

ANNUAL

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HUB

1985



University of Toronto

Scarborough Campus

1265 Military Trail Scarborough Ontario M1C 1A4


DIVISION OF LIFE SCIENCES
INSECT MIGRATION STUDIES

Nov. 27, 1985

Dear Margaret:

I have received a letter from Mary Darning asking for your address. Since we have had a little trouble in the past handing our addresses we decided not to do so - this also applies as you may have noted in our list of associates. We therefore put the question to our associate as to whether he or she wishes to correspond. I do not know what Mary wants but if you feel so inclined her address is as follows:

Mary Darning,
1327 Zee, Court 1-A,
Wheeling, ILL 60090.


Fred A. Urquhart.



University of Toronto

Scarborough Campus

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DIVISION OF LIFE SCIENCES
INSECT MIGRATION STUDIES

Jan 9, 1985

Dear Margaret:

The article in the Muser^{is} is accurate.

Now as to the tours to see the monarchs: We were most fortunate to discover the overwintering site of the monarchs in Mexico otherwise they might have been destroyed. You see, the local inhabitants, in need of more land for cultivating corn on the hillsides were going to remove the trees. Had we not shown the mexicans what a wonderful phenomenon they possessed they would not have realized that the monarchs should be protected. Ever since we discovered the site we have worked very closely with the mexicans including the President. As a result we have a very close relationship. The best way to protect the monarchs in Mexico, as in California, is to let the local citizens realize that it is in their financial interest to protect them. This we have been able to accomplish. To allow visitors, under qualified leaders, to visit the sites (the various loci) will protect them. Prof. Brower almost spoiled the whole thing by trying to put a fence around the mountain - to buy the property which was quite impossible. This antagonized the local citizens and they were ready to destroy the butterfly loci. I stepped in and prevented this from taking place and established a good relationship with the local citizens by showing them that they would benefit by protecting them. Now it would be quite impossible for anyone to remove trees, especially when the monarchs are there in the winter. The President has joined with those wishing to protect them. So, by all means visit the locus at Anganguero - this is one of the large ones that is well protected and can be approached quite easily by truck, with a short walk. Of course, the loci vary from year to year and perhaps they may be reached easily one year and with difficulty another depending on where the clusters form on the mountain. It is a marvelous sight and I do hope that you will arrange to see it.

My book should be available this summer. No price has yet been set but I imagine that it will be in the range of \$35.00 (U.S. funds). We will let you know when it is available. Your request will be on file along with many others. * less for assoc.

I was sorry to read that it was not a good year for monarchs for you. Most of our associates had a very good summer with many thousands of monarchs tagged and some very good recaptures which we will include in our next Insect Migration Studies.

We were pleased to read that you are still busily engaged in lecturing and display projects.

Many thanks for your tagging report.

Sincerely,

Fred

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TO OUR ASSOCIATES
FROM
NORAH AND FRED URQUHART

As we read the final copy of the monarch butterfly book, now in the hands of the publisher, it occurred to us that our associates would be interested in the Preface to the book since it outlines the reasons why our studies of this amazing butterfly are so important. It will also give our associates some idea of the nature of the book which has been written and designed primarily for the teachers and students of primary and secondary schools as well as junior colleges and the lay public. Unlike the former book, this one is not intended for the professional biologist. The latter category can obtain the scientific information from the published literature and by reference to the former book.

"Why was this particular species of butterfly given the name "Monarch?" The early settlers who came to North America from Europe, with particular reference to England and Holland were impressed by the sight of such a magnificent butterfly and so they named it "Monarch" after King William, Prince of Orange, Stateholder of Holland and later King of England - its orange color no doubt suggesting the name. From "William" we get the vernacular "Billy," and hence the name "King Billy" which has also been applied to this butterfly.

I have often been asked the question: "What good is the Monarch butterfly?" To this I have responded by asking another: "What good is man to the Monarch butterfly?" From my point of view, all living creatures inhabiting our earth - of which man, in his variety of races, is but one - have an equal right to life and were not placed on earth for the aggrandizement of man nor to satisfy his egocentricity. However, the Monarch butterfly inadvertently does contribute a great deal to the welfare of the human species and therefore is an insect that is well worth our consideration and study from the following points of view:

1. The agricultural viewpoint. The larvae of the Monarch butterfly feed upon the leaves of various species of milkweed, which is considered a weed. In parts of the United States and Mexico, certain species of milkweed are considered poisonous to cattle and have been given the vernacular name of "loco weed", since they presumably cause a form of insanity among the cattle eating them. Hence, the Monarch butterfly might be considered of economic importance and one may class it as a "beneficial insect", since it helps to reduce the abundance of a potentially noxious plant.

2. The scientific viewpoint. The Monarch butterfly is used in various investigations, such as: the study of the functions of lipids (form of fat) which are the Monarch butterfly's fuel

the compound eyes of the adult Monarch butterfly, possesses physiological aspects which can be used to interpret the chemical changes in a human eye; and the manner in which Monarch butterflies can find their way across thousands of kilometers from feeding areas to overwintering sites and return is a subject of interest to students of ornithology, particularly in view of recent research in which the substance magnetite has been found in the heads of Monarch butterflies as well as in birds. Monarch butterflies are used in research projects involved in the study of environmental factors controlling growth and development. Also, disease vectors, such as the polyhedrosis virus and numerous strains of bacteria that are important in the biological control of insects are found among populations of the Monarch butterfly.

3. The educational point of view. The Monarch butterfly is an ideal insect for students in primary and secondary schools engaged in the study of entomology or basic natural science. The students learn, by direct participation, the amazing transformation involved in insect metamorphosis; and the importance of conservation can be stressed using the Monarch butterfly as an example of the destruction in an area where there is an excess use of insecticides and herbicides. As a result of such studies by students in primary and secondary schools, areas have been set aside as wildlife sanctuaries, thus protecting not only the Monarch butterfly population but also the plants and animals with which it is associated. It has been a great pleasure for me and for my wife Norah, to have worked with such school classes over the past forty-odd years. Many students, having been thus introduced to the natural sciences, have completed their studies at the university level in biology and have gone on to appointments in various institutions where biological research is carried on.

