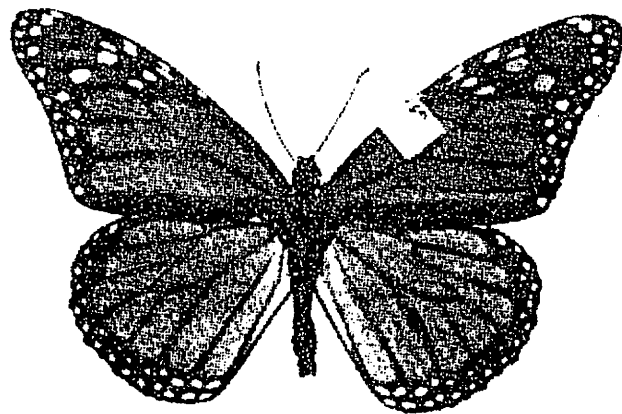


Insect Migration Studies



*Newsletter
to
Research Associates*

VOL. 4 MARCH 1967

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 WILSON, R.R. #5, COBOURG, ONTARIO, CANADA.

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FROM PROFESSOR URQUHART

HEAD OF MONARCH RESEARCH PROJECT

Although this has not been a very active year from the standpoint of tagging monarch butterflies, nevertheless, we have gained a great deal of valuable information about the monarch butterfly which we would like to bring to your attention.

We feel that our annual newsletter is a valuable link between the research associates and ourselves since it gives a comprehensive picture of the accomplishments of our project for the past year. We are, therefore, very grateful to Miss Audrey Wilson for acting as our Editor again this year.

* * *

TAGGING RETURNS FOR 1966

Although there was a marked scarcity of monarch butterflies in 1966, resulting in a drastic reduction of tagging by associates we had some returns which are of interest.

<u>TAGGED BY</u>	<u>AT</u>	<u>RECAPTURED AT</u>
BRENT BEAM	Burlington, Ontario	Akron, Ohio
J.T. CARLISLE	Whitier, California	Hurricane, Utah
F. MUNGER	Pismo Beach, California	Carmel, California
MRS. K. YEAGER	Pearsall, Texas	Batesville, Texas

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TAGGING FOR 1966

Even though many of you were able to do little if any tagging this past season, we appreciate very much having your report of conditions in your particular part of the country, commenting on the number of monarch butterflies you were able to find and the efforts that you put forth in looking for monarchs and in rearing them, securing the food plant etc. In this way, we are able to gain a comprehensive view of the variations in the monarch population.

TRANSFER EXPERIMENTS

Transfers of tagged monarch butterflies by mail from one part of the world to another in order to explore flight patterns where monarchs are of relatively rare occurrence were considerably reduced this year due to the scarcity of specimens.

However, we are very grateful to Mr. F. Munger, and Mr. J.T. Carlisle of Whittier, California for the 404 specimens which they mailed to Mrs. K. Yeager of Pearsall, Texas and to Mr. B. Beam of Burlington, Ontario for the 74 specimens that he mailed to Mrs. Yeager. We also appreciate Mrs. Yeager's efforts in releasing and recording data of the transferred butterflies.

Of the transferred specimens from California one was released in Pearsall and was picked up five days later in Pearsall. No other transferred specimens were recaptured.

From Toronto, Ontario, Dr. Urquhart mailed 50 tagged monarchs to England where they were released, through the kind co-operation of Mr. J. Burton of the British Broadcasting Corporation, near Clevedon in North Somerset. One specimen was recaptured at Littlestone Kent after a flight of 165 miles east, southeast. No other transferred specimen was recaptured.

We plan to continue our transfer experiments in the future on a greater scale when the population becomes more abundant.

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DONATIONS TO MONARCH BUTTERFLY RESEARCH FUND

We are extremely gratified this year to find that the number of our research associates who have contributed to our research fund in addition to paying their annual fee has increased significantly over last year. We are doubly grateful to these people who have expressed their interest and encouragement in the tagging project since this year we have found it very difficult to secure funds for our research through the normal channels.

