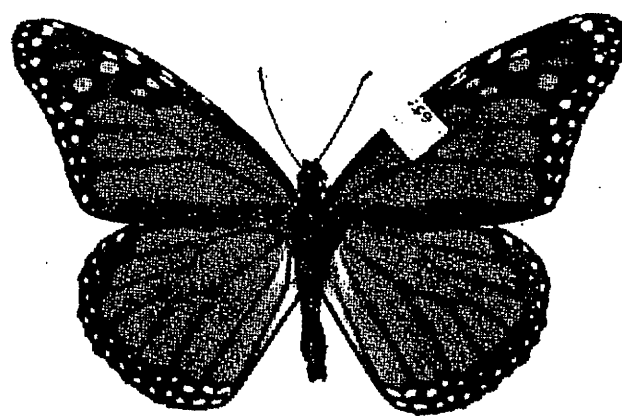


# *Insect Migration Studies*



*Newsletter  
to  
Research Associates*

VOL. 7 APRIL 1970

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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

We wish that we could share with you all of the many enjoyable experiences we have in this research project. Your many friendly letters which we receive are a constant pleasure. Your experiences, many of them delightfully humorous, are read and re-read with great interest. We often share such communications with our colleagues here at the University. We read them to groups that meet in the faculty lounge for a cup of coffee; some of them we post on the outside of our laboratory door so that our colleagues may enjoy these communications with us. And, what a real thrill it is to receive word that our young associates have obtained prizes and scholarships as a result of the work that they have done in our investigations of the monarch butterfly.

Is it not most satisfying to be involved in a project that takes us out-of-doors; that frees our minds of the petty annoyances of life; that brings us so close to the marvellous workings of nature, and trying to answer the many little and big problems that nature presents to us? How much pleasure it is for our young people to be engrossed in a project such as this instead of the many other unfortunate pastimes that occupy too many of our young people today. Together we share the wonders of nature. Together we share our experiences; and together we tell others about our activities and publish the answers to many problems for our scientific colleagues. We realize the importance of the animals and plants on this small earth. Thus we realize how important it is to keep our earth clean - free of man's smog and dirt. Nature to us is something to enjoy and not something to destroy.

We most sincerely hope that your interest will continue to grow and that we may all continue to enjoy working together in this most fascinating field of research for many, many years to come.

We would like to thank, very very warmly, Audrey Wilson who has acted as editor for this edition of the Newsletter. The term "editor" includes many detailed tasks such as proofreading, and sending the Newsletter out in the mail in addition to the jobs which are usually included in this designation.

In Memoriam

We regret to report the death of our long-time associate and friend, Norman Sibley of Whittemore, Michigan. Norman, who was one of the original members of our group of associates, was a very faithful worker. Because of the fact that he lived six months of each year in Florida and the other six months in Michigan, he was able to make many interesting contacts on our behalf. He also took an active part in our experiments of transferring monarch butterflies to Florida before we had any research associates in that state. We shall miss his friendly cooperation and the lively correspondence which we exchanged with him.

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" MONARCH BUTTERFLY TAGGING RETURNS for 1969

<u>Tagged by</u>	<u>Tagged at</u>	<u>Recaptured at</u>
Grant Alexander	Northcote, New Zealand	Northcote, N.Z.
Robert Allen	San Juan Capistrano, Calif.	Malibu, Calif.
Robert Artus	Chicago, Illinois	Hammond, Indiana
J.T. Carlisle	Whittier, California	Whittier, Calif.
W.C. Caselle	Ann Arbor, Michigan	Salina, Kansas
Paul Cherubini	Mount Eden, California	Alameda, Calif.
Tom DeKoster	Le Mars, Iowa	Newman Grove, Neb.
Bill Dufour	Richmond Field Station, Calif.	Coyote Pt., Calif.
Mrs. Chas. Hartley	Pensacola, Florida	Pensacola, Florida
Mrs. R. Klein	Geneva, Ohio	Canonsburg, Penn.
Mr. Steve Lewis	Palmetto, Florida	Palmetto, Florida
Mrs. S. Mayberry	Eagle Pass, Texas	Eagle Pass, Texas
David Minasian	Sacramento, California	Solvang, Calif.
Transferee Specimen Carlton McQueen Paul Cherubini	Mercedes, Texas	Brownsville, Texas
F. Munger	Whittier, California	Oceanside, Calif.
Franz Pogge	Morgantown, West Virginia	Laurel, Maryland
Mrs. R. Reuter	Bradenton, Florida	Bradenton, Florida
Mrs. E. Suhumskie	Sioux City, Iowa	Omaha, Nebraska

The recaptures of monarch butterflies listed on page 2 represent only a small percentage of the hundreds of tagged butterflies that have been returned to us in the past year. We have selected the list in order to let you see a good representation of locations where recaptures have been made. You will notice that some of these butterflies were recaptured in the same area in which they were released. Although these may not seem to be as significant as those that have travelled long distances, nevertheless, these provide us with valuable information concerning resident populations. We regret that space does not permit us to publish information re all of the recaptured specimens.