4. The monetary point of view. Each winter countless thousands of migrant Monarch butterflies collect upon the pine and eucalyptus trees in the Monterey Peninsula of California. Such masses of butterflies, which in some cases cause the branches of the trees to bend under their combined weight, attract thousands of tourists to these overwintering areas, giving rise to increased annual income to shopkeepers and motel and hotel owners. So important is this annual phenomenon to the citizens that each year children, dressed like huge Monarch butterflies, parade through the streets of Monterey in honor of the arrival of these colorful butterflies. A city ordinance was passed to insure the safety of these butterflies. A fine of \$500 or imprisonment is imposed on anyone harming them.

5. The esthetic point of view. I do not know of any species of insect that has aroused a greater interest among the populace in many parts of the world than the Monarch butterfly. Literally, thousands of published accounts have appeared in newspapers, popular magazines, naturalists' bulletins, and school papers. In addition, documentary films have been produced. The English firm, Survival Anglia, produced a film for television audiences, based on my research on the migratory habits, that has appeared in ninety-six countries of the world in several languages; Televisa of Mexico produced a similar documentary film that is shown in all Latin countries; short films have been produced for television in England and Japan. All of the above testify to the popularity

of the Monarch butterfly.

Over the past many years, Norah and I have received hundreds of letters relating the excitement of observing for the first time, the amazing transformation that takes place when a black and yellow striped wormlike larva changes miraculously into a jade coloured pupa studded with golden spots; watching the final transformation as the adult Monarch butterfly emerges from its pendantlike cell with budlike wings that eventually swell to full length as the body fluid is pumped into them and trees festooned with thousands of bright orange butterflies on the overnight roosting sites during the fall migration.

Many of our associates have taken pupae into the hospital so that patients can witness the emergence of the adult butterfly. Children, confined to hospital beds, have had a spark of pleasure light up their lives as they watched, transfixed, as a beautiful butterfly suddenly makes its appearance from an apparently lifeless pupa, a sight they would not otherwise witness.

It would take a separate book - and I have considered writing it - to relate the many experiences concerning the Monarch butterfly that have been related to us over the years, bringing much pleasure to children, adults of all walks of life, those suffering serious illness, and elderly people confined to hospitals or nursing homes. To me, this esthetic side, is one of the most important attributes of the royal Monarch butterfly.

The sight of a Monarch butterfly flying gracefully over fields of bright yellow goldenrod and purple New England asters - royal colors for a royal butterfly - has become a part of our North American heritage, a sight that is engraved in the memory of every child who has had the great privilege and pleasure to visit the lush countryside of our continent.

One of the greatest pleasures Norah and I have had in our studies of the Monarch butterfly has been receiving letters from children and adults alike expressing their delight at being introduced to the study of nature through our program of Monarch butterfly research. Many young people, who have worked with us alar tagging and reporting observations have carried their interest through the university and have received degrees in biology. Many of them now occupy positions in various universities, colleges, and government departments.

What I have written about the Monarch butterfly, with the exception of its annual migration, also applies to the life cycle of all insects that possess a complete metamorphosis consisting of egg, larva, pupa, and adult. Thus, the study of the Monarch butterfly introduces one to the realm of insect life in a most informative and interesting manner.

The Monarch butterfly is used by many teachers to introduce students into the discipline of entomology and at the same time emphasizing the important part played by insects in the "Web of life." What is most important, the students obtain a knowledge of insect life by direct contact with the living specimen, rather than studying collections of dead ones or learning about them through text books.

One of my associates, a primary school teacher, uses the Monarch not only in her natural science course but also in her geography

lessons in which the students follow the migratory routes of the Monarch butterfly in North America as well as its distribution in other parts of the world. Some of the students in her classes have written to students in other lands where the Monarch butterfly also occurs and, by means of this common interest, have established communication with them, many in different languages.

Many teachers have involved their students in tracing the flight of the Monarch butterfly by taking part in my alar tagging program as well as carrying out simple experiments. As a result, such students have received many scholarships and awards at various science fairs and have pursued an interest in biology to the university level and are now occupying teaching and research positions.

The study of the Monarch butterfly has been a source of great pleasure for me and Norah. I most sincerely trust that I have been able to convey this feeling in my book, which, I hope will add greatly to your interest and studies of this most attractive and fascinating insect."

ABOUT THE MONARCH BUTTERFLY BOOK

The book has been written in the first person as if I, the author, were speaking to you personally. Hence, it is not a science textbook, nor is it one designed for the researcher. The latter can, however, obtain scientific data from the published papers in various journals and from my former book published by the University of Toronto Press. Only a few selected references are presented in this new book.

I have divided the book into seven separate parts concerned with each section of the life cycle and anatomy of the monarch butterfly.

PART I: Milkweed. Identification and distribution of the species found in North America. A detailed description of the common milkweed, Asclepias syriaca.

PART II: Egg-Larva. Description of the larva from the time of hatching from the egg through the five instars to the final stage of suspension ready for the formation of the pupa. Included are accounts of moulting; playing possum; finding the food plant; larval population variation; petiole notching; cannibalism; individual responses.

PART III: Pupa. Formation of the pupa; removal of the larval integument; gold spots and their function.

PART IV: Adult. Emergence from the pupa; wing development; flight; mating; male alar gland; descriptions of the legs, proboscis, antennae, and eyes; egg laying; life span; number of generations; fluctuations in numbers; resident populations; internal anatomy.

