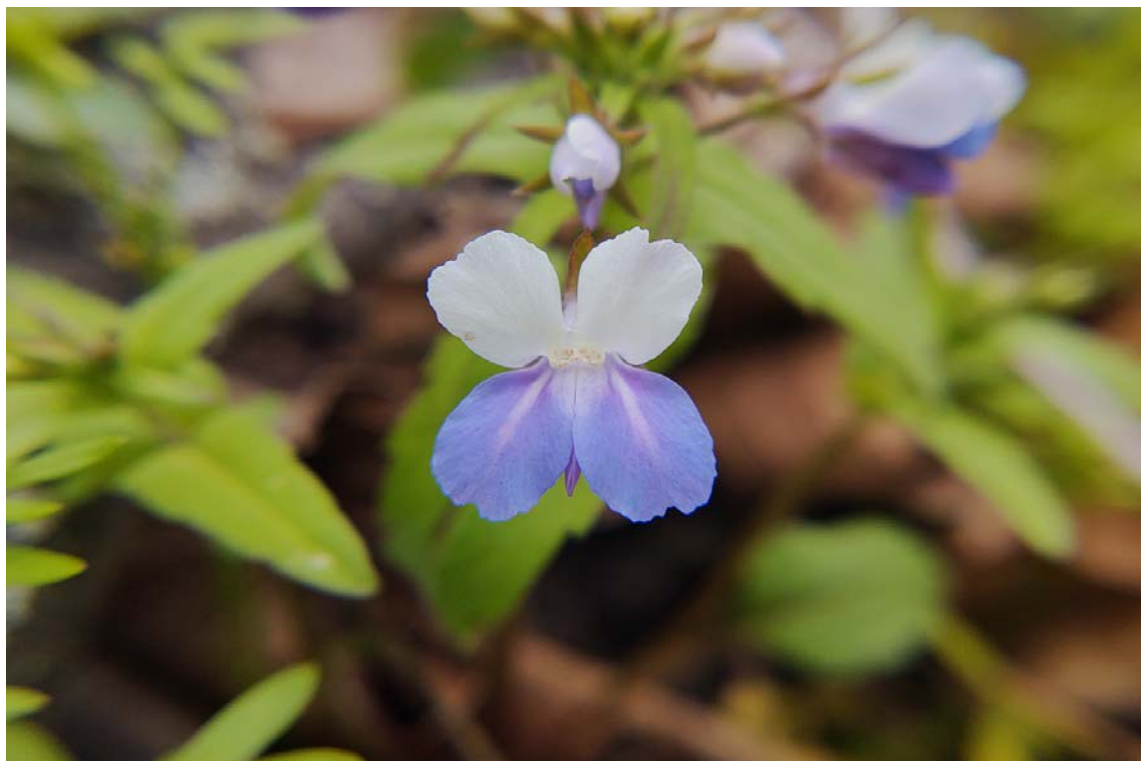


Figure 1. Typical Form of *Collinsia verna* (photograph by Michael Ostrowski).



Figure 2. Aberrant white form of *Collinsia verna* observed in Will County, IL (photograph by Mark Kluge).