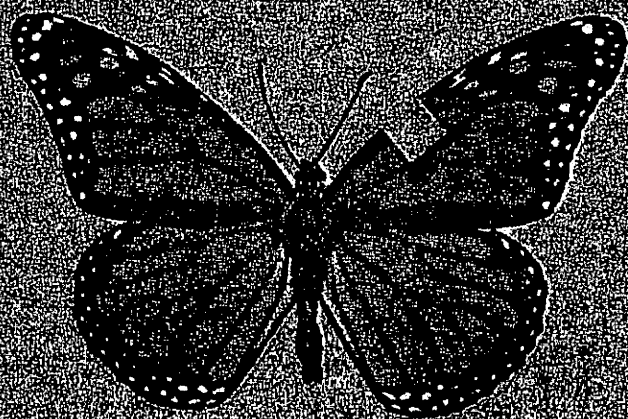


Insect Migration Studies



*Newsletter
to
Research Associates*

VOL. 9 APRIL 1972

INSECT MIGRATION STUDIES

NEWSLETTER TO RESEARCH ASSOCIATES

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THIS NEWSLETTER HAS BEEN PRODUCED IN ORDER TO INFORM OUR ASSOCIATES OF WHAT HAS BEEN DONE AND MUST NOT BE USED FOR SCIENTIFIC PUBLICATION. ANYONE WISHING SCIENTIFIC DATA SHOULD CONTACT THE EDITOR - MISS AUDREY E. WILSON, R.R. # 5, COBOURG ONTARIO, CANADA.

* * *

TO OUR ASSOCIATES

FROM

PROFESSOR AND MRS. URQUHART

Another year has passsd. It seems such a short time ago that we first tried to mark the monarch butterfly so as to find out where it flew after leaving its northern breeding grounds. This was the year 1938 - over 33 years ago! The war, of course, held up our studies for five years. However, it does point out how many years of steady, fact-finding work is involved in studies of the ecology of insects. The reason for this is obvious: In laboratory experiments you can repeat your tests hundreds of times in the course of a year, or in a few months, But nature works on a yearly calendar so your fact finding is done year by year, not hour by hour.

It has been, and continues to be, a most fascinating study. When you pause to think about it, you realize that when we first started we were not certain that all monarchs migrated and that for those that appeared to do so we had no accurate data informing us of their final flight destination. We suspected that they flew from the northern United States and Canada to Florida and perhaps along the Gulf Coast, there to remain, returning the following spring. We now know, as a result of our combined efforts over the years, that it is much more complex than that. We now know, from definitive data, that the population from the northeastern parts of the United States and Canada actually fly across the continent from northeast to southwest finally arriving in southern Mexico and parts of Central America - a most remarkable flight for what seems to be so frail an insect. We also know that some travel shorter distances there to mate, lay eggs and die.

We have had a great deal of publicity on our efforts this past year. This is very good, not only because it makes the public aware of the presence of "tagged butterflies" and hence more likely to look for them and return them to us, but it has awakened the public to one of the most amazing natural history events, a butterfly that can travel thousands of miles on an annual migration, and at the same time, it introduces the general public to the out-of-doors and the wild creatures that live there and the delicate balance that exists between their survival and a changing environment. We have noticed with interest and delight the place that the monarch butterfly now takes in so many television shows, radio programs and newspaper articles.

Our collective efforts have borne much fruit and we can share in the delight of it.

We have been fortunate this year to have the continued cooperation of Miss Audrey Wilson as our Editor of this Newsletter. In addition to her invaluable help with the Newsletter, Audrey is a very enthusiastic research associate and one of Canada's outstanding teachers of natural history.

TAGGING RETURNS FOR MONARCH BUTTERFLIES - 1971

The records of flights of monarch butterflies listed below are a sample of the many hundreds recorded for this past season. We have chosen them in order to give you some idea of the distances involved and also the many different areas that are involved in this tagging program. Unfortunately, it is impossible to publish all of the flights or mention all the research associates who have worked so hard and effectively to build up the large body of data necessary for this work, but each record is unique and valuable for our purposes and we greatly appreciate the efforts of all our associates.

Returns from Mexico

You will notice in the list that we have been most fortunate to document two excellent records of recaptures in Mexico. Both of these butterflies were returned from an area approximately 40 miles northwest of Mexico (City). In addition to the records we have had very interesting letters from the captors in Mexico stating that these tagged butterflies were found among many thousands of monarchs roosting in the same area so that we now have proof that the migration occurs in large numbers in Central Mexico. Our task now is to trace the migration further south, possibly to Central America. To this end we need to have many more hundreds of monarch butterflies tagged.