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#### TAGGED MONARCH BUTTERFLY RECAPTURED IN CUBA

One of the very interesting parts of our research is the receiving of tagged specimens at our laboratory and the anticipation of discovering where the specimen was tagged and recaptured. You may imagine our astonishment when we received a letter from Havana, Cuba, stating that one of our tagged specimens was caught in Havana on November, 1968 and had been brought to the Museum at the Academy of Science. Subsequently, in correspondence with the Entomology Department there, we received excellent photographs of the specimen which they wished to retain for their collection.

The butterfly was a female, obviously very worn, of which half the right forewing was missing; the right hind wing was also tattered but the tag was firmly in place. The butterfly, which had been captured alive had been tagged by E.R. McDonald of Port Hope, Ontario - a town 70 miles east of Toronto on the north shore of Lake Ontario, on September 25, 1968, thus making a flight time of 49 days. This is a unique record as this represents a distance flown of 1940 miles, point to point and includes 100 miles over water.

The question remains, how did the butterfly reach Cuba? Did it fly over the ocean or did it take advantage of the shipping between Florida and Cuba? Previous experiments of ours seem to discount the possibility of its flying over water, but it raises some very interesting questions to which we still do not have the answers as to the flight of monarch butterflies over large bodies of water.

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#### PERCENTAGE OF RECAPTURES

An analysis of the data concerning the number of specimens tagged and the number recaptured presents a figure of approximately two percent. This means that for every one hundred specimens tagged only two are recaptured and sent to us.

This is a purely statistical figure and has, as most statistical figures show, no relation to the success or failure of specimens being caught in proportion to those tagged. For example, one associate may tag over a thousand specimens and get no returns, whereas, as in one case, the associate tagged one specimen and it was recaptured.

The geographic locality has much to do with this. If you live in a densely populated area, as for instance in the New England States, the chances of one of your specimens being recaptured is much greater than if you lived in the plains region where the population is sparse.

It is necessary to bear in mind, however, that the number of specimens captured is not as significant as the direction, time, and distance one particular specimen travelled. We learned much more from the specimen that was captured in Mexico than many hundred of others that were recaptured. So, to those who have not had much success in having their specimens recaptured, may we emphasize that eventually one or more of your specimens will be recaptured and may add more to our knowledge of the migratory habits of the monarch butterfly than many of shorter or less significant distances.

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#### REMINDER RE TAGGING REPORTS

We would like to 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.

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#### LEFT OVER TAGS

If you have any tags left over from this past season or any past season, will you please notify us as to the serial numbers of the tags so that we shall know what numbers are in current use? For example, if you were issued tag number 33-1...33-50, and have used 33-1...33-15, please let us know that you still have 33-16...33-50 before you start your tagging in 1970.

THIS IS IMPORTANT IN ORDER THAT WE MAY AVOID ANY DUPLICATION OF  
NUMBERS!

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#### TAGS FOR NEW ASSOCIATES

We would like to emphasize to any of you who joined our project recently that your fee entitles you to any number of tags that you can use in any one year. Our purpose is to have as many butterflies marked with tags as possible.

Some of you who joined the project through the article published in "Ranger Rick" magazine were misled by the wording of the article

which specified that if you sent in \$5.00 you would receive 25 tags, implying that you would have to pay an additional \$5.00 if you needed more tags.

This was unfortunate as we had requested the "Ranger Rick" editor not to quote any specific number of tags as we are prepared to supply an unlimited number of tags if you think that you will be able to use them.

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#### RENEWAL FEE for 1970-71

Even if you have tags left over and do not need additional ones for the coming season, it is still necessary for you to pay your renewal fee which covers the Newsletter, correspondence and research expenses.

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#### VERIFICATION OF RECAPTURED MONARCHS

Sometimes we have been asked how we verify the fact that a particular tagged butterfly has flown from one point to another and so, for your interest, we shall outline the method we are currently using.

The tagged monarch, or portion of it, is returned to us by mail here at Scarborough College. Our first task is to fasten the tag to the letter, or sometimes to the wrapper of the box, making sure that we have the name and address of the sender, and the date and place of recapture. We then write the number of the tag in a record book, and look up our list of tags issued, to find out which research associate tagged the butterfly.

