THE REGULATION OF PETAL NUMBER

IN 1955-56, I examined 76,753 flowers from three plants of *Nyctanthes arbor-tristis*. The gamopetalous flowers are shed nightly and daily collections were made from 26-9-1955 to 11-1-1956. The number of petals varied from 4 to 9 with a high mode at 6. The totals for the three trees are given in Table I.

TABLE I

Total number of flowers with different numbers of petals for three trees

Petal number	4	5	6	7	8	9
Number of Flowers	134	10,975	55,732	9,431	471	8

The mean petal numbers for the three trees were $5 \cdot 924 \pm \cdot 0030$, $6 \cdot 050 \pm \cdot 0030$, and $5 \cdot 984 \pm \cdot 0050$. The second differs significantly from the others. It will be seen that 72·6% of all the flowers had the "standard" number of 6 petals. In most earlier work on variation of petal number[3,4,5,11] only a minority of flowers had the modal number. Here we clearly have a condition intermediate between the variable sepal number found in *Anemone nemorosa*[4,6] for example, and the selection where thousands of flowers must be examined before a deviation from the standard is found. My data are superficially comparable with those of Browne[2] who found that 77·1% of a thousand jellyfish *Aurelia aurita* had the modal number of 8 tentaculocysts. However he was studying a population, whilst I was studying individual plants.

There is clearly a strong but not overwhelming tendency to produce the normal number of six petals. It is reasonable to tabulate the percentage of "abnormal" flowers, *i.e.*, those with a petal number other than six. This is closely related to the standard deviation, but is easier to calculate, and its sampling error does not involve the calculation of the fourth moment. The percentages of abnormality for the three plants were $25 \cdot 37 \pm 0 \cdot 25$, $26 \cdot 48 \pm 0 \cdot 24$, and $33 \cdot 69 \pm 0 \cdot 40$. That is to say, regulation was far looser in the third.

The mean petal numbers altered significantly, being lowest about the end of November. And the trend was marked. On the other hand, the percentages of abnormality increased with time which in the first five and the last sixteen days were as given in Table II. The number of flowers produced per day during the end of the season was much less than that in the earlier part of the season. And the reason for considering five days initially and sixteen days at the end was to reduce difference in the sample size of the two groups which were compared.

TABLE II

Percentages of abnormality in the first five and last sixteen days

Plant	1	2	3
First 5 days	$20 \cdot 93 \pm 0 \cdot 99$	$23 \cdot 48 \pm 1 \cdot 44$	$28 \cdot 02 \pm 1 \cdot 76$
Last 16 days	$30 \cdot 75 \pm 2 \cdot 16$	$37 \cdot 24 \pm 2 \cdot 44$	$37 \cdot 61 \pm 2 \cdot 30$

It will be seen that the regulation was greatly reduced in each case.

These data open up a nearly new field of research, since previous workers have seldom counted enough organs on the same plant to

establish differences in the variation between different plants, still less with time. This applies to the work of Pearson[11] and his colleagues on homotyposis. Perhaps the most comparable results are those of Price-Jones[12] on diameters of human red blood corpuscles. Here the coefficients of variation differed between normal individuals and were greatly increased in pernicious anæmia. Attfield[1] subsequently observed significant increase in variance of the diameters of red blood corpuscles of mice in anæmia.

There are, of course, a number of more or less comparable data on the variation between individual members of different clones of Protozoa[10] and of pure lines of mice[6,9] and the like.[7,8,13,14] The regularity with which members of a genotype develop has been described as the effect of developmental homœostasis. Here it can be studied on a very large scale.

The work is being extended to the study of other individual plants and other characters. For a character as well regulated as petal number very large samples are needed. Samples of 500 flowers or less would not reveal differences of the order found. Since most work of this kind has been done on herbs, no comparable observations are on record.

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