We wish to thank the following for their generous contributions to our fund:

Mr A.L. Brandhorst, Denver Col.
Mrs. G. Brewer, Newton Highlands Mass
Mrs. R. Busby, Dilley, Texas
Mr F Carpenter, Far Hills, N.J.
Mr. W. Casello, Ann Arbor, Mich
Mr. B. Cobb, Falls Village, Conn
Mrs. Paul Elliott, Muskegon, Mich

Miss L. Malick, Wayne, Neb
Mrs. F. Marsi, Binghamton, N.Y.
Mr B.Mentes, Hasbrouck Heights, NJ
Mr. E.J.O'Connell 111 Springfield
Mr. C.W. Pitman, Litton Industries
Mr & Mrs J.C. Schmid Greenwich, Con
Mrs J.G. Senghas Mount Clemens Mic

Mr. F. Feiszli, Vermilion, Ohio
Mrs. R. Fender, Riverton Iowa
Mr & Mrs E.F. Fergus, Lampe Miss
Mrs. J. Glynn, Limehouse, Ont
Mrs. C. Hartley, Pensacola, Fla
Mr. J. Klipstein, Wausau, Wis
Mr. J. Malick, Stevens Point, Wis

Shell Canada Limited, Toronto Ont
Mr. S. Sweet, Manchester, Conn
Mrs. F. Throm, Overland Pk, Kans.
Mrs. B. Weitgenant, Minneapolis Min
Mrs. M. West, Gibsons, B.C.
Mrs N. Willison, Midland, Mich.
Mrs M. Wilson, Napa, Cal.

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LIVE MONARCHS FOR LABORATORY RESEARCH

In addition to carrying out our associate program for tagging the monarch butterfly, so that we may obtain more information on the migrations of this insect, we also study various other aspects of the life of this butterfly. In addition to the virus study, reported elsewhere in this newsletter, we are also working on the effect of light period on the development of the reproductive organs; the structure of the wing pockets on the hind wings of the male monarchs; the location and appearance of the cells located on the mesothoracic legs that are sensitive to chemical substances; and the effect of temperature and humidity on various parts of the life cycle.

For these studies we are, at times, in need of more live adult specimens. We wish to thank Mr. F. Munger and Mr. J.T. Carlisle of Whittier, California, for the many specimens which they have sent to us. Also, those sent by Miss M. Lussier of Florida, for a phase of the research dealing with the particular population found in Florida.

NOTICE RE RETURNING TAGS

Please note that it is no longer necessary to return any tags that you have left over from the previous season as we now have an infinite series of numbers. Please use any tags that you now have and request more as you need them, or when you send in your membership renewal fee for next year.

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SLIDES OF MONARCH BUTTERFLY FOR RENT

We would like to remind our research associates that we have a set of 25 slides of the monarch butterfly available for rent. These are excellent photographs covering the life history, tagging procedures, and overwintering sites, and are accompanied by a descriptive list.

If you wish to rent the slides for lecture or classroom purposes, the charge is \$2.00 plus postage. Please make your cheque or money order for \$2.00 payable to the University of Toronto, Monarch Butterfly Research and send it to Scarborough College, University of Toronto, West Hill, Ontario, Canada.

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DATA CONCERNING RESEARCH ASSOCIATES

We thought you might be interested in learning what happens after you register as a research associate in the Monarch Butterfly project.

First, a page is kept for each associate in a loose-leaf notebook, this page gives the following information; name, address, date of registration, the payment of the fee and the tags which have been issued. When the tagging report is submitted, a note is made of the date and the number of butterflies tagged.

Second, a file is set up under the name of each associate. This file contains correspondence and reports.

Third, a card is made bearing the name and address of each associate and this card is filed according to state or province.

Fourth, a pin is placed on our large (three feet by three feet) map of the United States and the southern part of Canada, indicating the location of each associate.