A form letter is then sent to the associate, telling him the name and address of the captor and the date and place of recapture. He is then asked to let us know where and when the specimen was tagged. This information is duly noted in the record book. If either the date or place of recapture is missing, we write to the captor, asking for the information. Once this is received, it is recorded and the captor is informed of the name and address of the associate who tagged the butterfly, and the date and place of the tagging. If all the necessary information was included in the original letter, we inform the captor of the pertinent information.

You might be interested to learn that all of the original tags of recaptured specimens are retained in our laboratory, also any correspondence involved; so that it is possible for us to verify this information at any time, if necessary.

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#### RE ANSWERING MAIL FROM OUR RESEARCH ASSOCIATES

One of the delights of this kind of research is the very interesting correspondence which we maintain with our research associates and which we thoroughly enjoy. Through our correspondence we have come to know some of you personally and we value these friendships very much.

Occasionally, however, due to the pressure of other commitments, such as the preparation of lectures, the compiling of data or writing of research papers we are unable to answer your letters as quickly as we would like to, we therefore hope that you will bear this in mind when you write to us and that you will be patient if your letter is not answered immediately. If, however, you require tags, please put URGENT-TAGS on the outside of the envelope and we shall send them to you as soon as possible.

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#### RESEARCH GRANT FROM NATIONAL GEOGRAPHIC SOCIETY

We are very gratified that the National Geographic Society has awarded another generous grant to us to help us to continue our research on the monarch butterfly during the coming year. As a result of this support we shall be able to get the extra clerical help necessary for us to maintain contact with our large number of research associates. As a further result of support from the National Geographic Society we have been able to complete a survey of the presence of monarch butterflies in Texas and Mexico and to complete and submit for publication a study of the monarch butterfly population of southern California and finally to further our activities in a study of the resident and migrant population of Florida.

We have also been able to make a survey of the fluctuations of numbers of monarch butterflies in North America as well as continuing studies of the possible relationship between mimicry and bird predation. We are hoping, in the future, as a result of continued support from the National Geographic Society, to complete our study of the monarch butterflies in Australia and to investigate the presence of the monarchs as a migratory population in Central America with special reference to Guatemala and Panama.

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We wish to thank those of our associates who have written to the National Geographic Society expressing their appreciation of support given to us and who sent us copies of their letters.

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#### LIST OF DONORS TO INSECT MIGRATION RESEARCH FUND

We are very grateful to the following research associates for donations that they have made to our research fund in addition to paying their annual fees. These extra funds will help us to cover increased mailing costs, arising from circulating questionnaires and mailing butterflies to be transferred.

Mrs. Fred Armstrong, Little Silver, N.J.  
Mr. Fairbank Carpenter, Farr Hills, N.J.  
Mr. Wm. C. Casello, Ann Arbor, Michigan.  
Mr. Boughton S. Cobb, New York, N.Y.  
Mr. Jerome C. Draper, San Francisco, Calif.  
Mrs. Paul A. Elliott, Muskegon, Michigan

Mrs. Ruby Fender, Riverton, Iowa  
Mr. and Mrs. E.F. Fergus, Lawrence, Kansas  
Mrs. Jessie Glynn, Limehouse, Ontario  
Mr. Fred Hough, Accord 1, N.Y.  
Mrs. Gertrude Juengel, Hampton, Iowa  
Mrs. Charles Hartley, Pensacola, Florida  
Mr. Edward W. Keith, Windsor, Ontario  
Mrs. Richard P. Klein, Geneva, Ohio  
Mrs. Susan Laughlin, Willoughby Hills, Ohio  
Mr. Steve Lewis, Bradenton, Florida  
Mr. Charles Lipscomb, San Antonio, Texas  
Mrs. Lester Luxenberg, Tonopah, Arizona  
Mrs. F. Marsi, Binghampton, N.Y.  
Mr. Phillip McArdle, Detroit, Mich.  
Mr. Franz L. Pogge, Morgantown, W.Va.  
Mrs. Francis Rafool, East Peoria, Ill.  
Mrs. L.G. Senghas, Mount Clemens, Michigan  
Mr. Prentice K. Stout, Far Hills, N.J.  
Miss Constance Swartzbaugh, Canton, Ill.  
Mrs. Laneil B. Teed, Wichita, Kansas  
Mrs. Frank Throm, Overland Park, Kansas  
Mrs. Pamela Weatherbee, Williamstown, Mass.  
Mrs. Maryanne West, Gibsons, B.C.  
Mrs. Sterling White, Whitney, Texas  
Mrs. Marie Wren, Fillmore, Calif.  
Mrs. Loraine Yurmanovic, Dearborn, Mich.