PART V: Fall migration. Definition of terms; why do they migrate; alar tagging method; two populations; roosting clusters; direction of migration; aberrant migration; appearance in England; termination of migration; specimen transferences.

PART VI: Overwintering sites and spring migration. Mexican site; Californian site; spring migration.

PART VII: New world relatives of the monarch; hybridization; monarchs on the islands of the South Pacific; do other species of butterflies migrate; mimicry, fact or fiction; predators; disease; parasites; rearing methods.

There are 82 illustrations of which 42 are in color.

Recapture Records of Monarch Butterflies-1984

Since quite a few of our associates reported a scarcity or complete absence of monarch butterflies in their area it came as a pleasant surprise when we toted up the number of monarch butterflies tagged in 1984 to find that the number tagged had far surpassed the number tagged in 1983- in fact the number rose from 3,321 in 1983 to 11,702 in 1984.

The reason for the small number tagged in 1983 was due to the decimation of the population as a result of the violent storms at the time of the spring migration, as reported in the 1983 issue of the I.M.S.

Strangely, however, the number of recaptures did not rise with the number of butterflies tagged, although there were many very interesting flights recorded as a result of the work done in 1984.

Below are listed the complete records of recaptures for 1984:

* --		
Ron Austing	Harrison Ohio	Cerro Pelon,Mex.
" "	Dillsboro,Ind.	Pensacola,Fla.
" "	" "	Owensboro,Ky.
Kenny Brooks	Manhattan,Ks.	Manhattan,Ks.
Larry Denison	Lansing,N.Y.	Lansing,N.Y.
Alta Horr	Gretna,Neb.	Omaha,Neb.
Lorraine Houck	Decorah,Ia.	Decorah,Ia.
Island Science School	Toronto,Ont.	Ponce Inlet,Fla
Marilyn Kaestner	Northville, Mich.	Northville,Mich.
Harold Mahan	Kellys Island,Oh.	Somerville, Tex.
**		
" "	" " "	Cerro Pelon,Mex.
Molly Monica	Cape May,N.J.	Cape May,N.J.
Dale Reichert	Hanover,Pa.	Moscow,Ark.
Faye Sutherland	Boise,Id.	Boise,Id.
" "	" "	Nampa,Id.
" "	Denver, Col.	Denver,Col.

*Tagged in 1982, reported to us in 1984

**Tagged in 1983

PUBLICITY

Fascination with the monarch butterfly's amazing life history continues unabated as attested by clippings from many publications sent to us each year by our associates. This year is no exception. We have received many well written and well illustrated articles on the subject.

We would like to thank those listed below for forwarding articles from the following publications:

Pacific Discovery, The Lepidopterist News, National Wildlife, The Sunday Union, Sunday Call Chronicle, Cedar Rapids Gazette, Reno Gazette Journal, The Prairie Center News, Mobile Home News, The Daily Tribune, The Journal Herald, Springfield News-Sun, News Science, Quad-City Times, Protector of Pine Oak Woods Inc. Bulletin, The Milwaukee Journal, La Crosse Tribune, State Island Advance, Southern Living, Gloucester Daily Times, Garrett Evangelical Theological Seminary Bulletin, The Blade, The Gazette, Audubon Action, Des Moines Register, Asbury Park Press, Atom Tabloid, Weekly Reader, Oakview Big News, The Herald, Earthwatch News.

Ray Bracher, Kenny Brooks, Joe Eddy Brown, Dick Buegler, Shirley Duffy, Barbara Hagenson, Lorraine Houck, Linda Malick, Marjorie Mathes, Helen Millward, Molly Monica, Nancy Perry, Doris Stifel, Edna Sutton, Ralph Ramey, Bev Thames, Bill Thomas, Amy Thompson, Larry Totton, Cyril Zewe were responsible for submitting the above.

FALL MIGRATION SIGHTED IN SOUTHWESTERN NEVADA.

The first ever report of the fall migration of the monarch butterfly was sent to us by Mary Holliday. Between September 28 and October 18, 1984 Mary sighted a total of 42 monarchs flying south from her vantage point at Saulsbury Wash, which is located east of Tonopah, Nevada.

It is through valuable information such as this given to us by research associates that we gain more and more knowledge about the migration and can piece together the gigantic jig saw puzzle created by the movements of the monarch butterfly. Remember, there are still many unanswered questions about the migration. Please keep your eyes open and keep us posted.

CONSERVATION OF THE MONARCH BUTTERFLY

We wish to congratulate Dick Buegler and his group of conservationists "Protectors of Pine Oak Woods In.", on their valiant struggle to conserve the Greenbelt area on Staten Island. Dick and his supporters have spent a great deal of time and money on this project and we wish them well in their current court case to protect part of this Greenbelt.

REARING MONARCH BUTTERFLIES FOR MIGRANTS

In late summer and fall, the larvae are exposed to falling temperatures and decreasing daylight period. These changes bring about a physiological change in the larvae resulting in a failure of the reproductive organs to become active. Thus, when the mature butterfly emerges from the pupa, the reproductive organs are in a state of dormancy. For some as yet inexplicable reason this generation gives rise to the migrants, which phenomenon is also common to migrating birds.

If you alar tag butterflies prior to July 21, these monarchs will not migrate with the result that such tagged specimens are recaptured in approximately the same area. It takes about a month after the summer solstice, June 21, for this transformation to take place. It is important, however, to alar tag these resident members in order to understand more clearly their behaviour on the breeding grounds.

If you are rearing monarchs from larvae, particularly in late July and August, this should be carried out outdoors so as to expose the larvae to changing temperatures and daylight period. If you rear them indoors exposing the larvae to more constant temperatures and artificial light the resulting adults will be residents rather than migrants.