In this way we are able to keep quite a comprehensive history of each associate, which is helpful in interpreting our data and in setting up transfer experiments, etc.

* * *

VERIFICATION OF RE-CAPTURED 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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PUBLICITY AND SCIENTIFIC PROJECTS

Mrs. Emily Stobbe of San Jose, California has given excellent publicity to our project by writing articles for the "Audubon Magazine" and for "Science and Children" about the tagging program. As a result of this we have made many valuable contacts.

Mrs. K. Yeager of Pearsall, Texas, and Mr. F. Munger of Whittier, California, were the subject of an article in the "Pearsall Texas Leader" because of their cooperative work in tagging and mailing butterflies for transfer experiments.

Mr. Edward Keith of Windsor, Ontario gave an informative speech about the monarch tagging project and the virus affecting monarchs which was reported in the Windsor Star, the Amherstburg Echo and the Kingsville Reporter.

Mrs. Virginia Rafool of East Peoria, Illinois was the subject of an article in the Peoria Journal Star because of her keen interest in the photographing of the life cycle of the monarch which caused her to stay up all one night to get the full sequence recorded.

Randy Reese of Newark Valley, N.Y. won first prize in the Science Fair in the grade 4-6 division with his colorful and dramatic presentation of the life cycle of the monarch.

Jane Rakowski of St. Albans, Vermont, won first prize for her written account of the "Migration of the Monarch Butterfly" at the school science fair.

Mrs. Barbara Dodge, of Hamburg, N.Y. gave a demonstration of tagging at the Buffalo Audubon Society at the Erie County Fair.

Mr. F. Munger's intensive work in rearing monarchs was reported in the Daily News, Whittier, California.

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RE PUBLICATIONS SOLICITING HELP FOR MONARCH TAGGING PROJECT

This year we have had many people join our project as research associates after reading books and magazine articles which have been published about our work. From our standpoint it is very gratifying that the monarch butterfly has such popular appeal and we are very grateful to those who have written about our work, and to those who have become interested enough to join as research associates.

We have found, however, that some misunderstanding has arisen due to this type of publicity; many people have assumed that we have written these books and articles ourselves publicizing our work and soliciting help. We would like to emphasize therefore, that this publicity has not been sought by us, and that we have not solicited help. The authors involved have, on their own initiative, asked interested persons to contact us. Once approached, we then send a form letter explaining the purpose of the project and the fee involved. We trust that this explanation will clarify the confusion which has arisen because some people assumed that we were soliciting help and then charging a fee for those who volunteered to assist us.

NEW ASSOCIATES AND SCARCITY OF MONARCH BUTTERFLIES

For the benefit of those who have recently joined our monarch butterfly project as research associates we would like to point out that monarch butterflies are subject to cyclical variations in population and that although monarch butterflies were extremely abundant in 1963, in 1964 we began to receive reports from our associates of monarchs being scarce in certain areas and from others that monarch larvae and pupae showed signs of suffering from disease. By 1965 the downward trend of the population was very marked and by 1966 the majority of our research associates reported that monarchs were of rare occurrence or were completely absent.

We are drawing these facts to the attention of our new associates so that they will be aware of the variation in monarch butterfly population and will not be discouraged if they have difficulty in locating butterflies to tag in the coming season. From past experience we would predict that this summer should see a slight increase in the numbers of monarchs over last year and that the population will increase rapidly in the next two or three years. In the meantime, we would suggest that although monarchs will not be abundant this season, that this would be a good opportunity for new associates to read about the monarchs life history and habits. We refer you to "The Monarch Butterfly" by F.A. Urquhart and to articles which have appeared in recent years in the Reader's Digest, Audubon Magazine and National Geographic.

REARING OF THE MONARCH BUTTERFLY

In co-operation with Professor Stegner of the University of Delaware, an article dealing with the methods which we have been using for the rearing of the monarch butterfly is being prepared. A number of copies of this publication will be purchased for distribution to those of our members who indicate their desire to receive such. Copies of publications are, of course, sent to our associates free of charge. The cost of such publications is paid for out of the balance of our research fund to which each member contributes a dollar each year.