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MONARCH BUTTERFLY SLIDES FOR RENT OR SALE

Many of our research associates have enjoyed showing the set of 24 kodachrome slides depicting the life history of the monarch butterfly to students and friends.

If you wish to rent a set of these slides, please send \$2.00 and we shall send them to you. If you then wish to purchase any of them, the charge is \$5.00 per slide if they are for your own personal use. If, however, the slides are to be used for commercial purposes, such as in books or articles, the charge is \$25.00 per slide; the proceeds are deposited in our research fund.

These slides are of excellent quality as they were selected from hundreds of slides made by professional nature photographers.

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### SCIENTIFIC PAPERS AVAILABLE TO ASSOCIATES

If you wish to obtain any of the scientific papers listed below, please let us know and we shall send them to you. These papers are supplied free of charge to our associates.

1. "A Population Study of a Hibernial Roosting Colony of the Monarch Butterfly - *D. Plexippus* - in Northern California".
2. "Laboratory Techniques for Maintaining Cultures of the Monarch Butterfly".
3. "A Study of the migrations of the Gulf Coast population of the Monarch Butterfly - *Danaus plexippus* L. - in North America".
4. "Monarch Butterfly - *Danaus plexippus* - Migration Studies: Autumnal Movement".

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### PUBLICITY RE MONARCH RESEARCH

Mr. Alfred Carlson of Toms River, New Jersey, has published in the "4-H News for Youth" and the "National 4-H Entomology Program" - stimulating accounts of the monarch butterfly tagging program designed to awaken young people's interest in our research.

Mrs. Margaret Elliott of Muskegon, Michigan was the author of "Outdoor Activities" column in the "Muskegon Chronicle" which described the monarch tagging program in that area and appealed for help from local residents in recapturing tagged monarch butterflies.

Mrs. Calvin Emery and her daughter Maryanne of Nevada, Miss., were the subject of an illustrated nature article published in the "Nevada Herald". The article described Mrs. Emery's varied activities in rearing monarch butterflies.

David Fagle of Marshalltown, Iowa and his work with special students in connection with the monarch butterfly tagging program was reported in the "Marshalltown Iowa Times-Republican" of October 1969 and in "The Daily News" of Camarillo, California of October 1969.

Mrs. Mary Hunholz of Manhattan, Kansas and her work with school children in tagging monarchs was the subject of an illustrated article in the "Mercury", September 1969.

David Minasian of Sacramento, California and his tagged butterfly that was recaptured there, was the subject of an illustrated article in the "Sacramento Union" in October 1969.

Mrs. Helen Raub of Chatam, New Jersey wrote an account entitled "Adventures in Butterfly Banding" which was published in the spring 1969 edition of "The Oak", bulletin of the Summit Nature Club of Summit, N.J.

Mrs. Sue Reuter of Bradenton, Florida and her work with the residents and school children in Bradenton, Palmetto and Sarasota was the subject of a profusely illustrated article in the "Bradenton Herald Tribune" of December 1969.

Mrs. Martha Schaffer of Baltimore, Maryland and her part in the Junior Naturalists program of the Maryland Ornithological Society was described in an illustrated article published in the "Sunday Sun".

Jimmie Stephens of Enon, Ohio and his interest in the tagging project were reported in the "Fairborn Daily Herald" in July 1969.

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#### LECTURES RE MONARCH BUTTERFLY RESEARCH

The following research associates have given or are about to give lectures describing the monarch butterfly research and their part in it as research workers:

Mr. William C. Casello of Ann Arbor, Michigan presented a lecture entitled "The Junior Scientists and the Insect Migration Studies" at the National Science Teachers' Convention at Dallas, Texas in March 1969.

Mr. Steve L. Lewis of Palmetto, Florida instructed a class at the Junior Science Museum of Bradenton on the subject of "Monarch Migration and Conservation".

Mrs. E.A. Raub of Chatham, New Jersey will present a lecture, "Tagging Butterflies" to the Chatham Nature Club in April 1970.

Mrs. Hellen Ochs of Columbus, Indiana spoke to the children of the sixth grade at Kent School in Columbus about the monarch butterfly tagging program.

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#### TEXAS MUSEUM EXHIBIT OF MONARCH MIGRATION

Charles Lipscomb of San Antonio, Texas sent us the following excerpt from "The Light", a San Antonio newspaper, May 1969, "A new natural habitat group, "Monarch Migration" has been added to the Lone Star Hall of Texas Wildlife and Ecology Exhibit at Hemisfair Plaza. The display features an exhibit of Monarch butterflies. The butterflies were collected and donated by Mrs. K. Yeager of Pearsall, Texas". Note: Mrs. Yeager is also a research associate of ours.