For best results, in so far as obtaining information on the migratory routes, specimens should be collected in the field in late August, September and October - as late as November in the more southern states. If possible try to locate an overnight roosting site. Such may be found by following the direction of flight of the migrants in the late afternoon. You will not only be able to alar tagged many hundreds of specimens but you will also enjoy the beautiful spectacle of thousands of orange butterflies clustered on the branches of the trees, similar to what you would see in the overwintering site in Mexico, but in a much smaller degree.

TAGGING OF SPRING MIGRANTS

Students of Bev Thames second grade class at Bay City, Texas were able to alar tag monarch butterflies during the months of March, April, and May. Of these, 11 were wild spring migrants and the other 5 were reared by Bev and her class of which Matt Tribo, one of our associates, is a member. We are always delighted when spring migrants are alar tagged since we have very little definitive data on the routes taken during the return to the breeding grounds.

SIGHTING OF MONARCH BUTTERFLIES IN THE GRAND CANYON, ARIZONA.

Walter Goodman reported seeing several monarch butterflies while on a trip down the Colorado River. The location of the sighting was between Lees Ferry and Diamond Creek during the fall migration. This adds evidence to our long-held conclusion that monarch butterflies migrate from areas in the Rocky Mountains to the overwintering loci in the mountains of southern California as well as to the coast of California at Carlsbad.

Sightings of Spring Migrants

One of the fascinating features of our study of the monarch butterfly is the fact that certain aspects of the migration vary so much from one year to the next. Since their movements are governed so much by the vagaries of the seasonal weather changes, each year we wonder just when and where the first spring migrants returning from Mexico will be seen.

Listed below are reports of spring migrants in 1984:

Walter Zimmerman, Rockwall, Texas	April 9/84
Kenny Brooks, Manhattan, Kansas	May 21/84
Margaret Elliott, Muskegon, Michigan	May 25/84
Ron Austing, Dillsboro, Indiana	May 30/84
Laura Banet, New Ulm, Minnesota	May 31/84
Jim Gilbert, Waconia, Minnesota	May 31/84
Edna Sutton, Richland Center, Wisconsin	June 9/84
Virgil Inman, South Bend, Indiana	July 8/84
Carol Hillman, farm, Massachusetts	July 27/84

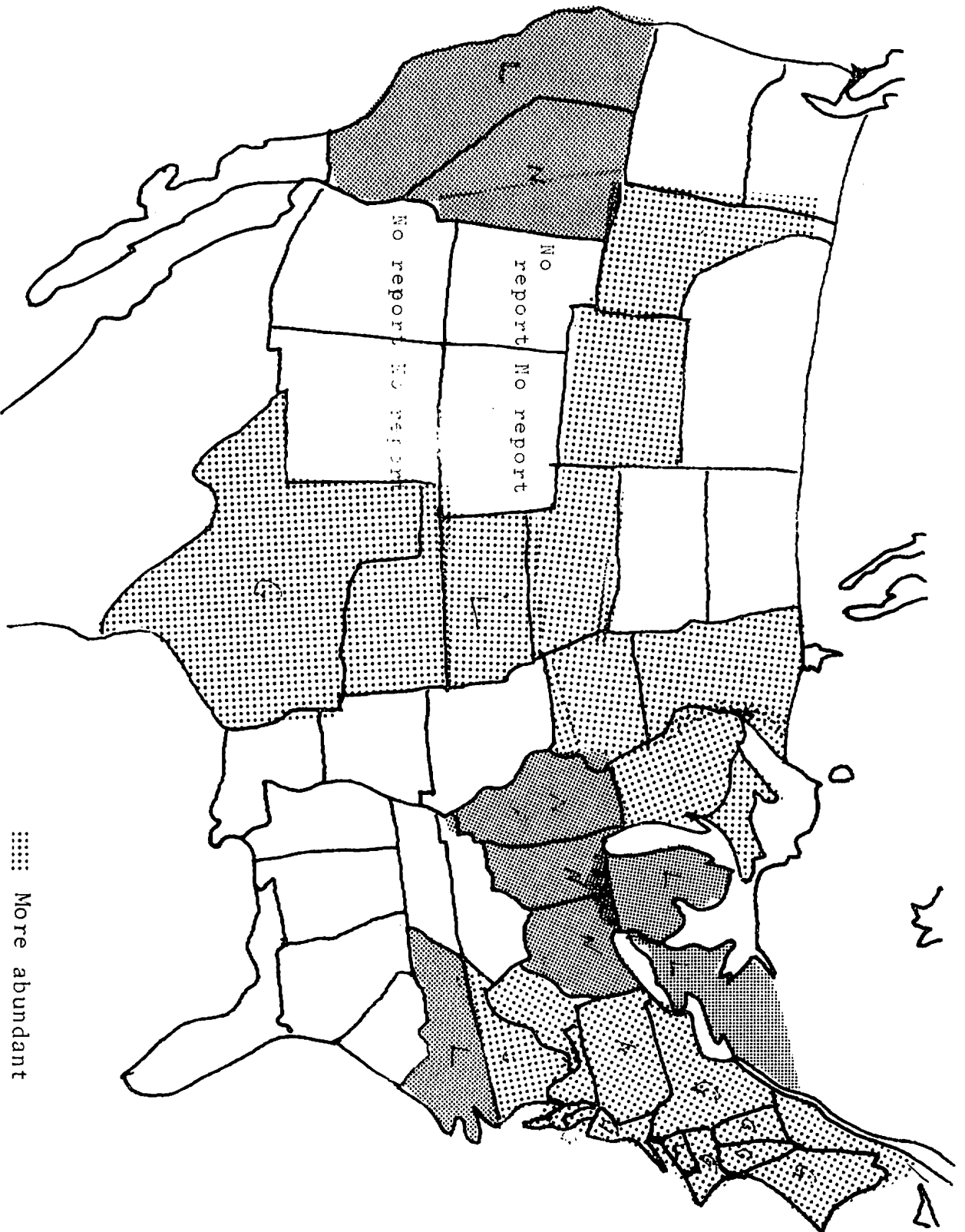
Recapture of Spring Migrants from Mexico

In March 1984, Carlos Gottfried of Mexico City, conducted a group of scouts up Cerro Pelon, a mountain near Zitacuero, Michoacan, Mexico about 80 km. west of Mexico City.

