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## A Monarch Butterfly Roosting Tree in Iowa

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Monarch butterflies, *Danaus plexippus*, yearly roost by the thousands in certain trees during their southward autumn migration. A study of a roosting tree in Manning, Iowa, suggests that monarchs originally chose the tree for the characteristics of its maple

leaves and its physical location and proximity to nectar-producing flowers. It is thought that later generations of monarchs were drawn to the tree by a combination of a residual sex attractant odor and favorable wind conditions.

INDEX DESCRIPTORS: Monarch Butterflies, Monarch Migration, *Danaus plexippus*.

The monarch butterfly, *Danaus plexippus*, is known for its spectacular autumn migration. This southward, daytime migration appears to be initiated by decreasing hours of daylight and sudden changes in temperature, the critical temperature being approximately 55° F (Urquart, 1960). Monarchs use long distance orientation by the sun (letter dated February 28, 1974, from F. A. Urquart, Scarborough College, University of Toronto, West Hill, Ontario). When evening approaches the monarchs congregate by the thousands year after year on certain large "roosting" trees. In the spring flight, however, the monarchs straggle northward, and come to rest on small bushes, not banding together in roosts. In this paper a known roosting tree in Iowa is described, and the paucity of information on such trees in the midwest is called to attention.

In Iowa the autumn congregations of monarchs have been reported in Keokuk and Riverside (personal communication, March 5, 1974, from Dr. H. Dingle, Department of Zoology, The University of Iowa, Iowa City, Iowa), but this occurrence is very irregular. A survey of literature suggests that there is only one tree known in Iowa where monarchs roost year after year with regularity. This is a silver maple, *Acer saccharinum*, found on a residential lot in the Carroll County town of Manning, population 1,800, one hundred miles northwest of Des Moines. A group of approximately 1,000 monarchs makes a brief stop and fills the lower branches of the maple yearly in mid-September. This phenomenon has occurred for at least the last 50 years (letter dated February 16, 1974, from F. J. McMahon, R.R. 4, Independence, Iowa). To attempt to explain this phenomenon, one must ask why the Manning tree was originally chosen by the monarchs for a roosting site, and why they return to it annually.

### THE ROOSTING SITE

It has been repeatedly observed that pine, willow and maple trees are chosen for roosting sites (Urquart, 1960). The deeply notched maple leaves allow the monarch to cling to them easily and securely. The monarch's tarsal segments do not have adhesive pads, so they are unable to cling to the plane surface of the leaves; they suspend from the leaves, legs up and wings down, hanging firmly by their sharply pointed, sickle-shaped tarsal claws.

The physical location of the Manning tree may be another factor that influenced the initial choice of the roosting site. Before 1900 the area was a pasture (personal communica-

tion, March 23, 1974, from E. Mueller, Manning, Iowa), and the maple was surrounded by a cluster of other trees—oaks, chestnuts and elms—that possibly served to shelter the maple from harsh winds.

Another factor, according to F. A. Urquart (letter dated February 28, 1974, from F. A. Urquart, Scarborough College, University of Toronto, West Hill, Ontario), is the presence of fields containing an abundant supply of nectar-producing flowers, such as goldenrod, *Solidago nemoralis*, and New England aster, *Aster novaeangliae*. The pasture land surrounding the Manning tree contained an ample supply of goldenrod.

### ODOR ATTRACTANTS AND WIND CONDITIONS

Monarch butterflies migrate southward only once. So, once a tree is chosen as a roosting site, what guides successive generations of butterflies to the identical tree? J. A. Simes (Teale, 1951) suggests the scent glands of the male monarch as a clue to the mystery. The Danaide family of butterflies is notorious for its scent-producing organs. Insects that have been dead for years have been known to exude scent (Teale, 1951). Male monarchs have these glands on the anal region which give off a very sweet flower-like aroma used to attract females for mating. A clear, yellow fluid collects on the surface of the anal gland, and if a drop of it is placed at the opening of the scent receptor on either hind wing, it will be absorbed by the receptor. The scent receptors hold the scent-producing fluid and continue to discharge the aroma while the anal glands are withdrawn during mating (Urquart, 1960). At Pacific Grove, California, where tens of thousands of monarchs congregate on cypress trees in winter, visitors remark upon the unusual perfume that is apparent in the vicinity of the trees.

It is possible that the male monarchs that roost in the Manning tree leave a strong residual sex attractant odor on the branches or leaves of the tree. Such leaves, of course, would be shed; then the odor would rise from the ground. This residual odor from the branches and leaves of the tree could attract new butterflies, explaining their return to the same tree year after year.

This hypothesis of attraction receives some support from examples of the extraordinary sense of smell of other Lepidoptera. Marked moths have shown the ability to find females in the dark from a distance of eleven kilometers, or almost seven miles (Teale, 1942). A practical application of this

knowledge has helped prevent the spread of gypsy moths, *Porthetria dispar*, in the United States and Europe. Traps baited with female scent extract have been reported to lure males from one-half to two miles away (Jacobson, 1972).

The direction of the wind may be a final factor influencing the yearly return of the monarch butterflies to the same roosting tree. Insects will commonly fly upwind toward an attractive odor. Male Saturniid and Bombycid moths fly upwind to the female in this way (Wigglesworth, 1964). In the case of gypsy moths, traps situated upwind from an infestation caught more insects than those situated downwind or across-wind (Jacobson, 1972). It is probable, then, that monarchs that roost in the Manning tree are apt to be attracted to the supposed residual odor by a wind blowing toward them from the direction of the tree.

#### CONCLUSION

It can be hypothesized that monarch butterflies initially selected the Manning tree for its biological and geographical advantages; then later generations were drawn to the tree by a combination of residual attractant scent and favorable wind conditions. Whatever the cause of the choice of the tree, the monarchs come to Manning from a northern point, stay one night, then move southward. If other roosting trees were made known, hypotheses concerning the choice of roosting trees could be tested, and a more distinct migratory route of the monarch butterflies through Iowa could be established.

Is there another "butterfly tree" in Iowa? If you know of one, any of the following information would be appreciated: the location and species of the tree, the general topography of the area surrounding the tree, the approximate number of butterflies roosting in the tree, the duration of stay of the insects, and the season of occurrence, i.e., fall, winter, spring. Please send information to the author, Box 6207, 1015 5th Street, Coralville, Iowa 52241.

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