MONARCH BUTTERFLY TAGGING RETURNS FOR 1971

<u>Tagged by</u>	<u>Tagged at</u>	<u>Recaptured at</u>
Lloyd Beamer	Meaford, Ont.	Olney, Ill
Paul Cherubine	Mount Eden, Cal.	Santa Cruz, Cal.
William Coleman	Santa Cruz, Cal.	Redwood City, Cal.
R. Gopening	Greenwich, Conn.	Dailey, W.Va.
Mrs. R. Davidson	Waterloo, Ia.	Tulsa, Ok.
Elmer Dengler	Oley, Pa.	Daphne, Ala.
Mrs. B. Hervey	Webster, Ia.	Laredo, Tex.
Mr. E. Keith	Point Pelee, Ont.	Toledo, O.
Mr. E. Keith	Point Pelee, Ont.	Knoxville, Tenn.
Mrs. R. Kendrick	Sault Ste. Marie, Ont.	Cooperstown, Pa.
Mr. J. Malick	Stevens Point, Wis.	Grayslake, Ill
Mrs. Syble Mayberry	Eagle Pass, Tex.	Maney, Hidalgo, Mex.
Franz Pogge	Westover, W.Va.	San Miguel Tenochtitlan, Mexico, Mex.

<u>Tagged by</u>	<u>Tagged at</u>	<u>Recaptured at</u>
Mrs. H. Raub	Chatham, N.J.	Philadelphia, Pa.
Mrs. S. Reuter	Bradenton, Fla.	Bradenton, Fla.
Mrs. F. Silliman	South Wales, N.Y.	Morehead City, N.C.
Dr. R. Swale	Mason City, Ia.	Clarksville, Ark.
D. Vosburg	Binghampton, N.Y.	Elmer, La.
Audrey Wilson	Cobourg, Ont.	Sweetwater, Fla.
Audrey Wilson	Cobourg, Ont.	Annapolis, Md.

* * *

MISSING TAG NUMBERS DID YOU HAVE THESE TAGS?

Occasionally we find that our record of tags issued is incomplete and therefore we cannot report recaptured butterflies which are returned to us.

If you have any of the following tag numbers will you please let us know as we have tagged butterflies with these numbers returned to us:

72 - 731

vv - 33

vv - 78

* * *

REMINDER RE TAGGING REPORTS

We would like to thank all of you who submitted your reports promptly. May we remind you that we would like you to send in your reports as soon as you have completed your tagging for the season as we need to have the reports available when we are compiling data about recaptured specimens. We regret that we were unable to complete some of the data which we would have liked to publish in this Newsletter as some of the reports were not sent in and others were not complete.

PLEASE SEND IN YOUR REPORTS AS SOON AS THEY ARE COMPLETED. If you have already sent in your reports will you check them to see if you have sent in all of the information about your tagging, otherwise we shall not be able to use the data from your tagging when we compile information for a scientific paper.

* * *

IMPORTANT NOTICE: RE: TAGGING REPORTS

Please be sure to include both the identifying letters and numbers when reporting the tags you have used. Unless we have both the letters and numbers we have difficulty in preparing data from your reports. In some cases where the numbers only are given and the serial letters omitted, the report is useless.

Also we would like you to keep a carbon copy of the report which you send to us, since occasionally material is lost in the mails and valuable data is destroyed. If you keep a copy of your tagging we can refer back to your data if necessary.

* * *

SPECIES OTHER THAN THE MONARCH

During this past year many associates captured and tagged species of butterflies, other than the monarch, as well as large moths. Although the distances travelled from point of release to point of recapture were not great, they may, however, prove significant when we come to analyze all of the return data. One should mention that a specimen of the spicebush swallowtail (*Papilio troilus*) tagged by Mrs. Hupp of Hinton, Virginia, flew 97 miles to Roanoke, Virginia. It is possible that some species do travel great distances and, perhaps are migratory as in the case of the painted lady (*Vanessa cardui*) the migrations of which, based on observational data, have been described by Dr. C.E. Williams and published in the "Journal of the Lepidopterists Society".

Our interest, however, extends beyond long distance records. It is possible that the environmental factors that initiate migration in the monarch butterfly also affect other species such that, although not travelling great distances, their flight directions at certain times of the year coincide with that of the monarch. For example, when the monarchs move south-westwards in the fall, perhaps other species also move in this direction; and when the monarchs move northeastward in the spring and early summer perhaps other species follow the same pattern. This is, of course, purely hypothetical and only tagging returns will prove the hypothesis to be correct or not. Therefore, short distances are just as important, although not as interesting to the person tagging the specimen that is returned, as long distances.

We are trying to arrange for a smaller label for the smaller species of butterflies. At the present time, in order not to add too much weight to one wing, we have suggested that the label be cut in two and each half placed on each of the front wings. However, it is interesting to note that the returns to date have been for specimens in which the large tag has been placed on one front wing. But perhaps, a smaller label would give us more significant distances.

