INSECT MIGRATION STUDIES

VOLUME 12, 1975

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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 PROFESSOR F.A. URQUHART AT SCARBOROUGH COLLEGE, WEST HILL, ONTARIO, CANADA, M1C 1A4.

TO OUR ASSOCIATES

FROM

PROFESSOR AND MRS. URQUHART

This has been a most eventful year.

For the past 31 years, but most intensively since 1950 when we introduced our "Research Associate" system, we have been studying various factors in the ecology of the monarch butterfly, with special reference to its migrations. Whether or not the monarch butterflies in the northern parts of the continent migrated was not known for certain. It had been suggested that perhaps some of them overwintered in some stage in their development, either as eggs or in the larval form. Some had suggested that, like certain species of fritillaries, such as the mourning cloak and the tortoise-shell, they might possibly overwinter as adults. We therefore set up a series of experiments in our laboratory to test the "cold hardiness" of all stages of the monarch butterfly life cycle. We found that the eggs and larvae died when exposed to temperatures below freezing and that the adults would survive if exposed to temperatures slightly below freezing for a period of less than ten days, although such experimental individuals exhibited lack of muscle coordination when removed from low temperatures. We therefore concluded that they must migrate or perish.

The question was: where did the monarch butterflies from the greater part of the North American continent spend the winter months? As a result of the active tagging program carried out by our team of Research Associates we learned, after many years and having tagged thousands upon thousands of specimens, that they journeyed to Mexico, with a few stragglers being found in Florida and along the coast of the Gulf of Mexico. During this long period of tagging, many field expeditions were made to check on the presence or absence of migrating monarchs throughout most of North America. We knew about the overwintering areas in California, but we realized that such clusters were not large enough to account for the masses moving from the North American continent, particularly the area east of the Mississippi drainage.

During a leave of absence, from The University of Toronto, we stayed at the Texas A. and I. University in Kingsville, Texas. From there we journeyed for 14,000 miles along the Rio Grande and through Mexico as far as Lake Chapala. As a result of this intensive field study we concluded that the monarch butterflies pass through Texas and through Mexico to some unknown region, perhaps Central America or even northern South America. Field studies carried out by Mr. and Mrs. Magner indicated that monarchs did indeed occur, along with species of milkweed, in Yucatan and other parts of southern Mexico, but not in abundance and many of the specimens observed and collected were not migrants. Therefore, the migrants must be in some inaccessible part of Mexico.

As a result of a field expedition sponsored by the National Research Council of Canada and the National Geographic Society, evidence began to accumulate indicating that the vast hordes of migrating monarchs were to be found somewhere in the mountain areas of Mexico.

We now wish to annouce to our associates, that, after these many years of intensive study, after having tagged thousands of migrants, we have finally located the exact area where they overwinter,with the very able assistance of Ken and Cathy Brugger of Mexico City - see special note in this issue.

The National Geographic Society sent one of their official photographers to the site and we can look forward to a short article in the near future informing all our associates and all members of the National Geographic Society of this amazing discovery. You will be informed by letter when this article will appear. For the present, we do not wish to give exact details of the location. However, in our next Newsletter we hope to write a complete article giving all of the data concerned

One might ask the question: Do the monarchs from the United States and Canada actually journey to this colony in Mexico? To this we can answer a definite, YES, since two specimens tagged, one in Texas and one in Iowa, were found in this overwintering colony. This is mentioned elsewhere in the Newsletter.

Then the question is asked: Do the monarchs from this area in Mexico return to the United States? Again we can answer with a definite, YES, since a specimen tagged in Iowa in September was recaptured the following April in Texas. This is the first tagged specimen to make a round trip. The question then might be asked: Do monarchs from the north-eastern parts of North America return to the same area? For this we do not as yet have a definite answer, but, in view of what has transpired this year, we can anticipate such a discovery in the future.

Our studies are, of course, not completed. There are a number of interesting problems facing us which I am certain we will be able to answer just as well as we have been able to answer the major one. We do not as yet know for certain where the overwintering migrants in California come from. We have a tremendous amount of data on California which has accumulated over the past twenty years and which we are now preparing to study in detail. Whether or not the answer will be found in this mass of data we do not know. For the present, we are of the opinion that the California population, which is relatively small as compared to the Mexican one, is formed from migrants, the larvae of which fed upon species of milkweed growing in various mountain valleys along the west coast.

We have completed our six years of study of the monarch populations in Peninsular Florida and the manuscript will soon be sent to the Lepidoperists Journal for publication, copies of this will be made available to you. This is a most interesting study and has solved many of the problems connected with what we have loosely termed "resident populations" However, much more data concerning the actual migratory routes of the Peninsular Florida populations are needed in order to show with certainty that the migration is indeed towards Cuba and Yucatan.

We have spent a good deal of time studying the migrations along the coast of the Gulf of Mexico in the area of Appalachee Bay. Although many thousands of migrants have been tagged we have been unable to obtain any flight records of any significance. We intend to continue this study if research funds are available.

Once we have completed our examination of the data for California, we will turn our attention to the data we have on the movements of the monarch butterfly in Australia. This should be a most interesting contribution to science since it deals with a migrant animal from the northern hemisphere transferred to the southern hemisphere.

Whether or not monarch butterflies can travel over hundreds of miles of open ocean is still unresolved. We are of the opinion that such is not possible. Only by tagging migrants and liberating them at sea, far from land, can we hope to answer, or at least obtain definitive data, about this most interesting and perplexing flight of the monarch butterfly. If any of our associates are intending an ocean trip during the monarch migration period or have friends that intend doing so, perhaps we can arrange to have a few thousand tagged monarchs released from the vessel well away from land. Observations of such liberated specimens would help to answer this cross-oceanic flight. We should also make careful observations of the presence of monarchs flying over large bodies of water, particularly over the Gulf of Mexico.