* * *

SCIENTIFIC PAPERS AVAILABLE

When sufficient information (data) has been obtained with respect to the various divisions of our studies of the monarch butterfly, a scientific paper is written and published in a scientific journal.

During the past year four such papers have been published. These are as follows:

1. A STUDY OF THE MIGRATIONS OF THE GULF COAST POPULATION OF THE MONARCH BUTTERFLY (DANUS PLEXIPPUS) IN NORTH AMERICA.
2. MONARCH BUTTERFLY (DANUS PLEXIPPUS) MIGRATION STUDIES: AUTUMNAL MOVEMENT.
3. A POPULATION STUDY OF A HIBERNAL COLONY OF THE MONARCH BUTTERFLY (D. PLEXIPPUS) IN NORTHER CALIFORNIA.
4. VIRUS-CAUSED EPIZOOTIC AS A FACTOR IN POPULATION FLUCTUATIONS OF THE MONARCH BUTTERFLY.

We have a limited supply of reprints of these publications available free to our associates. Let us know which of these topics are of interest to you and we shall send you a reprint, as long as the supply lasts.

FORECAST OF THE MONARCH POPULATION THIS SUMMER

If the monarch population follows the usual trend, as experienced in past years, we anticipate a slight increase in numbers this summer (1967). They should be more abundant in the south-western part of the continent and less so in the north-eastern. We would ask all our associates to make careful notes of monarchs seen this summer - this information would be more valuable to our studies than tagging, at the present time. In order to make a good assessment of the population, it will be necessary to visit areas where the milkweed grows and to observe over a period of at least two hours, as to the presence or absence of monarchs. This should be done at least every second week throughout the summer months, commencing in early June for the north-eastern parts of the continent, and early March for the south-western parts. The number seen in a two hour period should be recorded together with the presence of any larvae that may be found.

If you should find a female in the act of laying her eggs, we suggest that you capture the specimen and keep it in a cage with milkweed plants so as to obtain the eggs. These may then be reared and the adults tagged when they emerge from the pupae. If you wish further instructions on obtaining eggs and rearing the monarch larvae, please write to us and we shall send you the necessary instructions.

SPRING MIGRATION

It is interesting to note that in the 1964 newsletter dealing with the summer's activity of 1963, we recorded: "We have had more records of spring migration this year than ever before. In some cases there are reports of large northerly movements." In contrast with this, we had very few records of spring migrants last year and we do not anticipate any large numbers this spring.

It is most important that we have as many sight records as possible since the spring migration is indicative of what the summer population will be like. If there are many migrants then we can anticipate a larger summer population. And if there are very few, then the summer population will be small.

Monarchs enter the south-western States (Texas and the Gulf States), in March and continue through April and May with a few stragglers in June. In the north-eastern part of the continent, they enter toward the end of May and continue through June and the early part of July. During July and early August, few adults are seen but larvae are often abundant (in high population years).

This year, observations will be most important. Make them as frequently and as accurately as you can.

TAGGING SPECIES OTHER THAN THE MONARCH

It has been suggested that our tagging method be applied to other species of butterflies in order to find out whether or not they are migrants. Such species as the Queen butterfly, the Tortoiseshell, the Red Admiral and the Painted Lady, have been suggested to us.

We suggest that you try tagging such species with the labels you have, but please report to us that the tags have been used for this purpose. We hope within the next year or two, to expand our program so as to include other species, but this does not prevent such trials being made immediately. Undoubtedly there are many species of butterflies that migrate from one part of the continent to the other - although not on the long-distance scale of the Monarch butterfly.

You might find that the tags being used are too large for the species you wish to tag. If you find such to be the case, please let us have your experiences. In this way we shall be in a better position to expand our program to other species in the future.