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#### UNIVERSITY COURSE CREDIT GIVEN FOR MONARCH PROJECT

Mrs. Mary Hunholz of Lee School, Manhattan, Kansas 66502 has been awarded a university credit from the Kansas State University for her teaching unit on "Problems in Education" for science and social studies which is based on research on the monarch butterfly. Mrs. Hunholz has given us permission to state that she will answer questions about the teaching unit if associates wish to write to her. Please send any inquiries directly to Mrs. Hunholz at her school address.

### AWARDS AND PRIZES

Carol Chilson of Detroit, Michigan who is a student of one of our research associates, Mrs. Julia Jewell and a research associate herself was awarded a Blue Ribbon and 7th place at the Detroit Science Fair for her entry, "Mystery of the Monarch".

Margaret Fuzek, of Kingsport, Tennessee won Reserve Champion and a Scholarship at the Southern Appalachian Science Fair in March 1969. She also won the Navy Science Cruiser Award First Alternate, the United States Army Award, the Tennessee Veterinary Medical Ass'n Women's Aux. Third Biological Best Award. Margaret won third place in the Mead Science Essay Contest with an essay entitled "The Growth and Behavior of Butterflies and Moths" and was given the "K" letter award for being an outstanding member of her school science club.

Paulette Samuelson of Pleasantville, Iowa was a Blue Ribbon Winner at the local Science Fair with her project concerning the monarch butterfly.

Mary Sheppard of White Bear Lake, Minnesota won the champion ribbon with her 4-H entomology exhibit at the county fair.

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### SUGGESTION FOR FEEDING MONARCH CATERPILLARS

One of our young associates, Jerry Barcelow of South Royalton, Vermont has suggested the use of florists "frogs" - heavy metal discs set with upright pins - for supporting milkweed plants. Jerry places the plants on the frogs in water thus keeping the milkweed stalks moist, then he places his caterpillars on the plants. He observes that this device helps to make cleaning the jars very easy and that the plants will stay fresh for several days depending on their condition at time of picking.

Note: We were pleased to receive Jerry's suggestion and to pass it along to you. If you have any suggestions that you think would be helpful to others in rearing or tagging, please let us know and we shall be glad to pass them along.

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### SCARCITY OF MONARCHS

Those of us working in the north-eastern United States and eastern Canada have been aware of the fact that there have been relatively few monarchs during the past four years. We had anticipated a return to maximum numbers during the summer of 1969, but such did not materialize. However, in other parts of North America the monarch butterfly has become abundant.

As previously reported to you, we are convinced that the fluctuations in the numbers of the monarch are due to a virus epizootic (plague). Why the monarchs should occur in abundance in some parts of the country and not in others is a real problem but one in which there is a definite answer, if we can get sufficient good data upon which to work it out.

We hope to produce a short paper dealing with these fluctuations in the near future and such will be made available to you.

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### MONARCHS IN FLORIDA

From the data which was available to us at the time the Monarch Book was written, we had concluded that the monarch butterflies occurred in relatively small numbers in Florida during the winter but were absent during July and August, returning again in September. We also concluded that larvae and pupae occurred for a short time in September and October as a result of the returning migrants. One of our colleagues, who carried out studies on mimicry in Florida, drew our attention to the fact, however, that the monarchs occurred in all stages of development in Florida during the entire year.

Mrs. Reuter took up the study of this problem and, as a result of her efforts, and with the active assistance of her husband, Dr. Reuter, we now have a great deal of data upon which to formulate some fairly accurate conclusions and data which fit well into what we have found about a similar situation in southern California. We had the great pleasure of working with Dr. and Mrs. Reuter for a few days in February of this year - unfortunately, for too short a period since we had to return to our teaching at the University of Toronto following student "reading week".

We have started to collate the data on the Florida studies and we hope to have a short paper available to you in the near future.

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### AUSTRALIAN MONARCHS

We have made considerable progress with our paper on the studies that were carried out in Australia. Unfortunately, we have been unable to obtain the data for short flights from our associate and hence find it difficult to compare these data with those in our paper on the California population. However, we will try to publish what data is available to us and hope that as a result of this, some others in Australia may become sufficiently interested to take up the study and add the more finite data that is needed to complete the investigation. Perhaps you know of some one in Australia who would like to join our monarch research team. There is a most important contribution to be made in a study of the Australian monarchs which is the same species as our North American one and which was undoubtedly transported to Australia many years ago, as explained in the Monarch Book, and has become established there. The question now is, do these butterflies, now south of the equator, behave the same as ours? What factors govern their migrations - indeed if they do actually migrate?