There are other species of Danaus and subspecies of Danaus plexippus that occur in Central America and South America. We are particularly interested in the subspecies D. p. megalippe which overlaps our North American subspecies in Central America. We hope to encourage individuals living in northern South America and Central America to join our research team and make a study of this interesting subspecies. We wish also to start an intensive study of the species, Danaus erippus, that occurs south of the Amazon drainage and which appears to migrate in great numbers similar to our North American species.

Indeed, there is no end to this fascinating study of the migration of insects, a study commenced by Dr. Williams many years ago. Species other than the monarch family Danaidae may migrate, but there is no definitive data such as we now have for the monarch butterfly. Only sight observations have been recorded for species other than the monarch. There is, however, a growing interest among entomologists in Europe to alar tag migrants and we can look forward to some startling discoveries for species that appear to journey thousands of miles from Europe to Africa. We shall continue our study of many species of butterflies and moths in North America which study is being carried out by a few of our Research Associates. Although most species of Lepidoptera do not travel great distances it is quite likely that they do travel distances of which we are not now aware. In this connection, we hope to publish the discoveries made by our associates concerning the recovery of tagged butterflies other than the monarch.

Although we shall never come to an end in our studies of butterfly migrations, we shall be able to pass on, in the printed word, our findings for future scientists to examine, evaluate and increase. What may arise from such studies to the benefit of mankind we do not know; but this we do know, knowledge for knowledge sake is indeed worthwhile.

LONG TERM RESEARCH

When we mention to our colleagues at the University that we have been investigating the migrations of the monarch butterfly for the past twenty-five years, they are somewhat surprised. However, those who are involved in ecological field investigations have to work with the changing of the seasons and the response to such changes on the part of the animals under investigation. Thus, we can study the fall migration of the monarch butterfly only once each year. One might compare our data finding to a molecular biologist who uses scientific equipment in which he might push the necessary buttons twenty-five times in one week. It is for this reason, namely, the long term nature of such research, that we involve ourselves in other phases of research such as the experiments carried out on the possible significance of the gold spots on the pupae, or the histology of the alar gland of the male monarch. Thus we are able to indicate to granting agencies that we are busy people trying to solve many little problems as well as one big one.

MEXICO

This Newsletter might well be named "The Year of Mexico". We had suspected for the past number of years that the monarch butterflies from the eastern United States and Canada flew to Mexico there to spend the winter. All our release-recapture data indicated this. However, our expeditions into Mexico seem to indicate that the monarch butterflies simply flew to Mexico and, like the Bermuda triangle, disappeared. However, we persisted in our search and finally found the over-wintering site in Mexico, which as mentioned previously, will be dealt with at length in our next Annual Newsletter. Although we have found the end of the trail, much has yet to be done in Mexico and Central America and we are looking forward to adding many Research Associates living in Mexico to our list.

Recapture Records for Monarch Butterflies in 1974

Although we have received what we would consider a normal percentage of recaptured tagged monarch butterflies for the past season, we have been able to record only a small percentage of flights that were of any great length or significance since a very high proportion of the butterflies were recaptured very close to the point of tagging.

The following are records of flights which we consider to be most significant:

Number	Tagged by	Tagged at	Recaptured at
S2-294	Mrs.C.Emery	Nevada,Missouri	Monera Alta,Michoacan, Mexico
S4-62	Mrs.Harvey Houck	Decorah,Iowa	Richmond,Texas
pt-772	Mrs.F.Hupp	Hinton,Virginia	Buford,Georgia
u5-342	Mrs.E.Kendrick	Sault Ste.Marie,Ontario	South Haven,Michigan
b8-969	James Malick	Stevens Point,Wisconsin	Lincoln,Nebraska
84	John V.McClusky	Fredericksburg,Texas	Los Ranchitos,Michoacan, Mexico
t3-532	Mrs.S.Swanson	Omro,Wisconsin	Bonham,Texas

Even though the majority of records of flights for the past year were not of great significance in indicating movement of the butterflies, all data which is made possible by the cooperation of research associates is valuable to us and will be used at a later date in the publication of scientific papers since we are interested in studying the total numbers of butterflies tagged and the percentage of the total tagged which are recaptured.

Transfers of Tagged Monarch Butterflies in 1974

Due to a marked drop in the monarch butterfly population in Ontario it was not possible for the associates here to transfer butterflies for experimental purposes. However, Mr. Franz Pogge of Westover, West Virginia transferred a number of monarch butterflies to Mr. C. McQueeen of Donna, Texas; Mrs. Beatrice Ridgeway of North Tarrytown, New York, transferred a number of monarchs to Senora Marta F. de Molina of Mexico, D.F.Mexico.

Paul Cherubini of Castro Valley, California captured monarch butterflies on the coast of California and took them to Reno, Nevada where he released them. It is a tribute to Paul's dedication and painstaking research that of the 550 butterflies thus transferred, he recaptured 4 of his own tagged specimens at various colonies on the coast of California. Here are the details:

TAG #	Place Originally Captured	Date	Place Released	Date	Place Finally Recaptured	Date	Direc
qt-29	Muir Beach	Sept.14	Reno,Nev.	Sept.15	Morro Bay Calif.	Nov.30	SSW
qt-30	Muir Beach	Sept.14	Reno,Nev.	Sept.15	New Brighton State Beach, (east of Santa Cruz Calif.)	Dec.15	SW
qt-295	Santa Cruz	Sept.26	Reno, Nev.	Sept.28	Morro Bay Calif.	Nov.30	SSW
qt-377	Santa Cruz	Sept.26	Reno,Nev.	Sept.28	Pismo Beach Calif.	Nov.30	SSW

"The two specimens recaptured at Morro Bay were found at the exact colony where the monarch transferred to Boise, Idaho, was taken last year, further confirming a general SW or SSW flight.

These three new records also demonstrate again the remarkable ability of monarchs to, in effect, make a second migration back to the coast when transferred artificially back to their summer breeding grounds." From Paul Cherubini's letter re the transferred butterflies.