* * *

SCHOOL PROJECT

We are delighted that some school classes are assisting in our tagging program. This not only gives us accurate information, through the teacher in charge of the class, but also initiates the pupils into a phase of natural history study that is both instructive and at the same time enjoyable.

We would suggest that such classes attempt rearing the monarch butterfly from the egg stage. Observations on the rate of development; the changes in the appearance of the larvae as they mature; the number of times the larvae change their skins; the time spent in the pupa stage; and finally the tagging of the mature adults, all contribute to a good and instructive program.

If you wish to obtain instructions on rearing the monarch butterfly please write and let us know.

A DIGITALIS-LIKE SUBSTANCE IN THE WINGS OF THE MONARCH BUTTERFLY

Dr. J.A. Parsons of the Medical Research Council, of the National Institute for Medical Research in London, England, has reported the presence of a digitalis-like substance in the wings of the monarch butterfly. He also found that when starlings were fed this substance, it acted as an emetic. This would seem to lend support to the hypothesis proposed by Bates many years ago, that the monarch butterfly is rejected by birds as an item of food and that the viceroy butterfly gains immunity from attack by birds because it resembles the monarch butterfly in colour.

During the past two years, and again this summer, monarch butterflies will be scarce and, in some districts, non-existent. Yet, you will find that the viceroy butterflies are as numerous as ever. One wonders how the young birds of the year "learn" that the monarch butterfly is bitter to taste when it is not present and thus we may ask the question, How does the viceroy now achieve immunity from attack?

We would greatly appreciate receiving observations concerning the presence of viceroy's in your area this coming summer. Any observations you may make on the viceroy being attacked by birds would be appreciated. We have no records whatsoever of the Viceroy being attacked by birds and only four records (authentic) of birds attacking the monarch butterfly. Please send your observations along.

* * *

CALIFORNIA

We would like to make special mention of the excellent work that Mr. F. Munger, and Mr. J.T. Carlisle of Whittier, California have done this past year in rearing monarch butterflies in large numbers, tagging and releasing them locally and also shipping live specimens to other associates as part of our transfer experiments.

They have also been able to supply our laboratory with a number of live specimens throughout the winter which has been very valuable to our studies.

As a result of their intensive work on the monarch butterfly in Southern California we are now preparing a research paper based on their data.

* * *

SCARCITY OF MONARCHS

At somewhat irregular periods, the numbers of monarch butterflies in North America become small so much so, that in certain districts, they may appear to have completely vanished. At other times they become very abundant.

Three years ago, during the summer of 1963, we realized that there would be a sudden drop in numbers. The causative factor for this reduction in numbers appeared to be a viral infection.

Since 1963 we have been making a study of this virus and we have concluded that it was the causative factor. In our laboratory populations, out of a total of 4000 larvae being reared, only 150 reached the adult stage.

We suspect that eventually a strain of monarchs may evolve that can resist infection by this particular virus and as a result will once again become abundant. Whether such is true or not remains for future experimentation. We have retained in our laboratories preserved specimens of every stage of development that had contracted the virus infection and these will be used to inoculate future generations of monarchs as they once again reach maximum population dimensions.

If the trend of the past thirty years is repeated, we can expect a slight increase in the numbers of monarchs in North America this summer, with a marked increase in the summer of 1968 and maximum population in 1969 - 1970.

The viral infection has a characteristic effect on the monarch larvae and adults. The latter (adults) usually are deformed, with crumpled wings and inflated abdomens that somewhat resemble bowling pins. The larvae often die while attempting to pupate or when shedding their skins. They turn black and the skin is easily ruptured resulting in the release of a black, inky, ill-smelling fluid. Early stages in the development of the virus can be detected in that the larvae become sluggish and eventually do not eat. There is also a slight change in the colour to a light yellowish-brown. You may have noticed this in your rearing of the monarch butterfly and if you have would you please report this to us since, we would like to have information on the extent of the disease in North America.

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