After the long climb up the mountain, the group set up camp and on March 11, tagged over 3000 monarch butterflies which were part of the overwintering colony of Pelon.

One of these tagged butterflies was recaptured on April 4, 1984 at Galveston, Texas. This information will be a valuable addition to the very meagre data that we have on the spring migration.

More abundant
Less abundant or no change



POPULATION TREND - 1984

If you compare the population trend map in the present report with that in the report for 1983 you will note that there has been a marked increase in the monarch population density over the entire continent. The only areas that indicated that the population was the same (low) or decreased occurred south of the Great Lakes and in California and Nevada.

There have been a few anomalies. Although the northeastern states indicated an increase in population density, Molly Monica of New Jersey reported a marked decrease. Bill Coleman stated that there was a marked increase in his area in southern California.

In estimating whether there is a decrease or increase in the population in a certain state, we take the majority reports thus, if five persons found an increase and one person a decrease we assume that there was an increase but that in one particular locality there was a local decrease. We also take into account the number of years a person has been tagging and observing population density for an accurate estimate.

We conclude that there is a definite trend to a return to a peak of population which we anticipate to take place either this summer of 1985 or next summer, 1986. We would appreciate your taking notes of what seems to be occurring in your area.

None of the associates reported a decrease due to the virus infestations that can so reduce the population over the entire continent causing a general decrease, as happens periodically.

The absence of reports from some of the states can be accounted for as follows: Except for those states that are on the direct migratory route from California (Nevada, Idaho, Wyoming, Utah, Colorado) monarchs are scarce in Washington, Oregon, the Dakotas; the southeastern states have a comparatively scarce population during the summer months, since offspring from the migrants move northward. As a result there is very little interest in field studies of the monarchs during the summer months. We would, however, like to have associates in these states. If you know of anyone who might be interested or if you wish to send an account of the studies of the monarch migrations to local newspapers in various towns or cities, we would appreciate your assistance. A number of our associates in the eastern states are capable writers and hence might be interested in sending short accounts to newspapers for publication. The states concerned are: Missouri, Kentucky, Tennessee, Arkansas, Mississippi, Alabama, Georgia, South Carolina, Louisiana, and Florida. Try your hand at writing, You will enjoy doing it.

Recaptures of Tagged Monarch Butterflies in Mexico

The publication of this list was prompted by a request from Ron Austing about the number of tagged monarch butterflies which have been recaptured in Mexico since the beginning of this study.

We were pleased to bring these data together since they show the long and laborious history of our research in our attempt to discover the winter whereabouts of the monarch butterfly.

As you can see there was a 14 year gap from the time the first tagged monarch butterfly was recaptured in 1957 in Mexico to the date of the second one in 1971.

The number of recaptured increased after we discovered the overwintering site around Angangueo, Mexico in January, 1975. Even so, we have a total of 15 recaptures of fall migrants in Mexico after 40 years of research. No wonder that we prize these data above jewels!

Name	Place of Tagging	Recaptured at	Date
Fred Urquhart	Highland Creek, Ont.	San Luis Potosi, Mex.	1957
Dorothy Yeager	Pearsall, Tex.	Guadalupe, Mex.	1971
Sybil Mayberry	Eagle Pass, Tex.	Maney, Hidalgo, Mex.	1972
Jim Drobka	Manitowoc, Wis.	Cuatrociengas, Coah. Mex.	1973
Beatrice Ridge- way	North Tarrytown, N.Y.	Mexico 20, Mex.	1974
John McClusky	Fredericksburg, Tex.	Los Ranchitos, Mich, Mex.	1975
Jim Gilbert,	Chaska, Minn.	Barranca Honda, Mich. Mex.	1976
Steve Powers,	Oley, Penn.	Michoacan, Mex.	1978
Ellen Roush,	Lynchburg, Oh.	Malinaltenango, Mex.	1978
Barbara Hagenson	Clinton, Ia.	Angangueo, Mich. Mex.	1979
Ron Lachelt	Minneapolis, Minn.	" " "	1979
Joseph Moss	Roanoke, La.	" " "	1979
Larry Totton	Granger, Ia.	" " "	1979
Ron Austing,	Dillsboro, Ind.	Cerro Pelon, Mex.	1984
Harold Mahan	Kelleys Island, Oh.	" " "	1984

SCHOOL PROJECTS

Many of our young associates, having been introduced to the study of biology through the monarch project have completed their university studies and are now occupying various positions in universities and government departments engaged in biological research and teaching.

There are many interesting projects that can be carried out by primary school classes along with the study of monarch migration. The following may be of interest to our teaching associates.

Temperature and light are two important factors in the development of any species of insect. The most obvious one is temperature - the higher the temperature the more rapid the development. But what effect has light? Will larvae develop as rapidly in dark conditions as compared to light?

Pupils are divided into two groups. One group will raise the larvae under near total darkness and the other under continuous light. Those working with larvae under dark conditions can rear the larvae in closed cupboards. Of course, there will be a certain amount of light exposure when the cupboard is opened for cleaning and feeding. If the school has a photographic dark room this is ideal - insects do not respond to red light, such as is the light source in a photographic room. Those working with continuous light will arrange to have the containers close to continuous artificial light - do not place a lighted bulb over the rearing cages or jars since this would cause increase in the amount of heat and upset the experiment.

Larvae should be obtained from eggs. Larvae collected in the field are not satisfactory since they have already been exposed to the same light and temperature conditions.