Unique Recapture of Spring Migrant

We were extremely fortunate in having a female monarch butterfly, number S4-62, tagged by Mrs. Harvey Houck of Decorah, Iowa on September 3, 1973 returned to us by Mr. Eddie Gibson of the Lamar Junior High School at Rosenberg, Texas. The butterfly was in flight when it was recaptured on April 8, 1974 by one of Mr. Gibson's students at Richmond, Texas. The butterfly was 7 months old when recaptured.

Since we know from our intensive researches in 1969 that monarch butterflies do not remain in Texas during the winter months, we are convinced that this specimen was a fall migrant which spent the winter in Mexico in an over-wintering roost and that it was returning northward when it was captured in Richmond.

In all of our research experience this is the first specimen that has linked the fall and spring migration thus corroborating our theory that the fall migrants do return north in the spring of the following year.

Unusual Number of Spring Migrants Tagged

We are pleased to report that Jim Gilbert of Waconia, Minnesota was able to tag 99 spring migrants monarchs in June 1974. This is an unusually large number of sping migrants to be tagged as the spring migrants fly very high and fast and are difficult to capture since they rarely land in order to feed.

We would like to encourage you to be on the lookout for spring migrants in your area since we are very much in need of data on the northward spring migration as very little is known about the return migration of the fall migrants.

Recaptures of Various Species of Butterflies

It has long been one of our ambitions in our study of insect migration to discover whether or not species of butterflies other than the monarch butterfly are also migrants. To this end we have encouraged our research associates to tag as many species of butterflies as possible in order that we may gather data on the movements of the butterflies and also on their longevity. This is a long process as it is not easy to capture certain species of butterflies nor are many species as abundant as the monarch.

This year we have had recaptures made of tagged Gulf Fritillaries, Pipevine Swallowtails, and Tiger Swallowtails. Eventually we hope to have enough data to be able to write a scientific paper on our observations of these and other species of butterflies.

We do want to emphasize that we would like you to tag as many species of butterflies as possible in your area. If you want to tag small species, please ask for the special small tags and we shall be glad to send them to you.

Fluctuations in Numbers of Monarch Butterflies

Because we are very much interested in keeping track of the cyclical fluctuations in the populations of monarch butterflies we would like to encourage you, as a research associate, to comment on the rise or fall of the population of monarch butterflies in your area after you have finished your tagging for the season. These comments can be added to the final tagging report that you send to us. We keep such comments on file in order to try to get an overview of the situation in order to understand whether the monarch butterflies are on the increase or the decline. Below is a list of those who sent in pertinent comments on the monarch butterfly population in their area during the past season:

Those reporting abundance of monarch butterflies:

Mrs. Rowena Davidson, Waterloo, Iowa
Jim Gilbert, Waconia, Minnesota
Barbara Hagenson, Clinton, Iowa
Mrs. Alta Horr, Gretna, Nebraska
Donna and Mary Seelhorst, Athens, Ohio
William Sieker, Madison, Wisconsin

Those reporting scarcity of monarch butterflies:

Barbara Adams, Fanwood, New Jersey
Kenny Brooks, Colora, Maryland
Michael Clemente, Atlantic City, New Jersey
Philip Del Vecchio, Paterson, New Jersey
Jim Drobka, Manitowoc, Wisconsin
Alice Hopf, New York, New York
Mrs. Franklin Hupp, Hinton, Virginia
Woody Keeney, Hudson, New Hampshire
Ruth Kough, Dysart, Pennsylvania
Ruth Milani, Meaford, Ontario
Steve Powers, Philadelphia, Pennsylvania
Mrs. Kathryn Spack, Salem, Ohio
Jim Steamer, Medfield, Massachusetts

It would appear from the above that during the past summer the monarch populations were dropping in eastern North America and remaining high in the mid-western states.

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.

Mail Delayed Due to Postal Strikes

For the past few years in Canada the mail service has been interrupted at intervals due to strikes by post office employees. Since our contacts with you depend almost entirely upon the mails this has been a source of inconvenience and embarrassment to us. In 1974 the delivery of our "Insect Migration Studies" was made in some areas several weeks after being mailed from Toronto, and in some cases the copies were lost necessitating the sending of replacement copies. We hope that you will receive this copy in reasonable time after it is posted. We are marking all copies with the date on which they were posted by us. This situation does not seem to be improving at the present time. Please bear with us if our replies to your letters are delayed.

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 mail and valuable data is destroyed. If you keep a copy of your tagging we can refer back to your data if necessary.

Protest Against Misleading Advertisement by Rockwell International

In the spring of 1974 our attention was directed by Mrs. Marjorie Mathes of Pontiac,Michigan, to an advertisement published in "Garden Ideas and Outdoor Living 1974", a special issue of "Better Homes and Gardens".

The advertisement was designed to appeal to gardeners to destroy insects with an insecticide sprayer, a legitimate enough motive if confined to those insects which are harmful to plants. Unfortunately, the advertisement depicted many insects which are beneficial to man together with the monarch butterfly which was most prominently displayed.

We were very much dismayed at this piece of misinformation which might lead the untutored gardener to deliberately destroy this remarkable insect and we therefore wrote a letter of protest to Rockwell International, copies of which we sent to our research associates suggesting that they might want to join the protest against such misinformation being directed to the public.

We were heartenend to learn that many of our associates responded with promptness and vigour to our suggestion. The following wrote personal letters of protest to Rockwell International: Mrs. Donald Davidson of Waterloo, Iowa; Mrs. Herman Holtz of Philadelphia, Pennsylvania; Mrs. Shirley Hupp of Hinton, Virginia; Gregory Glovas of Bethlehem, Pennsylvania; Mrs. Harvey Houck of Decorah, Iowa; Mr. James McQueen of Donna, Texas; Mr. Donald Seelhorst of Athens, Ohio; Brenda Reynolds of Erin, Tennessee; Mrs. Joan Senghas of Mount Clemens, Michigan; Mrs. Laneil Teed of Wichita, Kansas; and Mrs. Stephen Wilson of Los Gatos, California.