### BATESIAN MIMICRY

Many years ago Dr. Bates formulated a hypothesis, based entirely on sight observations, that a species of butterfly, because of its resemblance to a species which birds found distasteful, is protected from its predators. We have never been able to accept this hypothesis and, as time goes by, it is becoming apparent that the hypothesis is rather weak and supported by rather weak experimental data. Observations we have made together with our laboratory studies point to the idea that the hypothesis is, for the most part, anthropomorphic, that is the behaviour of the animals is interpreted as though the animals had the same reactions as humans.

In your field studies, how many times do you see a bird attempting to capture a butterfly? Why not try some experiments of your own? Cut up a few dead monarchs into pieces and place them on your bird feeding stations and see, as one of our associates has already whether or not birds reject these pieces. You might be surprised to find that many species of birds like them. We have found this to be the case in our laboratory experiments. Not only that, the birds will capture the flying butterflies when placed in the cages, nip off the wings and devour the bodies. Others, eat the entire insect, wings and all with no ill effects. Ground up butterflies mixed with bird feed has no ill effect - indeed the birds grow fat and sleek on the diet. Why is it that butterflies are captured and eaten when placed in the same cage with birds but do not do so out-of-doors? We think we have an answer to this one. Have you any ideas? Why not try a few experiments of your own? Perhaps you will think of some method or explanation that has so far escaped our mental gymnastics.

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### RESPONSE TO QUESTIONNAIRE

We would like to thank all of you who have responded so promptly to our questionnaires concerning the possible predation of birds on butterflies and the scarcity of monarch butterflies this past season. We appreciate your cooperation in this effort very much as we are able to obtain much valuable information from your answers, especially in view of the fact that our associates represent almost every sector of the United States and many parts of Canada.

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### OVER THE OCEAN

Can the monarchs travel across vast stretches of the ocean? Can they be carried by winds from North America to the United Kingdom (U.K.)? Is it possible that these seemingly frail creatures can be picked up by cyclonic storms, carried to thousands of feet above the surface of the earth and in this way are transported to the U.K.? These are the questions for which we have no definitive data upon which to formulate an accurate answer. From our research we do know that monarchs will not fly at night. We also know that if they land on a water surface and stay there for a period in excess of half an hour, that they can no longer fly. We also know that monarchs tend to take to cover in a strong wind - coming to rest on trees or bushes on the leeward side. We also know that monarchs will land on vessels

travelling across the Great Lakes, coming to rest on the rigging when the wind is strong. We also know that the pupae may be carried on shipments from North America to Europe.

When we consider the above definitive data we must surely come to the conclusion that the monarchs may be carried out to sea by strong winds - no one will deny this possibility - but once so stranded far from land they will come to rest on any small island, and what better island than a large ship bound for the U.K? This, we believe, is the true answer to the question of how the monarchs travel from North America to the U.K.

There are those who have studied bird migration and know, by definitive data, that they are sometimes carried by strong winds far from their regular migratory pathways. However, the ornithologists must bear in mind that birds manufacture their own body heat (homeothermic) while insects do not; their body temperature is about the same as the surrounding air temperature (poikilothermic). Birds can fly at low temperatures, butterflies cannot. Also, birds do fly at considerable heights. Butterflies, as has been shown by Dr. Glick after 1700 flights at heights as high as 5,000 feet, do not fly above 500 feet except on very rare occasions - only one incident noted by Dr. Glick.

How can we obtain definitive data? One way is by our tagging program. Perhaps Paul Cherubini, one of our most active associates in California, may supply the data we need. Paul's father liberated hundreds of monarchs as far at sea as he travelled across the Pacific ocean. Paul's father also made observations on the activities of the butterflies when so liberated. Perhaps you know of someone who might also carry out a similar program? Only by liberating thousands of butterflies at sea and having them picked up again by other vessels or in far off lands can we begin to piece together this most fascinating aspect of the migration of the monarch butterfly.

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#### LABORATORY INVESTIGATIONS

Our laboratory work has progressed extremely well. We have completed our studies of the "gold spots" on the pupae of the monarch. We now know about their cellular structure and what functions they apparently perform. Three separate scientific papers will be prepared for publication and these will be made available to you during the coming year.

