

COLOR OF OHIO FLOWERS.

CLARA G. MARK.

From earliest times the flowering plants have received a great degree of attention, which no doubt is attributable for the most part to their varied and often brilliant colors. There have been many curious beliefs and theories with regard to the coloring of flowers, both as to its cause and as to its significance. Of these theories the one that has been most generally accepted in modern times is that the color of flowers is a device to attract animals, particularly insects, which may serve to carry pollen from one flower or plant to another. That insects are sometimes attracted by color has been proved; but it has been demonstrated that a color sense is almost wholly lacking except in the higher insects, and when present has been developed in comparatively recent times. This precludes the idea of color attraction in so far as at least a part of the pollen-carrying insects are concerned, and it gives weight to the probability that a majority of such insects are attracted by the form and odor of flowers rather than by their color. It follows that while the attraction of pollen-carrying insects may be in some cases one of the incidental results of the coloring of flowers, it can hardly be said to be the primary purpose of such coloring. The supposition at the present time is that the purpose of the coloring in the flower is to increase the temperature to a greater or less degree and so stimulate the activity of the protoplasm; also the colored parts of the flower may serve as a screen to protect the more delicate reproductive parts from the action of the direct rays of the sun.

The two principal classes of pigments occurring in flowers are the lipochromes and the anthocyanins. The lipochromes vary through the different tints of yellow, orange and dull red and occur in the flowers as crystalloids. The anthocyanins form a series of substances varying from red to blue and violet and are always found in solution in the cell sap. The color of a flower may be due to the presence of one or both of these classes of pigments. It has been found by experiments that flowers of different colors show a marked difference in temperature when exposed to the same conditions of light, moisture, etc.

In studying the Ohio angiosperms with regard to the coloring of the flowers, they were first divided into two general groups: First, those without typical floral parts, such as grasses and sedges; second, those with typical floral parts. This second group was again separated into two divisions: First, those in which the flower or flower cluster is so large as to be conspicuous; second, those in which the flower or flower cluster is inconspicuous. Record was kept in a general way of the seasons of

blooming as spring, summer and fall. In many cases the period of blooming extends through two seasons and often through all three. A few plants, such as *Taraxacum*, were found to be in bloom practically throughout the entire year. In keeping a record of the various colors, for the sake of convenience nine general headings were used. These are white, violet, purple, blue, green, yellow, orange, red and pink. Many of the species studied produce flowers of more than one color, though in most cases the variation is confined to different shades or tints of the same color. In many of the species that typically produce bright colored flowers occasional white flowers are found. Examples of this are *Mertensia* and the Giant *Habenaria*, the flowers of the former being typically blue and those of the latter violet. No note was taken of these occasional white flowers, as they were thought to have been caused by exceptional conditions.

About two thousand angiosperms were examined, which includes practically all in the Ohio flora. Of these about five hundred were discarded, being grasses, sedges, etc., without typical flowers. The remaining fifteen hundred are divided among the different colors as follows: white, 538, or 35.86% of 1500; violet, 170, or 11.33%; purple, 193, or 12.86%; blue, 136, or 9.06%; green, 160, or 10.66%; yellow, 380, or 25.33%; orange, 21, or 1.4%; red, 70, or 4.66%; pink, 160, or 10.66%.

Of the fifteen hundred plants with typical flowers, 1040 have conspicuous flowers and the remaining 460 inconspicuous. Eight hundred and three of the species with conspicuous flowers are native and 237 introduced; of the inconspicuous 350 are native and 110 introduced.

With regard to color the record for these two divisions is as follows:

Color	CONSPICUOUS—1040			INCONSPICUOUS—460		
	Number	% of 1500	% of 1040	Number	% of 1500	% of 460
White.....	383	25.53	36.826	155	10.33	33.7
Violet.....	127	8.46	12.211	43	2.86	9.12
Purple.....	144	9.6	13.846	49	3.26	10.65
Blue.....	98	6.53	9.423	38	2.53	8.26
Green.....	47	3.13	4.519	113	7.53	24.565
Yellow.....	291	19.4	27.98	89	5.93	19.34
Orange.....	21	1.4	2.019	0	0	0
Red.....	59	3.93	5.673	11	.73	2.39
Pink.....	128	8.53	12.307	32	2.13	6.95

It will be seen from this table that the percentage of green flowers among the inconspicuous is much higher than among the conspicuous, while the percentage of flowers of each of the other colors falls a little below the percentage of those of the same color among the conspicuous flowers.

In the following tables the principal division is made with regard to the time of blooming, the three seasons, spring, summer and fall, being used. While a few species are found in bloom in the winter it was not considered necessary to keep a record of them.

SPRING.

	Con- spicuous	Incon- spicuous	Total	% of 1500	% of 605
All Colors	416	189	605	40.33	100
White.....	179	69	248	16.53	40.99
Violet.....	42	7	49	3.26	8.09
Purple.....	52	13	65	4.33	10.74
Blue.....	48	17	65	4.33	10.74
Green.....	22	52	74	4.93	12.23
Yellow.....	96	30	126	8.4	20.82
Orange.....	7	0	7	.46	1.15
Red.....	17	6	23	1.53	3.80
Pink.....	43	9	52	3.46	8.59

SUMMER

	Con- spicuous	Incon- spicuous	Total	% of 1500	% of 1156
All Colors	776	380	1156	77.06	100
White.....	259	121	380	25.33	32.87
Violet.....	93	43	136	9.06	11.76
Purple.....	114	47	161	10.73	13.92
Blue.....	67	34	101	6.07	8.73
Green.....	27	82	109	7.20	9.42
Yellow.....	232	74	306	20.4	26.47
Orange.....	18	0	18	1.2	1.55
Red.....	50	9	59	3.93	5.10
Pink.....	94	21	115	7.66	9.94

FALL

	Con- spicuous	Incon- spicuous	Total	% of 1500	% of 627
All Colors	401	226	627	41.8	100
White.....	125	59	184	12.26	29.34
Violet.....	61	37	98	6.53	12.44
Purple.....	59	29	88	5.86	14.03
Blue.....	43	23	66	4.4	10.53
Green.....	9	50	59	3.93	9.409
Yellow.....	141	43	184	12.26	29.34
Orange.....	9	0	9	.6	1.43
Red.....	20	8	28	1.86	4.46
Pink.....	33	12	45	3.	7.16

If the percentages of the different colors for each season are examined it will be seen that the percentages of white and green flowers are greatest in the spring and least in the fall, while the percentages of violet, purple and yellow flowers are least in the spring and greatest in the fall.