Other research associates wrote not only to Rockwell International but also spread their protest among friends, colleagues and students: Mr. Ray Bracher of Granger, Indiana, wrote to his Congressman, to the Lepidopterists Society and to the Michigan Entomological Society; Mrs. Jo Brewer of Auburndale, Massachusetts, Associate Director of the Xerces Society, wrote to the members of the Society asking them to join the protest; Mrs. Janet Kern of Fanwood, New Jersey posted our letter to Rockwell International on the bulletin board of the Hartshorn Arboretum, and passed along the information re the advertisement to two local nature clubs; Brian Tuttle of Tulsa, Oklahoma, collected forty-five signatures to add to his personal letter of protest to Rockwell International and also signed a petition by the Oklahoma State Beekeepers to the U.S. Government to ban the careless spraying of insecticides; Audrey Wilson of Cobourg, Ontario, Outdoor Education Consultant had her students write personal letters of protest re the advertisement which she forwarded to the company.

We were much encouraged to learn that many of these associates received replies from Rockwell International and we hope that as a result of our combined efforts such advertising will not appear in the future. In trying to squelch the non-selective spraying of insects which would upset the balance of the ecology as we know it today, we feel that our associates have made a very important and positive contribution to the preservation of our natural environment.

Awards Won by Our Research Associates

Richard Ebright of Reading, Pennsylvania prepared a project using monarch butterflies to test the theory of "Batesian Mimicry" - see "The Monarch Butterfly" pps. 70-76 for a discussion of this theory - for which he received the following awards: one at the school science fair; 1st prize at the Ber County fair; and reserve champion of the fair; 1st in his category at the tri-county competition and in the state competition; and a $50 certificate from the Eastman Kodak Company for photographic excellence.

Jeff Korte of St. Cloud, Minnesota, won a purple ribbon at th Regional Science Fair held at St. Cloud State College and a g medal - the top award for junior high school students - at th Minnesota State Science Fair held at St. Paul Minnesota in April, 1974. Jeff's entry was a research project based on "The Effects of Heat and Light upon the Painted Lady Butterfl

Mrs. Hellen Ochs of Columbus, Indiana received a Meeman-Scrip Howard Conservation Writing Award in April 1974. The article submitted for the contest included several that Mrs. Ochs had published on the subject of the monarch butterfly.

Kim Richards, one of the students of Audrey Wilson of Cobourg Ontario, won a prize for his essay on monarch butterflies. The prize took the form of having the essay published in the "Orono Weekly Times". The essay was later reprinted in "The Naturalist" published by the Oshawa Field Group of the Federa of Ontario Naturalists.

Publicity Concerning Insect Migration Research

Over the past many years we have come to realise the important role played by press coverage of the migration of the monarch butterfly and of the activities of our research associates in helping to unravel this mysterious phenomenon.

The fact that our research is often the subject of enthusiastic articles in newspapers and magazines has resulted in a heightened awareness on the part of the public about the monarch butterfly and its migration and has also led to many of our most capable associates joining our group.

Since we like to keep our associates and colleagues informed of the many news releases which indicate the degree of interest in our research, we are grateful to those of you who have sent us clippings from the press and who have told us of their own contribution to heightening public awareness of this research by delivering lectures on the subject in classrooms and through the media of radio and television. We are sure that the monarch butterfly will become revered by many people as the marvels of its behaviour become known and appreciated and we sincerely hope that such appreciation may lead to a decrease in the random use of insecticides, to the preservation of milkweed, the sole food plant of the monarch larvae, and to the preservation of trees used by the monarchs as overnight and overwintering roosts.

The following list indicates the keen interest in and awareness of our research by many people in diverse parts of the North American continent.

William Coleman of Ventura, California sent a clipping from "The Ventura County Star-Free Press", October 6, 1974 about the life history of the monarch and about Mr. Coleman's

Publicity continued.

activities in our program. He also sent us another article for which he was interviewed, published in "Westways", September 1974, illustrated with colour photographs of overwintering roosts of monarch butterflies in California.

Mrs. Margaret Elliott of Muskegon, Michigan sent clippings from the "Chicago Tribune", "The Muskegon Chronicle" and the "Washington Star-News" with text and photographs describing the fall migration of the monarch butterfly.

Mrs. Harvey Houck of Decorah, Iowa told us of an article which appeared in the Decorah newspaper concerning the recapture of one of her tagged monarch butterflies in Rosenberg, Texas in April, 1974.

Heidi Hughes of Dumont, New Jersey, informed us of the newspaper coverage which dealt with her introduction of second grade students to the life cycle of the monarch butterfly. In November 1974 Ms. Hughes arranged for Dorothy Yeager to do a presentation on monarch butterflies at the second annual Girl Scout Wildlife Values Education Workshop in Austin, Texas; she also wrote a section on monarch butterflies for the Girl Scout publication "Tuning-in to Wildlife". With the assistance of Calvin and Pauline Myers she gave a monarch butterfly workshop for the New York City Teachers in October 1974.

Charles Lipscomb of San Antonio, Texas sent us a clipping from the "Austin -American Statesman", October 10, 1974, describing the fall migration of monarch butterflies in that area, another from the "Daily Texan", October 25, 1974, speculating about the reasons for the drastic drop in the numbers of monarchs in the southward migration. Charles also sent an illustrated article from the "Austin Citizen" describing Mrs. Dorothy Yeager's release of tagged monarchs at the Wildlife Workshop sponsored by National Girl Scout Headquarters in central Texas.

Publicity continued

Mrs. Elisabeth Lytle of Detroit, Michigan sent us clippings from the "Detroit Free Press", "Audubon Magazine", and "Yankee" magazine all dealing with different phases of monarch lore, rearing, tagging and migration.

John V. McClusky of Fredericksburg, Texas and two friends experimented with fastening the wing from a dead monarch butterfly to a disabled Spicebush butterfly which was then able to fly for short distances. This event was described in the "Fredericksburg Standard", July 17, 1974, and "The Radio Post", Fredericksburg, July 18, 1974.