If your class carried out such an experiment, please send the results so that we can report them in our next volume, along with another experimental suggestion.

Both experiments should be carried out under the same temperature conditions - that is in the same classroom. It would be advisable to take the temperature of the cupboard and the room to check on any differences.

REMOVE ALL WING SCALES

Before applying an alar tag, it is most important to remove all scales from the portion of the wing to which the adhesive tag is to be applied. As you rub your thumb and finger over the area, thus removing the scales from both the upper and lower surfaces of the wing, your thumb and finger become covered with scales. You should remove these scales, using a piece of tissue or your shirt, pants, skirt, or whatever. Then after removing the scales from your thumb and finger in this manner rub the area again. Repeat this procedure until there are no scales left on the area. If care is not taken to remove all the scales from the area of the wing the tag will not adhere to the wing membrane and will drop off over a short period of time. It is well to remember that one specimen carefully applied is worth a hundred done carelessly. As in all scientific endeavours, exact procedure is most important. The specimen you tag may be the one to add to our knowledge of the migrations of this remarkable butterfly. Take your time and do it properly. This is excellent instruction for students whether as a scientific experiment or in studies devoted to a particular subject.

THE SMALL WORLD OF YOUR GARDEN

By

Elma Cook

Published by Hodder and Stoughton, Auckland, New Zealand, 1983.

Over the past many years we have seen hundreds of color photographs on insects. We have also taken many hundreds of photographs ourselves. However, we have never seen such magnificent photographs as are contained in this small booklet. You should be able to obtain a copy from any bookstore on request.

SCIENTIFIC PAPERS

The following reprints of scientific papers published in scientific journals are available to our associates.

Aberrant autumnal migration of the eastern population of the monarch butterfly as it relates to the occurrence of strong westerly winds.

Vernal migration of the monarch butterfly in North America from the overwintering site in the Neo-volcanic Plateau of Mexico.

Breeding areas and overnight roosting locations in the northern range of the monarch butterfly with a summary of associated migratory routes.

Please send \$1.00 to cover mailing costs. Specify the paper or papers you wish.

Special Donors

In order to defray expenses involved in the study of the biology of the monarch butterfly, we suggest a minimum donation based upon the number of associates and the projected costs involved. We are most grateful to those associates who donate more than the required minimum which permits extended activity. We extend our sincere thanks to the following:

Gary & Connie Abraham	Carl Allgrove	Fred Armstrong
Ron Austing	Bobbie Bartlett	Betsy Briggs
Barbara de Montes	Larry Denison	Erma de Witt
Margaret Elliott	Bob Faber	Jessie Glynn
Barbara Hagenson	Denis Hahn	Olivia Hansen
Joann Holden	Mary Holliday	Shirley Hupp
Ann Goin	Joan Johnson	Niel & Sheila Karrow
Ann & Chris Kathan	Norwood Keeney	Donna Kessler
Debbie Knutson	Marion Lopina	Harold Mahan
Joyce & Charles Mallery	Roland Matson	Helen Millward
Molly Monica	Pamela Mueller	Helen Norman
Naturalists Club of Broome County	Protectors of Pine Oak Woods	Dale Reichert
Millicent Scott	Marion Smith	Doris Stifel
Edna Sutton	Bev Thames	Bill Thomas
Ruth Trim	Alice Woodcock	Walter Zimmerman
Patricia Kester		

Special Activities

It is always a pleasure to report on the community activities of our associates such as presenting illustrated lectures, school demonstrations public displays and distributing informative pamphlets dealing with the many facets of the life of the monarch butterfly. As a result of such associate activities, the members of the lay public are made aware not only of our studies but it draws their attention to this remarkable insect and the part it plays in the ecology of nature.

Bill Coleman, Margaret Elliott, Joyce Mallery, Richard Mikula and Edna Sutton have been most active in this aspect and we wish them continued success in the future undertakings. We realize that it has given them great pleasure in discussing the life of the monarch butterfly as well as enriching the lives of those who have attended their talks or read their pamphlets.

Margaret Elliott was named Chairman for Butterfly Conservation for the Central Region of the National Federation of State Garden Clubs which includes seven States in the United States located in the midwest and bordering on the Great Lakes.

POSSIBLE POSTAL STRIKE IN CANADA

As we prepare the material for this volume of Insect Migration Studies there is a possibility that the postal workers will be on strike by March 11 in Canada. In the past these strikes have lasted for periods of weeks and, at times, months. If your copy of this volume was delayed you will understand.

IVY LEMON

1913-1983

Ivy Lemon, a longtime active member of the Massachusetts Audubon Society, was one of our original research associates (1952). Her devotion to the study of butterflies gave her the name "The Butterfly Lady". She was an outstanding teacher, researcher, and lecturer. Her classroom and lecture theater were the outdoors. She was honored with the award Conservation Teacher of the Year in 1975.

Unexpectedly, Ivey arrived at our home on a visit in 1954, equipped with a well supplied camper-trailer and her pet dog. Along with another of our longtime associates, Audrey Wilson, we toured the area of Presquile Point on the north shore of Lake Ontario, looking for migrant monarchs. At one point in our numerous discussions, the matter of a lack of finances arose. Ivy, being a very forthright person, simply stated: "I'll see what I can do." Shortly after this visit we received a cheque for \$150.00 from the Massachusetts Audubon Society. This amount marked the beginning of our research fund which, with the assistance of over 3000 research associates alar tagging in many parts of the continent, was established as the Inveretebrate Migration Research Fund held in trust by the University of Toronto. With such financial aid we were able not only to locate the overwintering site of the eastern population of the monarch butterfly but also trace, with considerable accuracy, the migration routes.

We will always remember Ivey with warm affection along with the generosity of the Massachusetts Audubon Society that came to our assistance at a time of financial need.