* * *

NOTE RE: TAGGING CECROPIA MOTH

Mrs. Donald L. Davidson of Waterloo, Iowa has reported that she has had difficulty in tagging cecropia moths as the tags will not adhere to the wing. This may be due to the heavy scales on the wings, which may require extra effort to remove. If you have had experience with tagging moths, please let us know what success you have had.

* * *

REQUESTS FOR TAGS

If you are asking for a supply of tags, please mark on the Outside of the envelope "Urgent Tag" if your request is made during the tagging season in your part of the country. We shall send them as quickly as we can. Otherwise, please request tags (any number you believe you will be able to use) when you send in your renewal fee and renewal sheet (found in the Newsletter).

* * *

LEFTOVER TAGS

If you have tags left over from last season, please keep them for use in 1972, and report the numbers which you have kept on the renewal sheet in this newsletter.

The adhesive on the tags will keep for several years if the tags are kept tightly wrapped in order to preserve the moisture.

* * *

SIMPLIFIED RECORDING OF TAGS

Mrs. Helen Raub of Chatham, N.J. suggests using one sheet of tags for female monarchs and another sheet of tags for males. In this way she cuts down on recording the sex of the butterfly: eg.

monarchs a1 - a50 females a51 - a100 males

* * *

HAVE YOU RETURNED YOUR QUESTIONNAIRES?

This is to remind you of the questionnaires which were mailed to you in early February for you to complete and return.

We have received a very enthusiastic response from our associates, and now have a great deal of valuable data about the

comparative populations of monarch butterflies which we intend to use in a scientific publication.

We were delighted to receive so much interesting information about our associates from the biographical questionnaire and will use this for proposed popular articles.

* * *

RENEWAL FEE

Your renewal fee is due each year when you receive your Newsletter for that year. Please fill in the sheet and send it in with your fee and request for tags - if you need a supply.

SPECIAL NOTE: Many of you have already paid your fee for 1972 which we have recorded. If you have, just fill in renewal form - "Fee already paid".

* * *

POPULATION DECLINE?

The summer of 1970 proved to be a pre-peak year in monarch population. This past summer appeared to be the peak year. In our part of the continent, we were able to collect and tag many hundreds of monarch butterflies as they clung in great masses to the trees in the evening as they winged their way southward,

But there was evidence that a population decline is under way and hence this next summer should be one of careful observations on abundance and, disease, by rearing caterpillars to ascertain whether or not they are being attacked. The latter could be a virus infection, in which case on the death of the caterpillar the body becomes filled with an ill smelling, inky fluid; or a bacterial infection in which case the caterpillar ceases to feed and gradually becomes shrunken and withered with no indication of an inky fluid.

In our examination of a quarter acre field plot of milkweed, situated at the rear of our home, we saw many female butterflies ovipositing and we were able to find a few eggs; however, we were unable to locate a single larva. In our laboratory rearing, the first two generations of larvae came through with only slight loss, but the third generation exhibited an 82% die-off caused by what appeared to be, a bacterial rather than a virus infection.

It is possible that we shall witness a marked drop in the population this summer. We would appreciate your making field observations on abundance and raising caterpillars so as to observe whether or not they have become infected.

The study of population fluctuations involved many species of animals in which the event seems to be somewhat cyclical. It has been

suggested that, in such well-known examples, as the lemming, the fluctuations in numbers are correlated with meteorological or cosmic phenomena. Perhaps such extraneous forces can influence the physiology of the animal such that it is more prone to disease.

The monarch butterfly offers a unique example of cyclical fluctuations in numbers and perhaps, by astute observations over the entire continent, we may be able to offer definitive data that would be applicable to other animals that exhibit the same changes in their population density.

* * *

NATIONAL GEOGRAPHIC

As a result of the financial support given to us by the National Geographic Society, our studies during the past three years have progressed at a much more rapid rate. The grant enabled Mrs. Urquhart to devote more of her time to the study and has been responsible for releasing funds from the National Research Council to hire student assistants and to defray expenses involved in expeditions.

This year, 1972-73, will make the termination of the projects outlined to the National Geographic Society and for which support was given to us. The data will be compiled and a science article written for publication in the National Geographic Society's "RESEARCH REPORTS". We have already submitted one paper to "RESEARCH REPORTS" dealing with the data accumulated during the first year of the grant. The next publication will deal with the entire four year study. These publications will be made available to those of our Research Associates who wish them.

As yet we do not know whether or not an article of a popular nature will appear in the National Geographic Magazine. In preparation for such an eventuality, we have taken many hundreds of photographs in colour depicting various phases of our expeditions, the places visited and the people we have met. If such an article is contemplated you will be so informed.

* * *

DONORS TO INSECT MIGRATION RESEARCH FUND - 1971

Mrs. George Brewer, Auburndale, Mass.

Mr. Donald Burk, Worthington, O.