Mrs. Frances Naas of Feasterville, Pennsylvania sent us an illustrated article from "Today's Spirit", June 28, 1974, describing Mrs. Naas' development of a butterfly habitat at the Churchville Outdoor Education Center for the preservation of all species of butterflies.

Mr. Joe Nash of "The News", an English language newspaper published in Mexico City, Mexico, was the author of an article giving a résumé of the research on the migration of the monarch butterfly and highlighting the importance of gaining new research associates in Mexico to further our research there.

Mrs. Ruth Rippel of La Porte City, Iowa sent us a clipping from "The Progress-Review", October 2, 1974 showing one of the monarchs she had tagged after it had been recaptured.

Raúl Pérez de Santiago and Francisco González of San Luis Potosí, S.L.P. México were responsible for publicity concerning the monarch butterfly on a programme presented on National Mexican Television and called "Para Ninos y Similares" - (For Children and Others). They also visited the Cultural Television Station of Mexico in Mexico City where they supplied information for a second program on the subject of the monarch butterfly.

An illustrated article about Donna, Mary and John Seelhorst of Athens, Ohio and their activities in tagging monarch butterflies was published in "The Messenger", September 24, 1974.

Mrs. Joan Senghas of Mount Clemens, Michigan provided us with an illustrated article from "The Bay City Times" showing school children involved in studying the migration of the monarch butterfly.

A profusely illustrated article about Mrs. Trudy Smith of Noank, Connecticut appeared in "The Groton News", October 2, 1973. The pictures showed Mrs. Smith tagging a monarch butterfly. Mrs. Smith also sent us a newpaper article discussing the question of the reproductive activities of monarch butterflies on their northward migration.

Mrs. Faye Sutherland of Boise, Idaho released tagged butterflies sent to her by Paul Cherubini of Castro Valley, California via air mail. One of these butterflies was recaptured on the coast of California. These two events were the subject of an illustrated article in "The Idaho Statesman", June 23, 1974.

Sam Sweet of Manchester, Connecticut sent us a clipping from the "Hartford Journal" about students in a local school who had arranged to send late emerging monarch butterflies by air freight to Fort Lauderdale, Florida, in order to help them to avoid the cold fall weather.

Prof. Nicolás Vázquez Rosillo of the Universidad Autonoma de San Luis Potosí, México sent us an illustrated article from "El Sol", a Spanish language newspaper published in San Luis Potosi. The article emphasized the amazing energy and navigational ability displayed by monarch butterfly migrants.

Publicity continued

Nancy Votava of Westchester, Illinois, sent an article from "Suburban Life" which discussed the remarkable navigational powers of monarch butterflies which make it possible for them to migrate for long distances.

An article published in "Texas Parks and Wildlife", September 1974, was sent by Audrey Wilson, of Cobourg, Ontario. The article dealt with the spectacular fall migration of monarch butterflies through south Texas.

An unusual migration of four-spotted dragonflies in the Port Hope-Cobourg, Ontario region was described in the "Sentinel Star" of June 26, 1974, the "Port Hope Guide" June 27, 1974, and the "Cobourg Sentinel Star", September 25, 1974. These clippings were sent to us by Audrey Wilson of Cobourg, Ontario.

In the spring of 1974 Mrs. Maxene Wright of Mountain Brook, Alabama and her class of school children reared several monarch butterflies which they tagged in the hope that they might be recaptured on their way north and thus help to provide much needed data for the northward spring migration. This event was illustrated and described in an article which appeared in the "Shades Valley Sun" June 20, 1974, which was sent in by Mrs. Wright.

Photographs of monarchs which appeared in "The Austin American Statesman", September 22, 1974, "The Dallas Morning News", September 25, 1974, and the "San Antonio Light", August 4, 1974 were sent to us by Mrs. Dorothy Yeager of the Yeager Butterfly Farm, Pearsall, Texas.

Special Donors to Insect Migration Research Fund 1974-75

As we have mentioned in earlier issues of our "Insect Migration Studies" this type of research is such that research funds are not easily available. We are fortunate in having funds available from the National Research Council of Canada and donations from our research associates but as with any endeavour the need for funds is always pressing and the more that we have the more thorough our study can be. We are therefore especially grateful to those who have contributed substantially more to our research fund than the suggested donation. The list of special donors for this past year appears below:

Augst, Tary, Riverside, California
Barney, Mrs. Carolyn, Dallas, Texas
Brooks, Kenneth, Colora, Maryland
Elliott, Mrs. Paul, Muskegon, Michigan
Gilbert, Jim, Waconia, Minnesota
Glynn, Mrs. Jessie, Limehouse, Ontario
Hughes, Heidi, Dumont, New Jersey
Kendrick, Mrs. Evelyn, Sault Ste. Marie, Ontario
Komarek, E.V., Tall Timbers Research Station, Tallahassee, Florida
Kough, Ruth, Dysart, Pennsylvania
Luxenberg, Dr. and Mrs. Lester, Tonopah, Arizona
Lytle, Elisabeth B., Detroit, Michigan
Mallery, Mrs. Charles, Vestal, New York
Matson, Roland R., Minneapolis, Minnesota
Pogge, Franz L., Morgantown, West Virginia
Powers, Steve, Philadelphia, Pennsylvania
Reichert, Dale, Hanover, Pennsylvania
Ridgeway, Mrs. B., North Tarrytown, New York
Ronan, Mrs. Thos. P., Fishkill, New York
Smith, Leslie, Citrus Heights, California
Smith, Mrs. Trudy, Noank, Connecticut
Stout, Prentice K., Bedminster, New Jersey
West, Mrs. Maryanne, Gibson's, British Columbia
Wilson, Mrs. Marjorie, Napa, California
Woodward, Ro, Falconer, New York
Wright, Mrs. Maxene, Mountain Brook, Alabama

NATIONAL SCIENCE FOUNDATION REFUSES A GRANT IN AID OF THE MONARCH RESEARCH

Since 90% of our Research Associates reside in the United States and since many schools and organizations use the project in their class work, it was suggested that perhaps the National Science Foundation of the United States might be willing to make a grant in aid of this research. We wish now to report on what happened - as briefly as possible.