Memorial Donation for Mrs. Harvey Stiles

Margaret Elliott gave a special donation towards the research on the monarch butterfly in honor of the late Mrs. Harvey Stiles. Harvey Stiles and his daughter, Anne Wylie, were research associates in the late 1950's and contributed a great deal of information which is contained in the book, The Monarch Butterfly, published by the University of Toronto Press in 1960.

Memorial Donation for Ivey Lemon

Shirley Duffy, a very special friend of Ivy Lemon, contributed a special donation to the monarch research fund in memory of Ivy Lemon.

In Memoriam -- Mrs. Dale Reichert

It is with deep regret that we learned of the passing away of the wife of Dale Reichert. Mrs. Reichert was a very faithful member of our group; she and Dale tagged numerous monarchs over a period of 17 years (1967-1984). Dale is continuing as an active member.

RESEARCH ASSOCIATES 1984-1985

Those listed below are research associates actively involved in the study of the ecology and migrations of the monarch butterfly.

Note: If your name does not appear on this list it is because you joined our group after this issue was submitted for printing. If there are other omissions, please bring it to our attention.

Abraham, G. W. & Connie. Waseca, Minnesota.
Alder, Lee Ann. Ontario, New York.
Allen, Bob L. Mission Viejo, California.
Allgrove, Carl G. Windsor, Connecticut.
Anderson Carolyn. Madison, Wisconsin.
Armstrong, Fred . Red Bank, New Jersey.
Austing, G. Ronald. Dillsboro, Indiana.
Banet, Sister Laura. New Ulm, Minnesota.
Banet, Mary. Calumet City, Illinois.
Bartlett, Bobbye. Mountain Home, Idaho.
Beerbower, Bruce. Hickory, North Carolina.
Bengtson, Annie. Afton, Minnesota.
Blanchard, Yvonne M. Lake Shastina, California.
Boehlke, Paul R. New Ulm, Minnesota.
Boss, Elsie. Boise, Idaho.
Bracher, Ray W. South Bend, Indiana.
Brazil, Susan. Braham, Minnesota.
Breen, Jean. Brookfield, Connecticut.
Briggs, Betsy. Marshfield Hills, Massachusetts.
Brooks, Kenny A. Manhattan, Kansas.
Brown, Joe Eddy. Glen Ellyn, Illinois.
Buchanan, Francis B. New Paltz, New York.
Buegler, Richard P. Staten Island, New York.
Carter, F. Gray. Winston-Salem, North Carolina.
Cavanna, Pedro E. Norfolk, Connecticut.
Clements, Marta. West Paris, Maine.
Coleman, Wm. J. Ventura, California.
Davis, Donald A. Newmarket, Ontario.
De Montes, Sra. Barbara M. Can Cun, Quintana Roo, Mexico.
Denison, Larry. Lansing, New York.
Derning, Mary. Wheeling, Illinois.
De Wind, Joan M. Sherman, Connecticut.
De Witt, Erma R. New Paltz, New York.
Dombroske, George, M. Elmira, New York.
Elliott, Margaret. Muskegon, Michigan.
Emery, Mrs. Calvin C. Nevada, Missouri.
Faber, Bob. Hiram Outdoor Education Center, Hiram College, Hiram, Ohio.
Fashingbauer, Bernard D. St. Paul, Minnesota.
Fink, Betty. Huntington Station, New York.
Fullington, Richard. Dallas, Texas.
Gilbert, James R. Waconia, Minnesota.
Gimbel, Gary & Linda. Warren, Ohio.
Glovas, G.S. Bethlehem, Pennsylvania.

Glynn, Jessie. Limehouse, Ontario.
Goldman, Jeri. Harrisburg, Pennsylvania.
Goodman, W. F. Jr. Dallas, Texas.
Grew, Janet M. Maplewood, Minnesota.
Hagenson, Barbara. Clinton, Iowa.
Hahn, Denis R. West St. Paul, Minnesota.
Hamilton Country Park District. Cincinnati, Ohio.
Hamilton, Maryann. Concord, New Hampshire.
Hansen, Olivia. Staten Island, New York.
Hansen, Virginia. Marshfield, Wisconsin.
Hatch, Wendy. Port Carling, Ontario.
Heller, Caroline. Bronx, New York.
Henshall, Mary S. Nampa, Idaho.
Hill, Marion. Lyndhurst, New Jersey.
Hillman, Carol B. White Plains, New York.
Holden, Joann. Birmingham, Michigan.
Holliday, Mary. Reno, Nevada.
Hopf, Alice. Upper Black Eddy, Pennsylvania.
Horr, Mrs. Alta L. Gretna, Nebraska.
Hoskins, Dorothy M. Weston, Massachusetts.
Houck, Harvey & Lorraine. Decorah, Iowa.
Huber, Mabel L. Fernley, Nevada.
Hummer, Larry. Vista, California.
Hunt, Elva L. South Orange, New Jersey.
Hupp, Mrs. Franklin. Hinton, Virginia.
Inman, Virgil. South Bend, Indiana.
Irwin, Ann D. Bloomfield Hills, Michigan.
Island Natural Science School, Toronto, Ontario.
Iverson, Bruce A. Willmar, Minnesota.
Jaquay, Nelson. Wallingford, Vermont.
Johansen, Steve. Sioux City, Iowa.
Johnson, Joan L. Berryville, Virginia.
Kaestner, Marilyn. Northville, Michigan.
Karrow, Tom & Sheila. Waterloo, Ontario.
Kathan, Ann & Chris. Onalaska, Wisconsin.
Keeney, Norwood. Hudson, New Hampshire.
Kelchner, Susan. Lansing, New York.
Kendrick, Eva. Sault Ste. Marie, Ontario.
Kessler, Donna. Audubon, Iowa.
Kester, Patricia A. Appleton, Wisconsin.
Knutson, Debbie. Iron Mountain, Michigan.
Kough, Ruth. Dysart, Pennsylvania.
Larsen, Kirk L. Ann Arbor, Michigan.
Larsen, Donald W. Minnetonka, Minnesota.
Lindburg, Steve. Lincoln, Nebraska.
Locher, Tami. Chesterland, Ohio.
Lombard, Matt. Guilford, Connecticut.
Lopina, Marion T. Wauwatosa, Wisconsin.
Lorimer, John & Family. West Bloomfield, Michigan.
Magdich, Mitchell L. Toldeo, Ohio.
Mahan, Harold D. Cleveland, Ohio.
Malick, Linda. La Crosse, Wisconsin.
Malick, Patricia. Stevens Point, Wisconsin.
Mallery, Joyce & Charles. Vestal, New York.
Marossy, Sarah. Shelby, Michigan.
Mathes, Eldred & Marjorie. Pontiac, Michigan.
Matson, Roland. Minneapolis, Minnesota.
McAllister, Noreen. Orchard Park, New York.