Our studies of Batesian Mimicry have been curtailed for the present since the student who was carrying out these investigations has joined a group known as "Pollution Probe". This is a very active group in Canada, headed by the Chairman of our Department of Zoology. One of the big achievements of last year was the ban on the use of DDT in Ontario which we hope will be extended to include all of Canada. Have you ever considered starting a similar group? The more such groups we have, particularly those of us who are so fond of our natural world and appreciate it so very much, the more our politicians will have to sit up and take notice of us and the more they will be forced to enact good laws to stop this destruction of our very finite earth for the good of all.

We have completed our study of the so-called "hold-fasts" on the pupa of the monarch butterfly and this paper has been sent to the "Canadian Entomologist" for publication. If accepted and published, copies will be made available to you. It is a most fascinating structure and answers the question, which must have occurred to you, "How does the caterpillar hang on to the mound of silk while the cremaster of the pupa is being withdrawn?" We have found the answer and it is a most fascinating one.

We have completed our study of the cell structure of the alar glands of the male monarchs. As yet we have not had time to collate this material but hope to do so sometime this summer. The structure of these wing spots is most fascinating and I am certain that you will enjoy reading about it. We have used various optical equipment in the study - various types of light microscopy and electron microscopy. The first paper will deal with our light studies; the electron microscope studies will be published at a later date.

Our studies of virus continue, but slowly, owing to lack of time. Dr. Victor Kingsley, a Professor on our staff, is making a study of the bacteria of the monarch butterfly and this study should be available for publication in the near future.

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#### TEXAS TO MEXICO

Based on the data received over the past many years we were led to the conclusion that the monarch butterflies from the eastern parts of North America migrated southward and westward finally overwintering in parts of Florida, along the Gulf Coast and, for the most part, south-western Texas.

Thanks to the generosity of the National Geographic Society, we were able to plan a trip across the south-western United States to the south-western parts of Texas. Along our route we stopped at fourteen Universities and had the very great pleasure of talking to scientists interested in field biology, to graduate students who were carrying out various research projects, and to undergraduate students in Biology. We learned a great deal as a result of these contacts.

We arrived at Kingsville, Texas, in late January and made our headquarters at the Texas A & I University where we were given a small laboratory space for use as an office. While at Texas A & I we had the very real pleasure of meeting one of our most active associates, Charles Lipscomb, and his family. Charles recently hit the news headlines with a recapture of one of his cecropia moths.

From Texas A & I we travelled far and wide across the great expanse of western Texas from the Gulf of Mexico in the south to the mountains of Big Bend in the north. Throughout our journey, covering many thousands of miles, we made contacts with various naturalists, biology teachers, and faculty members of Universities. We found, much to our amazement, that the monarchs do not remain in Texas but continue through Mexico.

So, off we went through Mexico as far as Lake Chapala near

the Pacific Ocean.

To shorten this discussion - for we could write pages about our many wonderful experiences and the friendly and most cooperative people we met - we concluded that the monarch butterflies in their southward movement pass through Texas, across the mountainous sections of Mexico finally reaching the Pacific area of Mexico and the Central Americas.

Now what!!! Well, we have made arrangements through the kindness of members of the staff of the University of Florida at Gainesville and the Florida State University at Tallahassee, to commence a study of the monarchs in Guatemala and Panama. We hope to add a number of associates in these areas in an attempt to obtain as much definitive data as possible on these amazing long-distance flights. Some day the entire story will be told and this will be the result of the efforts of all of us who are devoted to the study of this most amazing little butterfly. Incidentally, we did capture monarchs on their return trip from Mexico and tagged a number of them.

In carrying out our investigations in Texas we were most grateful to Mrs. Kerry Yeager, one of our most enthusiastic associates and one who has added a great deal of knowledge to our studies. We wish we had more space to tell you about our visits with Mrs. Yeager and her delightful family and the opportunity we had to meet another enthusiastic associate, Mrs. Roy Busby. If ever you are in the neighbourhood of Pearsall, Texas, call on Mrs. Yeager - she would be delighted to meet you and chat about monarchs.

\* \* \*

#### TRANSFER OF BUTTERFLIES

As a result of our investigations in Texas and Mexico in the winter and spring of 1969, we realise that it is important for us to have as many tagged specimens released in Texas as we possibly can. Since, to date, we have not been able to locate large overnight roosting colonies in Texas, we have encouraged those who have access to temporary or permanent roosting colonies to transfer their specimens to Texas in the hope that they might be picked up in Mexico or even further south. We are grateful to the following for cooperating in these experiments:

Paul Cherubini of Castro Valley, California for sending specimens to

Mr. C. McQueen of Mercedes, Texas .

Mr. F. Munger of Whittier, California for sending specimens to Mrs. S.

Mayberry of Eagle Pass, Texas.

Mrs. L. Teed of Wichita, Kansas for sending specimens to Mr. J.