Mr. Boughton Cobb, Falls Village, Conn.

Carol Colangelo, Manville, N.J.

Mr. Jerome Draper Jr., San Francisco, Cal.

Miss Jessie Draper, San Rafael, Cal.
 Mrs. Jessie Glynn, Limehouse, Ont.
 Mr. Paul Hale, Jeffersonville, Pa.
 Mr. Fred Hough, Accord, N.Y.
 Mrs. Julia Jewell, Detroit, Mich.
 Mrs. Evelyn Kendrick, Sault Ste. Marie, Ont.
 Mrs. Richard P. Klein, Geneva, O.
 Miss Ivy Lemon, Gloucester, Mass.
 Matt Limburg, Salt Lake City, Utah
 Dr. and Mrs. Lester Luxenberg, Tonopah, Ariz.
 Mrs. Harriet Marsi, Binghamton, N.Y.
 Ruth Anne McKee, Stockton, Cal.
 Mr. David R. Miner, Barre, Mass.
 Mr. Franz L. Pogge, Morgantown, W. Va.
 Mrs. Helen V. Raub, Chatham, N.J.
 Martha D. Schaffer, Baltimore, Md.
 Mr. and Mrs. John C. Schmid, Greenwich, Conn.
 Mrs. James Stewart, Somerset, Pa.
 Mr. Prentice K. Stout, Far Hills, N.J.
 Samuel Sweet, Manchester, Conn.
 Mrs. Frank Throm, Overland Park, Kan.
 Mrs. Maryanne West, Gibson's, B.C.
 Mrs. Marie Wren, Fillmore, Cal.
 Mr. David Yurmanovic, Dearborn, Mich.

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PUBLICITY GIVEN BUTTERFLY TAGGING PROGRAM

The following are some items sent to us from our associates regarding the publicity given to our research program. We are pleased to receive these as it is interesting to learn of the widespread interest shown in this work particularly as the attention of the public is so necessary in making our program successful. We wish to thank

our associates for sending us the following news items:

Lillian Bussma of Minot, North Dakota and her tagging of monarch butterflies was the subject of a feature article in the local paper in the fall of 1971.

Alvin Chase of Port Jervis, N.Y. and his interest in the monarch research was the subject of an article written by his father, Phil Chase, in the Middletown, N.Y. "Times Herald Record".

Mr. Wm. Coleman of Santa Cruz, California addressed the Valley Floral Club of Felton, California on the subject "Monarch Butterfly Research" on January 5, 1972.

Philip Del Vecchio, Director of the Paterson Museum, Paterson, N.J. was the author of a comprehensive illustrated article about the tagging method and the migration of monarch butterflies. This article was published in the "Paterson News".

Dick Eason of Cedar Falls, Iowa and his interest in monarch butterflies was the subject of a well illustrated article in "The Record" for September 16, 1971.

Mrs. Addye Hartley of Pensacola, Florida sent us an article published in the "Grit" showing a tagged monarch butterfly and discussing the wide distribution of this species in many parts of the world.

A monarch butterfly tagged by Lynne Heasley of Sharpsville, Pa. was pictured with its three young captors in the July 14, 1971 edition of "The Herald" published in Sharon, Pa.

Mrs. Janet M. Korn of Short Hills, N.J. reported that an article about tagging and release of butterflies was published in the Millburn "Item" of November 11, 1971.

Matt Limburg of Salt Lake City, Utah was pictured in a full page spread in "The Salt Lake Tribune" of November 7, 1971. Other pictures and an article described Matt's work of rearing monarch butterflies.

WOAI Radio station of San Antonio, Texas broadcast a lengthy account of our research project on the "Farm and Ranch News" at the request of Charles Lipscomb of San Antonio.

"The San Antonio Light" published a picture of a gulf fritillary which had been tagged by Charles Lipscomb of San Antonio, Texas in the September 4, 1971 edition of the paper.

The transfer of live monarch butterflies from associates in Canada and the U.S. to Mr. Carlton McQueen of Mercedes, Texas was filmed by KRGV-TV. Mr. McQueen was shown taking transferred monarch butterflies out of the mailing boxes, recording their numbers and releasing them for further flight. This film was used by the NBC network on television.

Many interesting facts about monarch butterflies were related in an illustrated article about Gary Craig Mockli of Lakewood, California. The article appeared in the "Press Telegram" in August 1971.

A tiger swallowtail, tagged by Gary Craig Mockli of Lakewood, Calif. was pictured in the "Press Telegram" of Long Beach, Calif. in August 1971. A letter to the Editor written by Gary's father, Mr. Frank Mockli, explained briefly the scientific value of tagging butterflies and the connection with the project at the University of Toronto.

Mark Mortimer of Marshall, Mich. received a blue ribbon for a project showing the rearing of monarch butterflies and also "Best of Junior Demonstrations" for his demonstration of tagging a monarch butterfly, and a blue ribbon and rosette.