Merrill, Kristy. Berlin, Pennsylvania.
Meyer, Norman, Babs & Andy. Mexico D.F., Mexico.
Miktuk, Kathy. Panama, New York.
Mikula, Richard. Hazleton, Pennsylvania.
Milani, Ruth. Meaford, Ontario.
Millet, Carol. Jacksonville, Vermont.
Millward, Helen. Fallon, Nevada.
Monica, Molly. Berkeley Heights, New Jersey.
Moss, Joseph. Roanoke, Louisiana.
Mueller, Pamela. Glen Ellyn, Illinois.
Naturalists Club of Broome County. Endwell, New York.
Neri, Jennifer. Montreal, Quebec.
Newbauer, Dany. Apple Valley, Minnesota.
Nicolai, Dick. Appleton, Wisconsin.
Norenberg, Marilyn. Duluth, Minnesota.
Ocean County 4-H Program. Toms River, New Jersey.
O'Neil, Catherine. Whitmore Lake, Michigan.
O'Neil, Karen. Fenton, Michigan.
O'Rourke, David. Buffalo, New York.
Ortt, Marilyn & Jennifer. Marietta, Ohio.
Osterbauer, Ron. Faribault, Minnesota.
Papermaster, Madeline. Centerville, Minnesota.
Pendleton, Emily V. Montevallo, Alabama.
Penn, Linda. Toledo, Ohio.
Pentaleri, Donna. New York, New York.
Perry, Wesley Lee. Memphis Tennessee.
Perry, Nancy. Shenandoah, Iowa.
Perzanowski, Phyllis. Havre de Grace, Maryland.
Peterson, Patricia Jewell. Stillwater, Minnesota.
Post, Earle M. West Milford, New Jersey.
Preston, Vicki L. Whiteford, Maryland.
Price, Barbara J. Eaton Rapids, Michigan.
Radanovich, Paula D. Hummelstown, Pennsylvania.
Radens, Elizabeth Clancy. New York, New York.
Ramey, Ralph. Yellow Springs, Ohio.
Ransom, Christina & Shani Darden. Plattsburgh, New York.
Rappeport, Sally. New York, New York.
Reese, Pat. West Hartford, Connecticut.
Reese, Randy. Newark Valley, New York.
Reichert, Dale L. Hanover, Pennsylvania.
Rodman, Charles. La Crosse, Wisconsin.
Rongish, Kathy. Underwood, Iowa.
Roush, Ellen. Lynchburg, Ohio.
Scott, Millicent. Casper, Wyoming.
Senghas, Joan. Mount Clemens, Michigan.
Siegel, Russell. Danbury, Connecticut.
Sinclair, Mary Lu. Falls Village, Connecticut.
Smith, Leslie V. Citrus Heights, California.
Smith, Marion. Lyndonville, New York.
Smith, Trudy. Mumford Cove, Connecticut.
Sotherland, Muriel. Waukesha, Wisconsin.
Spivak, Lisa A. Great Falls, Virginia.
Spoonier, Sally. Lakeville, Massachusetts.

Stecker, Philip P. Sheboygan, Wisconsin.
Stifel, Doris. Toledo, Ohio.
Strike, Megan Gange. St. Paul, Minnesota.
Strong, H. William Jr. Novelty, Ohio.
Stull, Jean H. Waterford, Pennsylvania.
Sutherland, Faye. Boise, Idaho.
Sutton, Edna M. Richland Centre, Wisconsin.
Swain, Eileen. Glen Carbon, Illinois.
Swanson, Arthur C. Hartland, Wisconsin.
Swanson, Elaine. Pickett, Wisconsin.
Tauber, Agatha. Ithaca, New York.
Teed, Laneil. Wichita, Kansas.
Terry, Mrs., W. G. Baytown, Texas.
Thames, Bev. Bay City, Texas.
Thomas, Bill. Springfield, Missouri.
Thompson, Amy. Stoneboro, Pennsylvania.
Thompson-Hoffman, Susan. Washington, D.C.
Totton, Larry W. Granger, Iowa.
Tribo, Dianne. Bay City, Texas.
Trim, Ruth. Richardson, Texas.
Wesselman Park Nature Center, Evansville, Indiana.
Westwood Hills Environmental Center, St Louis Park, Minnesota.
Williams, Gary. Glen Ellyn, Illinois.
Wilson, Audrey. Cobourg, Ontario.
Wilson, Roger L. Merville, Iowa.
Woodcock, Alice P. Upper Montclair, New Jersey.
Woythal, Debbie. North Barrington, Illinois.
Yeager, Dorothy. Pearsall, Texas.
Zewe, Cyril. North Huntingdon, Pennsylvania.
Zimmerman, Helen. Vineland Station, Ontario.
Zimmerman, Walter. Greenville, Texas.
Norman, Helen. Lexington, Kentucky.