Vichareli of Laredo, Texas.

\* \* \*

## TAGGING RETURNS FOR NEW SPECIES OF BUTTERFLIES AND MOTHS

When we refer to the "new" species of butterflies and moths we are referring to species other than the monarch butterfly which have been tagged and recaptured.

Although the flights of species other than the monarch may not be as long and therefore do not seem to be as dramatic as those of the monarch, nevertheless we are very anxious to have all possible species tagged, as tagging has proved to be the only definitive method of tracing the flight of an insect from one particular point to another. Also, the reports of insect migration which have been documented up to the present have been based on sight records only. Thus, any information we can document about the flight of these insects will be new to science. We are more concerned with recording flights than we are with the actual length of the flight involved since this evidence will help us to establish which are migrants and which are not. We are very pleased to report that the following species of butterflies and moths have been tagged and recaptured:

black swallowtail, tiger swallowtail, spicebush swallowtail, mourning cloak, common sulphur, parsnip butterfly, painted lady, gulf fritillary, viceroy, cecropia moth.

Of these, one cecropia moth travelled 5 miles, the tiger swallowtail travelled 9 miles and the mourning cloak travelled 31 miles. All of these are much longer flights than we had suspected these insects were capable of, although it has been suspected that cecropia moths were capable of long flights, this is the first time that such a flight has been documented. As a result of tagging these insects we hope to find out which of them are migrants and which have a limited range of movement.

The following associates have been responsible for tagging the above species:

Robert Allen, Brent Beam, Amy Bickel, Paul Cherubini, Thomas Corbett, James DeMaio, Bill Dufour, Margaret Fuzek, Gregory Glovas, Anne Heath, Diane Keithahn, Charles Lipscomb, Mrs. Clifford Morgan, Stephen Overbey, Linda Payne, Robin Renner, Mary Sheppard.

\* \* \*

### RE: TAGGING SPECIES OTHER THAN MONARCH BUTTERFLIES

NOTE: If you are tagging new species, please identify them according to some reliable source and quote your source in your report with the page number and species involved. We ask you to do this as sometimes only the tag or portion of the wings are returned to us and we have no way of knowing the species that has been sent back to us.

Suggested sources are: Ehrlich and Ehrlich, "How to Know the Butterflies:"

S.C. Brown Publishers, Dubuque, Iowa.

"A Field Guide to the Butterflies" by A.B. Klots, published by Houghton, Mifflin, Co., Boston, Mass.

TAGGED CECROPIA MOTH RECAPTURED

The interest generated by the capture of a tagged butterfly or moth is a constant source of amazement to us. We have had many telephone calls at Scarborough College from places as far distant as Louisiana and California as a result of one of our associates' tagged insects being recaptured. Recently, we received a telephone call from San Antonio, Texas, from a Mrs. Sharp, whose son found a cecropia moth which was tagged by one of our associates. The associate turned out to be Charles Lipscomb, also of San Antonio, who had tagged and released the moth, which had travelled  $2\frac{1}{2}$  miles before being recaptured. The incident was featured in two news releases published in the "San Antonio Evening News" of March 16 and March 17, 1970.

We are pleased that this incident had been the focus of publicity as we are anxious for the public to be aware of our tagging program so that they will be on the alert for recapturing tagged insects, and returning them to us at Scarborough College.

\* \* \*

LATE COPY - PUBLICITY RE MONARCH BUTTERFLY RESEARCH

Philip Hagopian of East Long Meadow, Mass. and his interest in monarch butterfly research was the subject of an illustrated article in the January-February 1970 issue of the magazine "Hobbies for Fun and Profit" published in Seabrook, New Hampshire.

MEMBERSHIP For 1970

RENEWAL FORM

If you wish to continue as a research associate in the Monarch Butterfly Tagging Project, please fill out the following form and send it to: -

Professor F. Urquhart,  
Scarborough College,  
University of Toronto,  
West Hill, 483, Ontario, Canada.

Please enclose your renewal fee of \$2.00. Make cheques or money orders payable to the University of Toronto, Monarch Butterfly Research Fund.

Please write on the face of your cheque - "Payable in Canadian Funds"  
Please do not send cash.

.....  
RESEARCH ASSOCIATE FORM 1970

Name - Mr. ....  
Mrs. ....  
Miss .....

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

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

Age(if under 18)

Occupation .....

Year in which you were first registered as a research associate .....

Enclosed please find \$2.00 for the annual fee .....

Fee already paid for 1970 .....

Number of tags required for 1970 .....

Serial number of tags on hand for use in 1970 .....  
.....

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

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