Peter J. McGuinness of Hamilton, Ontario received a grade "A" and "Superior" rating for his project entitled "Insect Migration" presented at his school.

At a local shopping centre, Mr. Joseph A. Muench and his students of Manitowoc, Wis. made a display of the monarch butterfly research program during American Education Week.

Butterfly tagged in N.Y. used for Entomology Research at Texas A. and M. University.

We were pleased to receive a letter concerning a monarch butterfly tagged by the Naturalists' Club of Broome County, Binghamton, N.Y. The letter from the Jackson County agent at Edna, Texas inquiring about the details of the butterfly's flight read in part, "----- this kind of information is useful to me in conducting educational programs with our farmers and ranchers to lend credibility to entomology research".

"The New Jersey Nature News" of June 1971 published by the N.J. Audubon Society published a description of the demonstration of tagging of monarch butterflies done by Mrs. Helen Raub of Chatham, N.J. during a lecture series.

A monarch butterfly tagged by Robin Renner of Chicago, Ill. was the subject of an article published in the "Globe and Mail", Toronto, Canada in August 1971.

The movements of monarch butterflies of Florida were discussed by Mrs. S. Reuter of Bradenton, Florida in an illustrated article in the September 24, 1971 edition of the "Sarasota Herald Tribune".

"The Cedar Rapids Gazette" published an illustrated article about the work of Nancy Rutherford of Marion, Iowa with the tagging program and the interest shown in the program by Nancy's family and neighbors.

Mrs. Duane Rippel of La Porte City, Iowa, was pictured in a two column article in the "Waterloo Courier" showing her large model of a tagged monarch butterfly which she uses for her young students. The article also explained at length Mrs. Rippel's interest in this project and the nature of the project itself.

Mrs. Helen Silliman of South Wales, N.Y. was involved in a television program dealing with the monarch butterfly research program during 1971.

Mrs. George Toalson Jr. and Mrs. Kerry Yeager of Pearsall, Texas discussed their work with the Insect Migration Studies at the Frio Public Library. This event was reported in the local paper.

Mr. Herbert C. Troester, Manager of the Tewauken National Wildlife Refuge in North Dakota, was the author of an illustrated article published in July 1971 in "North Dakota Outdoors". The article dealt with various aspects of our tagging program and encouraged interested persons to help in our research. As a result of Mr. Troester's efforts we now have a new and very active group of associates in North Dakota.

A display of monarch migration arranged by Mrs. Kerry Yeager of Pearsall, Texas, in the Witte Museum, San Antonio and Mrs. Yeager's keen interest in our research were described in an illustrated article in the "Corpus Christi Caller", October 25, 1971.

In three different editions in July and August 1971 the "Racine Journal Times" carried illustrated articles about Mrs. Neil Vail and her son, Paul, of Racine, Wis. and their connection with insect migration research. The interest of the newspaper reporters was aroused by the capture of a mourning cloak butterfly which Mrs. Vail and Paul tagged.

Mrs. Anna Wallbridge of Quincy, Mass. reported that a national television network carried a program, "Hodge Podge Lodge" which explained the insect migration research and the tagging carried on by our research associates.

Audrey Wilson of Cobourg, Ontario was responsible for introducing 75 teachers to monarch butterfly research at the Environmental Studies Winter Course sponsored by the Northumberland and Durham County Board of Education 1971-72.

"The Atlanta Journal" of August 9, 1971 published a UPI article about a tagged monarch butterfly recaptured in Chicago.

* * *

PRIZES AND AWARDS

Matt Limburg, Salt Lake City, Utah received an A plus grade for his final term paper "Insect Migration Studies, The Monarch Butterfly" submitted for his zoology class requirements.

David Kipperman, Dousman, Wis. won an award for his monarch butterfly project submitted to the Boy Scouts and also displayed at the District Science Fair.

Keith Dirck of Milan, Illinois entered a monarch butterfly project titled, "Is this Butterfly Doomed" in the Science Fair at the Jr. High School and won first place. He also used the same project in the Quint City Science Fair where he received an Honorable Mention. Keith also illustrated the life cycle of the monarch by placing the different stages in plastic; he displayed this at his high school after a summer course in Biology.

Calvin J. Sippola, Loomis, Cal. won the following awards for his projects, "The Life Cycle of the Monarch Butterfly" and The Life Cycle of the Pipevine Butterfly":

May 1971 Placer Co. 4-H Fair2nd place
July 1971 Placer Co. FairMonarch1st place
pipevine.....2nd place
1971 California State Fairmonarch3rd place
Sept. 1971 Auburn District Fairmonarch1st place
Special mention for his exhibit at the Auburn District Fair "for
the finest exhibit in the Wildlife Section".