We wrote to the National Science Foundation on November 3, 1972 and received a letter from Dr. D.J. Hruz, Administrative Officer for the Division of Biological Sciences informing us that our suggestion had been given to Dr. John L. Brooks of the Division of General Ecology. We did not hear from the office of Dr. Brooks for some time even though we wrote to him about the matter. Finally, on September 18, 1973 we submitted our request in the form of a 76 page report dealing with the research and including all details of the contributions made by our many active associates. As requested, we submitted twenty copies of this rather voluminous report together with twenty copies of all our scientific publications and five copies of "The Monarch Butterfly" book.

One year later and we had no further response to our request. So we wrote to Dr. Brooks on August 8, 1974. Again no response so we finally telephoned long distance to Dr. Brooks stating that we had to know the fate of our request since we were not able to apply to any other granting agency until we had had word from the National Science Foundation. Dr. Brooks informed us that although the Foundation would not be able to give the complete amount of the grant that they would consider a reduced budget. A revised budget was sent on August 29, 1974. On October 4, 1974 we received a letter informing us that we had not supplied sufficient information. So, we revised the revised budget and resubmitted it.

To make a long story shorter, Dr. Brooks finally telephoned us on February 8, 1975 informing us that our request had been refused.

The amount we had requested was $5500.00 a year for two years. The cost of our submission was approximately $700.00, not counting the time spent in preparing the report, obtaining graphs and illustrative material.

Needless to state, we were greatly disappointed since we thought that this research project was of international interest and could be shared by Canada and the United States. Our National Research Council in Canada has been supporting this project for the past number of years and has been responsible, together with the assistance received from the National Geographic Society, and donations from our associates, in making the project the great success it has been.

If any of our associates have a suggestion to offer as to possible sources of financial aid we would be more than pleased to follow it up.

NEED FOR RESEARCH FUNDS

Although we obtain research grants from our Canadian National Research Council, and we have the small continuing fund resulting from the contributions made by our associates, we are badly in need of funds in order to employ clerical and typing assistance. We are hoping to increase the number of our Research Associates this year, particularly in those parts of North America where more data are needed. This will require an increase in the amount of correspondence. In addition, we would like to be able to answer all of the questions that are submitted to us as well as replying to your most friendly and informative letters. This we will be able to do more fully after January 1, 1976 since we will be on leave of absence from our lecturing duties in order to write a number of scientific

papers based upon the great deal of information we have accumulated over the years, particularly the work that was done in California, Florida and Australia. If you have any suggestions as to how or where we could obtain more funds to help us with the above mentioned projects we would be willing to follow them.

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 insect netting. This may be simply a piece of mosquito netting, or nylon netting, draped around a 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 MONARCH BUTTERFLIES 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.

REQUESTS FOR TAGS

If you are asking for a supply of tags, please mark on the outside of the envelope "Urgent Tags" 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 donations and renewal sheet (found in the Newsletter).

LEFTOVER TAGS

If you have tags left over from last season, please keep them for use in 1975, 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.

RENEWAL OF MEMBERSHIP

If you wish to renew your membership as a research associate, please note that the term of your membership extends from the date on which you joined our group as a research associate until the date of the publication of the Newsletter following that date.

Therefore you should renew your membership upon receipt of the Newsletter by sending in the renewal form and your donation.

LECTURES

Barbara Hagenson of Clinton, Iowa, delivered lectures to 10 classrooms of schoolchildren about butterflies and the monarch butterfly tagging programme in particular.

ANNUAL DONATION TO
INSECT MIGRATION RESEARCH FUND

This year we again ask you to make a donation to our research fund in order to help us cope with the costs of tags, postage, clerical supplies and assistance in connection with our program.

In order to spread the costs more evenly we have established two kinds of membership, and therefore two levels of donations:

$10.00 per year for Individual membership - (donation requested)

$15.00 per year for Group membership - (donation requested: includes schools, nature clubs, societies for conservation, etc.)

The donations from our associates cover only a small portion of the cost of this research; most of the cost is covered by Scarborough College, University of Toronto, and by granting agencies.

Research Associates 1974-75

Once again for the past year we have had to keep the numbers of our research associates down so that they form a very small group located in areas where we need additional data about the migration of the monarch butterfly. We were forced to refuse generous offers of assistance with the research from hundreds of people in order to free us to write scientific papers. This policy has worked so well that we have made great strides in our analysis of data which has been accumulating for many years. Therefore we may be in a position to enlarge the number of our research associates during the next year.

A.

Adams, Miss Barbara, Fanwood, New Jersey
Albrecht, Mr. Carl, Columbus, Ohio
Armstrong, Mrs. Fred, Little Silver, New Jersey
Augst, Tary, Riverside, California

B.

Baird, Mr. James, Pine Bush, New York
Barney, Mrs. Carolyn, Dallas,Texas
Beimborn, Mr. Don, St. Paul, Minnesota
Bevens, Miss Sally, Dakota, Minnesota
Black, Mrs. G., Pleasantville, Iowa
Boyles, Carolee, Tallahassee, Florida
Bracher, Mr. Ray W., Granger, Indiana
Brooks, Mr. Kenneth, Colora, Maryland
Brouchoud, Mrs. Lynette, Manitowoc, Wisconsin
Brugger, Kenneth and Cathy, México 8, D.F., México
Brunnemann, Mr. Eric, San Antonio, Texas
Butler, Mr. John R., APDO. 6424 R. Panama

C.

Carpenter, Mr. Fairbank, Far Hills, New Jersey
Cherubini, Mr. Paul, Castro Valley, California
Clements, Master Michael, Atlantic City, New Jersey
Coleman, Mr. Wm. J., Ventura, California
Cooper, Mrs. Mary, Findley Lake, New York
Cox, Judee, Watonga, Oklahoma
Currie, Mr. E.A., Toronto, Ontario

D.