* * *

WHY DO WE TRANSFER LIVE BUTTERFLIES?

One of the problems we are trying to solve with our tagging program is to increase the number of tagged specimens which safely reach the southern part of the continent in order to increase the chances of tagged butterflies being recaptured in areas where the flight patterns are not yet well known.

To this end we again used our method of transferring live butterflies through the mail--arranging for associates in the northern part of the U.S. and southern Canada to mail butterflies to associates in the south. We were fortunate to have a large population of monarchs to draw upon again this year and we were very gratified to have the cooperation of several of our associates in what we call our "transfer experiments".

We are especially grateful to these associates for the extra effort that they made on behalf of our research program since the transferring of butterflies means that the butterflies must be captured (or reared), tagged, numbers recorded, then placed in special envelopes, carefully packed in mailing boxes, and mailed at a required time. The receivers of the transferred butterflies must be on hand to accept the parcels (report their condition on arrival), record and release the butterflies. For both senders and receivers this means much meticulous time-consuming work for which we are very appreciative.

The following associates cooperated in the transfer experiments this year:

Senders

Bull Dufour, El Cerrito, California

David Falk, Wilmington, Delaware

Matt Limburg, Salt Lake City, Utah

Joseph Mass, Roanoke, Louisiana

Mrs. Helen Ochs, Columbus, Indiana

Franz Pogge, Morgantown, W. Virginia

Jim Steamer, Lake Forest, Illinois

F.A. and Norah Urquhart, West Hill, Ontario

Receivers

Mr. Fred Mayberry, Harlenjen, Texas

Mrs. Syble Mayberry, Eagle Pass, Texas

Mr. Carlton McQueen, Mercedes, Texas

Mrs. S. Reuter, Bradenton, Florida

* * *

MONARCH TRANSPORTED TO NEW ORLEANS

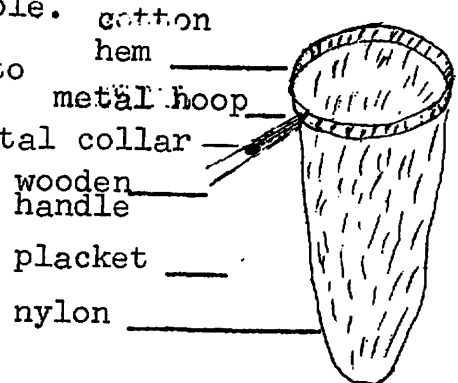
Mrs. Margaret Katz of New York, N.Y., wrote that she had a number of monarch butterflies which emerged too late in the season to be able to fly south before the onset of winter. Fortunately, Mrs. Katz had a friend who kindly took the tagged monarchs to New Orleans, La. where they were released to continue their migration.

* * *

NET FOR COLLECTING INSECTS

From time to time our associates write to ask directions about the making of an insect net. The following instructions are to help you make an insect net from materials which should be readily available.

The first necessity is an insect net. This may be simply a piece of mosquito netting, or nylon netting, draped around a round metal frame, the latter firmly fixed to a small pole. An iron hoop or a stout piece of iron wire, such as a coat-hanger, which has been bent to the proper shape and approximately fourteen inches in diameter will prove very satisfactory. The iron hoop may be cut through with a hack saw and the free ends bent so that they may be placed along the side of the wooden pole and then tied into place with a piece of stout cord. If you wish to dismantle the net, the free ends of the iron hoop, or bent wire, can be made



so that they fit into the grooves, one on each side of the pole. A metal sleeve can then be thrust over the free ends thus holding them in place.

Although mosquito netting is used by many amateur collectors for making their insect nets it is not the best material. Wet mosquito netting tends to fray and form large holes which permit the specimens to escape. Nylon netting, on the other hand, is a fabric which will not fray when wet. An old white curtain will prove far superior to mosquito netting for the insect net.

In making the bag of the insect net, be sure that it is at least twice as long as the diameter of the supporting frame and that it does not taper to a point at the bottom. If it is not long enough you will be unable to imprison the specimen when caught. A flick of the wrist should cause the net to overlap the mouth and still leave enough room for the captured specimen. If the net is tapered to a point, butterflies and moths will work their way into the folds and thus become damaged.

* * *

TO COLLECT MONARCHS FROM HIGH ROOSTING SITES

Mr. William Coleman of Santa Cruz, California suggests taping the handle of your insect net to a long thin dead tree limb at a location where monarchs are roosting high in the trees. This eliminates carrying a long pole for collecting monarchs from roosting sites.

* * *

LABORATORY INVESTIGATIONS

We have published one science paper on our experiments of cauterizing the "gold spots" of the pupa of the monarch butterfly. This paper, which is now available to our associates, deals with the cauterization of the LU, LN and MO spots (see the Monarch Butterfly book for the meaning of these symbols.)

We have submitted two other papers for publication dealing with our experiments on other gold spots. We trust that these papers will be available for you by next Newsletter.

Our papers dealing with the cell structure of the alar glands of the male monarch butterfly has not as yet been written. We hope that it will be written and accepted for publication this coming year.

* * *

TWO BOOKS FOR OUR ASSOCIATES

The following two books are available to our associates at reduced cost. The amounts received for these books are deposited in the research account held by the University of Toronto to further the study of invertebrate migration with our special interest in the monarch butterfly. Please make cheques payable to the University of Toronto-Invertebrate Migration Fund.

THE MONARCH BUTTERFLY:

Although the price of this book has been increased to \$6.00 it is still available to our associates at 3.95 with a 10% discount (3.50). This was made possible by our purchase of a number of copies of this book before the increase in price.

INTRODUCING THE INSECT:

This beginners book, written by Professor Urquhart, was published by Clark Irwin and Co. Ltd. of Canada. It has been retailed at \$5.00 but, as in the case of the Monarch Butterfly book, the price is to be increased. We therefore purchased a number of copies of it for our associates at \$5.00 less 10% (4.50). This book outlines collecting methods and gives keys to the identification of insect Families. It contains numerous illustrations together with four colour plates of some common butterflies and moths.

When our present supply of these books is depleted we will not be reordering them at the increased cost.

* * *

FLORIDA MONARCHS

Since the last Newsletter report on Florida, we have made one expedition to the West Coast and the off-shore island as well as areas of the Gulf Coast west to Panama City. The data supplied by Dr. and Mrs. Reuter together with our field observations would seem to indicate that we are dealing with a physiological change in a migrating population in which, for reasons that only future laboratory experiments will explain, the ovarian dormancy period is broken. In the presence of a species of milkweed, the larvae can feed and produce a generation of adults which in turn will breed rather than enter a dormancy period, as happens in laboratory reared material.

We hope to be able to analyze our data this summer and perhaps when we do so the answer to this interesting problem will emerge which may be of significance to other species of animals as well as the monarch butterfly.

* * *

RETIREMENT OF MRS. HARTLEY

We regret to announce the retirement as research associate of Mrs. Addye Hartley of Pensacola, Florida. Mrs. Hartley has been an associate for the past ten years and has contributed much useful information concerning the monarch butterflies of northern Florida. We appreciate very much Mrs. Hartley's efforts and shall miss her friendly letters about her research.

* * *

CALIFORNIA MONARCHS STILL A MYSTERY

This Newsletter would not be complete without special mention of the remarkable amount of tagging done in northern California by Paul Cherubini of Castro Valley, and William Coleman of Santa Cruz. These two associates have tagged many thousands of monarch butterflies in the 1971-72 season at the overwintering sites on the coast. Their prodigious efforts have resulted in the recapture of many tagged monarchs and we are grateful for this data since it is useful for showing movements of monarchs in the area and for duration of stay at the roosting sites.

However, the remarkable fact remains that the recaptures of the tagged butterflies are invariably at a short distance (comparatively speaking) from the place of release, thus, even though such a great amount of tagging has been done, we still do not really know what happens to the countless thousands of monarch butterflies which appear on the California coast every winter, remain for months and then leave the area. Where do they go? We haven't yet been able to answer this question by tagging. Obviously, they must go to remote parts of the country where the population is thinly scattered and the chances of recapture are slim. This remains an intriguing problem; the answer to which has so far eluded our best efforts.

* * *

MEXICO AND CENTRAL AMERICA

It was little realized when studies of the migrations of the monarch butterfly were first initiated, that eventually definitive data on tagged and recaptured specimens would show a remarkable flight from the northeastern parts of North America to southern Mexico. As a result of an expedition through Mexico, it was possible to indicate that the migrating monarchs did not remain in the region of the Rio Grande or in northern Mexico during the winter months. All evidence now points to the possibility that the monarchs of northeastern North America in their autumnal flight actually travel as far as Guatemala and perhaps to Costa Rica and Panama.

An attempt is being made to form groups of Research Associates in these southern areas so that we might obtain observational and release-recovery data on tagged specimens. Since it is not possible

to assess accurately a given geographical area from pictures and notes received from those who have visited the region, we are now making plans to travel to Guatemala next winter at which time we shall be able to make on-the-spot observations and at the same time talk to biologists and naturalists about the presence of the monarch in these areas throughout the year. We now have considerable data on the presence of monarchs in the area of Oaxaca where larvae and adults are found during the winter months. This would indicate a situation similar to that in Florida and southern California, in which case we are once again facing the physiological problem and its relationship to the migrating population that possess an ovarian dormancy period. Only accurate observations and tagged data will answer the problem.