Dammann, Dr. Arthur, Virgin Islands
Davidson, Mrs. Donald, Waterloo, Iowa
Day, Mr. Ezra R., Hunter, Utah
Deal, Lindsey, Stanford, Illinois
De Sato, Mrs. Cecilia Buenos Aires, Argentina
Del Vecchio, Mr. Philip J., Paterson, New Jersey
Drexler, Mr. David, Marcellus, New York
Drobka, Jim, Manitowoc, Wisconsin
Dubois, Mabel, Bannister, Michigan —
Duncan, Mrs. Ruth, Brampton, Ontario

E.

Ebright, Mr. Richard H., Reading, Pennsylvania
Elliott, Mrs. Paul A., Muskegon, Michigan —
Emery, Mrs. Calvin, Nevada, Missouri
Erickson, Mary E., Napa, California

F.

Fagle, Mr. David, Marshalltown, Iowa
Farmer, Mary A., St. Paul, Minnesota
Fender, Mrs. Ruby, Hamburg, Indiana
Field, Dr. W.D., Washington, D.C.
Fleetwood, Dristen, Grand Junction, Colorado
Foster, Sandra, Austin, Texas
Frazier, Mrs. Anna, Columbia, Missouri

G.

Gaddis, Mrs. Isabel, Cotulla, Texas
Gerber, Mr. Ian, Glenview, Illinois
Gilbert, Mr. Jim, Waconia, Minnesota
Girl Scout Council of St. Croix Valley, St. Paul, Minnesota
Glovas, Mr. Gregory, Bethlehem, Pennsylvania

G.

Glynn, Mrs. Jessie, Limehouse, Ontario
Gerardo, Gonzales, Molina, Mérida, México
Goodman, Mr. Geoffrey, Williamsport, Pennsylvania

H.

Hagenson, Mrs. Barbara, Clinton, Iowa
Hansen, Mrs. R.E., Staten Island, New York
Hartley, Mrs. Chas., Pensacola, Florida
Heasley, Miss Lynne, Sharpsville, Pennsylvania
Hill, Mrs. Erick, Jenks, Oklahoma
Hintz, Mr. Roger, Waldo, Wisconsin
Holtz, Mr. Abraham, Philadelphia, Pennsylvania
Horr, Mrs. Alta, Gretna, Nebraska
Hosea, Kernan, Lafayette, Louisiana
Hoskins, Mrs. D., Weston, Massachusetts
Houck, Mrs. Harvey, Decorah, Iowa
Hughes, Miss Heidi, Chatham, New Jersey
Hummer, Mr. Larry, San Mateo, California
Hupp, Mrs. F., Hinton, Virginia

I.

Ingvall, Mr. Jerry, Spirit Lake, Iowa

J.

Jackson, Mrs. Marjorie, México, 10, D.F. México
José Javier, A.T. León, Guanajuato, México

K.

Keeney Jr., Mr. Norwood H., Hudson, New Hampshire
Kendrick, Mrs. Evelyn, Sault Ste. Marie, Ontario
Kennedy, Mrs. Laura, Islington, Ontario
Kester, Mrs. Patricia, Appleton, Wisconsin
Klipstein, Mr. John, Wausau, Wisonsin
Knight, Seth, Doylestown, Pennsylvania
Komarek, Mr. E.V., Tallahassee, Florida
Koplay, Ferenc, San Antonio, Texas
Korte, Mr. Jeff, Cloud, Minnesota
Kough, Ruth, Dysart, Pennsylvania

L.

Laking, Mrs. Valeria, Mt. Clemens, Michigan
Lee, Cliff, Englewood, Colorado
Lemon, Miss Ivy, Gloucester, Massachusetts
Limburg, Mr. Matthew, Salt Lake City, Utah
Lipscomb, Mr. Charles, San Antonio, Texas
Francisco, López Nunez, San Luís Potosí, México
Lorimer, Mrs. John, Birmingham, Michigan
Luxenburg, Dr. and Mrs. Lester, Tonopah, Arizona
Lytle, Elisabeth, Detroit, Michigan

M.

MacGregor, Mr. Mauricio, México, México
Magner, Mr. and Mrs. Laurence, Salem, Massachusetts
Malick, Mr. James, Stevens Point, Wisconsin
Mallery, Mrs. Charles, Vestal, New York
Mathes, Mrs. G. Eldred, Pontiac, Michigan
Matson, Mr. Roland R., Minneapolis, Minnesota
Maxwell, J.W.H.,Montreal, Quebec
McClusky, John, Fredericksburg, Texas
McClure, Mr. O.M., Salem, Oregon
McGee, Miss Kathleen, Falls Village, Connecticut
McKee, Mrs. Ruth Anne, Stockton, California
McQueen, Mr. Carlton, Donna, Texas
A. Medrano Mendoza, San Miguél Tenochtitlán, México
Miale, Mrs. Joseph, Trenton, New Jersey
Middleton, Peter, Toronto, Ontario
Milani, Mrs. Ruth, Meaford, Ontario
Miller, Mr. and Mrs. A.P. Jocótepec, Jalisco, México
Miller, Mrs. Donna, Ottawa, Ontario
Miller, Mr. Glen, Annada, Missouri
Monica, Molly, Berkeley, New Jersey
Moores, Kenneth, Claremont, Ontario
Prof. Pedro Morales López, Toluca, México
Morton, Dr. Eugene, Edgewater, Maryland
Movall, Miss Julie, Storm Lake, Iowa
Muldoon, James, Darien, Illinois
Musgrove, Mrs. Grace, Saxton's River, Vermont
Muyshondt, Alberto, San Salvador, El Salvador

N.

Naas, Mrs. John, Feasterville, Pennsylvania
New England, Kurn Hattin Homes,Saxton's River, Vermont
Nash, Mr. Joe, México City, México

O.

Ochs, Mrs. Hellen, Columbus, Indiana
Olivas, J.T., Cuatrociénegas, Coahuila, México

P.

Raúl Pérez De Santiago, San Luis Potosi, México
Plouffe, Rick, West Baraboo, Wisconsin
Pogge, Mr. Franz L., Morgantown, West Virginia
Powers, Mr. Steve, Philadelphia, Pennsylvania

R.

Reece, Mr. Tim, Kanata, Ontario
Reese, Mr. Randy, Newark Valley, New York
Reichert, Mr. Dale Lynn, Abbottstown, Pennsylvania
Reuter, Mrs. Suzanne, Bradenton, Florida
Reynolds, Brenda, Erin, Tennessee
Ridgeway, Mrs. Robert F., North Tarrytown, New York
Rippel, Mrs. D., La Porte City, Iowa
Riveredge Nature Center Inc. Newburg, Wisconsin
Roberts, Mrs. Fay, Sellersville, Pennsylvania
Robinson, Vivian, Winona, Minnesota
Ronan, Mr. Thomas, Fishkill, New York

S.

Francisco Sánchez González, San Luís Potosí, México
Sawyer, Miss Mary, Rockland, Maine
Sciaroni, Mrs. Linnea, San Carlos,California
The Science Museum of St. Paul, Minnesota
Scott, Mrs. George, Casper, Wyoming
Seelhorst, Misses Mary and Donna, Athens, Ohio
Senghas, Mrs. L.G., Mount Clemens, Michigan
Severson, Mrs. W., Middleton, Wisconsin
Sherman, Daniel, Los Angeles, California
Sibole, Mr. Mark, Alliance, Ohio
Sieker, Mr. Wm. E., Madison, Wisconsin
Smith, Mrs. Jean, Cambridge, Massachusetts
Smith Mr. Leslie, Citrus Heights, California
Smith, Mrs. Trudy, Noank, Connecticut
Spack, Mr. Scott, Salem, Ohio
Stout, Mr. Prentice K., Far Hills, New Jersey
Stovall, Brenda, Dallas, Texas
Struthers, Mr. Joseph, Boulder, Colorado
Stull, Mrs. Jean H., Waterford, Pennsylvania
Sutherland, Mrs. Faye, Boise, Idaho
Swanson, Mr. Jon, Dublin, New Hampshire
Swanson, Mrs. Severin, Omro, Wisconsin
Swensen, Robert, Baltimore, Maryland

T.

Tall Timbers Research Station, Tallahassee, Florida:
Betty Ashler, Jimmy Atkinson, Wilson Baker, Peggy Cleghorn,
Bobby Crawford, Donny Harris, Prince Jinright, Lynn Wiese.

Tappé, Madeleine, México City, México
Teed, Mrs. Laneil B., Wichita, Kansas
Thompson, Brent, Lucas, Ohio
Throm, Mrs. Frank, Overland Park, Kansas
Torrey, Mrs. Anne, Scituate, Massachusetts

V.

Nicolas Vazquez Rosillo, San Luís Potosí, México
Votava, Nancy, Westchester, Illinois

W.

Waggy, Mrs. Paula, Marlinton, West Virginia
Weil, Anne, So. Harpswell, Maine
West, Mrs. Maryanne, Gibsons, British Columbia
Williams, Jim, Dallas, Texas
Wilson, Miss A., Cobourg, Ontario
Wilson, Mrs. Ellen K., San Jose, California
Wilson, Mrs. John, Cobourg, Ontario
Wilson, Mrs. Marjorie, Napa, California
Woodard, Ro, Falconer, New York
Wright, Mrs. Maxene, Mountain Brook, Alabama

Y.

Yeager, Mrs. K., Pearsall, Texas

PLEASE NOTE - The names of some research associates will not appear on the above list as these people joined our group after the Newletter was sent to the printer.

SLIDES FOR LECTURES

A set of 40 colour slides are available to our associates only. The slides deal with the following subjects:

a) life history (egg, larva, pupa and adult)
b) tagging method
c) overnight clusters of monarch butterflies and method of collecting from these clusters
d) overwintering clusters of monarch butterflies
e) monarch butterflies shown in various faunal zones of North America
f) map showing migration lines

These slides are accompanied by a description of the subject matter with information suitable for classroom discussion or lectures.

The cost of rental of the slides is $3.50 plus $1.50 postage for a period of two weeks. Slides may also be purchased for $1.00 each or $30.00 for the complete set.

If you wish to rent the slides please fill in the following information:

Name _____

Address _____

_____

_____

Fee of ($3.50 + $1.50 postage) = $5.00

Please, cheques or money orders payable to Invertebrate Migration Research Fund, University of Toronto.

Date required: _____

Send your request and payment to:

Professor Fred A. Urquhart
Scarborough College
University of Toronto
West Hill, Ontario
Canada, M1C 1A4

SCIENTIFIC PAPERS FREE TO RESEARCH ASSOCIATES

The following scientific papers are now available. If you wish to have copies in order to learn what we have found out about various aspects of the ecology of the monarch butterfly, check the appropriate spaces and fill in your name and address:

[ ] 1. A discussion of the use of the word "migration" as it relates to a proposed classification of animal movements.

[ ] 2. Laboratory techniques for maintaining cultures of the monarch butterfly.

[ ] 3. A study of a continuously breeding population of Danaus p. plexippus (in California).

[ ] 4. Fluctuations in the numbers of the monarch butterfly in North America.

[ ] 5. Mechanism of cremaster withdrawal and attachment in pendant rhopalocerous pupae (Lepidoptera).

[ ] 6. Microcauterization to maxillectomize lepidopterous larvae by fulguration.

[ ] 7. The effect of cauterizing the PPM of the pupa of the monarch butterfly.

[ ] 8. The effect of cauterizing the MNPPM of the pupa of the monarch butterfly.

[ ] 9. The effect of microcauterizing the ALPPM of the pupa of the monarch butterfly.

[ ] 10. Epidermal cells of the PPM of the pupa of the monarch butterfly.

[ ] 11. Functions of the prismatic pigmented maculae of the pupa of Danaus p. plexippus.

Name _____

Address _____

_____

_____

Date papers were requested _____