* * *

SPECIAL HELP IN MEXICO AND CENTRAL AMERICA

It would now appear, from the results of expeditions and the tagging returns, that the monarch butterflies from northeastern North America fly as far as Guatemala and perhaps even as far as Costa Rica and Panama. At the time of writing this note, we have received reports from Mr. and Mrs. Lawrence Magner (115 N. Acacia Ave., Apt. 3, Solana Beach, California), who are travelling extensively through Mexico and Central America. They have taken a real and exciting interest in the study of the monarch butterfly and in their travels they are making notes on their observations, taking pictures, and interviewing individuals in the various areas concerning the presence or absence of the monarch butterfly. Such notes and observations will prove most valuable when it comes to writing the final account of the migrations of the monarch butterfly.

Sara Annon of Oaxaca, Mexico continues to work actively with us and has sent many reports as well as tagging butterflies in her area.

We hope to visit parts of Guatemala and southern Mexico next winter so as to better acquaint ourselves with the situation before analyzing the observations and tagging data for publication. We will report on our observations in a future Newsletter.

* * *

HAVE YOU ANY CONTACTS IN MEXICO OR CENTRAL AMERICA ????

Due to the very significant records that we now have for tagged monarch butterflies recaptured in central Mexico, and to the information we have received from associates in southern Mexico we are convinced that the monarch butterflies migrate to southern Mexico or possibly Central America.

Our need now is to establish more contacts in these countries and, if possible, to have associates there do concentrated tagging.

So far we have been fortunate to make a few contacts but in order to get significant data we must have many more. If you know of anyone in these countries that we could contact about our research program, please send us their names and addresses.

We now have translation services available and can correspond in Spanish if necessary.

* * *

I would like to suggest the following person or persons who might be able to help you make contacts in Mexico or Central America:

Name

Address

.....

.....

Suggested by Research Associate:

Name

Address

.....

.....

Please return to: Prof. F.A. Urquhart,
Scarborough College,
University of Toronto,
West Hill, Ontario, Canada.

"The Effect of Cauterizing the PPM ("Gold Spots")
of the Pupa of the Monarch Butterfly"

A limited number of copies of this paper are now available to research associates at a price of .50¢. It is necessary to charge for this publication since we had to cover the cost of the colour plates demonstrating the effects of cauterization of the pupa on the wings of the monarch butterflies.

"The Monarch Butterfly", by F.A. Urquhart published by the University of Toronto Press is available at a discount to research associates. The cost is \$4.25 (3.50 for the book plus .75¢ for postage and bank charges.)

"Introducing the Insect", by F.A. Urquhart published by Clarke, Irwin & Co. is available at a discount to research associates. The cost is \$5.25. (\$4.50 for the book plus .75¢ for postage and bank charges).

If you wish to order any of the above please indicate:

The Effect of Cauterizing the P.P.M. _____ .50 _____

The Monarch Butterfly _____ 4.25 _____

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Name _____

Address _____

Total amount of money enclosed for the above _____

Cheques payable to the University of Toronto -
 Invertebrate Migration Fund.

SCIENTIFIC PAPERS FREE TO RESEARCH ASSOCIATES

The following scientific publications about our research are free to our research associates. If you wish to have copies please check the appropriate spaces and fill in your name and address:

Autumnal Movement -----

A Study of the Monarch Population in Northern California -----

Gulf Coast Monarch Migrations -----

A Virus Epizootic (A Study of the virus that is responsible for the monarch cycles) -----

Laboratory Techniques in Raising Monarch Butterflies -----

Microcauterization (A Method Now Used to Study the Gold Spots on the monarch pupa) -----

Fluctuations in the Numbers of Monarch Butterflies in North America -----

A Continuously Breeding Population of Monarch Butterflies in Southern California -----

The Method of Cremaster Withdrawal in the Pupa of the Monarch Butterfly -----

Name _____

Address _____

Return this sheet to: Prof. Fred A. Urquhart,
Scarborough College,
University of Toronto,
West Hill, Ontario, Canada.

MEMBERSHIP for 1972RENEWAL FORM

If you wish to continue as a research associate in the study of insect migration, please fill out the following form and send it to:

Professor F. Urquhart,
Scarborough College,
University of Toronto,
West Hill, Ontario, Canada.

Please enclose your renewal fee of \$5.00. Make cheques or money orders payable to the University of Toronto, Insect Migration Research.

.....

RESEARCH ASSOCIATE FORM 1972

Mr.
Name - Mrs.
Miss

Mailing Address
.....
.....

If you are in a rural district please indicate the nearest town or city

Age (if under 18)

Occupation

Enclosed please find \$5.00 for the annual fee

Fee already paid for 1972

Number of tags required for 1972

Serial number of tags on hand for use in 1972
.....

I understand that I may request more tags if I should need them.

NOTE: Due to the increase in costs of printing and mailing, it has been necessary for us to increase our renewal fee to \$5.00.

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