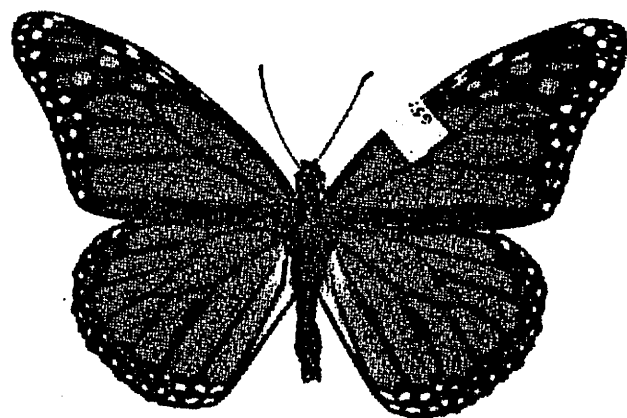


Insect Migration Studies



*Newsletter
to
Research Associates*

VOL. 6 MARCH 1969

I N S E C T M I G R A T I O N S T U D I E S

NEWSLETTER TO RESEARCH ASSOCIATES

MARCH 1969

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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.

* * *

FROM PROFESSOR URQUHART

HEAD OF MONARCH RESEARCH PROJECT

Last year I reported to you on the research that was being carried out in our laboratories at Scarborough College, University of Toronto. I should point out to you that our laboratories are well equipped for our research. We possess most of the modern up-to-date electronic devices, growth chambers, histological apparatus, ultramicrotomes, electron microscopes, etc. The work done in the laboratory is in addition to our continuing interest in the migrations of the monarch butterfly, which interest we have had for the past many years. Since most of my time is devoted to my students and research in the laboratories, the work on the migration is now handled by my wife, Norah Urquhart. This includes answering many hundreds of letters each month, filing of data on returns, answering numerous enquiries from our associates and many others, and preparing data for a joint publication on the monarch populations in southern California.

Miss Chang, who comes to our University from the University of Taipei, Taiwan, prepared over five hundred stained sections in her study of the gold spots that "ornament" the pupa of the monarch butterfly. The question is, "What is the function of these gold spots?" We hope to give you the answer in the next year or two.

Mrs. Dampney was unable to accomplish much on her project, the use of a microcauterizing technique, because of her involvement in a television series dealing with human physiology. She is hoping to get back to this research this summer.

Mr. Brian Kelly, who will be entering a graduate school next year, obtained a great deal of most interesting data on Batesian mimicry. His work will be published shortly and I am certain you will be surprised at the results he obtained which are contrary to popular belief and very much opposed to recent publications dealing with this interesting and confused subject.

Mr. Kelly and I are now preparing a joint publication dealing with the mechanism involved in the withdrawal of the pupa cremaster from the shed skin of the larva when the pupa is being exposed.

The study of the alar glands on the hind wing of the male monarch has been completed and we await the necessary photomicrographs before publishing our results.

Professor Kingsley, a microbiologist, and I are considering a joint study dealing with the various species of bacteria that infest the monarch larvae and pupae. We hope to commence this study in the spring.

Two of our undergraduate students and an undergraduate student from the University of Guelph carried out a study of the effect on growth rate of larvae fed on milkweed that had been processed in various ways, as well as on a synthetic diet in which milkweed leaves were not used. These data are now being analyzed.

The experiments will be repeated again next summer together with an analysis of the factors involved in sterility when larvae are fed on the artificial diet.

The above studies are supported by the University of Toronto and the National Research Council of Canada.

Copies of our research publications are made available to our associates upon request, at no extra charge.

Our interest in the migrations of the monarch butterfly continues with even increased activity, thanks to the financial assistance recently given to us by the National Geographic Society, as discussed in another part of this letter. We now have over four hundred associates working with us. Some of them have been most active in tagging other species of Lepidoptera in addition to the monarch butterfly. As yet, we do not have sufficient data to analyze the significance of the movements of other species. We would ask you to join in this interesting project. We do not know how many species of butterflies and moths actually migrate and it is only by the activity of all our associates that we will be able to find out. Perhaps many species migrate, or at least fly considerable distances. If you would like to tag the smaller species, it is necessary to cut our present tag in two and place half the tag on each of the front pair of wings.

We are most interested in the apparent "resident" populations found in Florida and California. Mrs. Reuter of Bradenton, Florida, with the assistance of members of the Florida Audubon Society is making an intensive study of the movements of the monarch butterflies in Florida. These data will be compared to the data we now have for southern California. We are also carrying out experiments using our growth chambers in order to analyze the effect of light cycle and temperature on producing migrants and resident populations. So, you see, the field data and the laboratory experiments work together in ecological research.

Dr. Smithers of the Natural History Museum in Sydney, Australia, spent a few days with us in our laboratories comparing his data for monarch movements with ours. After the California work has been published, we anticipate a joint publication with Dr. Smithers in which comparison will be made between the North American migrating population and the population of California. We suspect a similarity here.

The studies on migration are supported by contributions from those interested in the work being done on the monarch butterfly and we do appreciate the fine support our associates have been given to assure the continuation of this research. I might add here, that not only has the work produced most satisfactory factual material; it has also stimulated an interest in research among our American and Canadian boys and girls, with the result that many of them have achieved much success in the science projects and school work. Some of them, during the past many years, have gone on to University and pursued studies in biological science. Mrs. Urquhart and I enjoy this aspect of the work very much and we do appreciate the many enthusiastic letters which we receive from our youth.

* * *

SPECIAL NOTE RE THIS EDITION OF THE NEWSLETTER

Since both Mrs. Urquhart and I shall be absent from the College at the time when the Newsletter would normally be sent out, I would like to especially thank Miss Audrey Wilson, our editor, for taking the responsibility of sending out the Newsletter in our absence so that the research associates may receive it at the usual time.

Fred A. Urquhart

Tagged by: " MONARCH BUTTERFLY TAGGING RETURNS for 1968 " (Recaptured)

Brent Beam	<u>At-</u> Burlington, Ontario	Pearsall, Texas
Paul Cherubini	Castro Valley, Cal.	Alameda, California
Ted Currie	Toronto, Ontario	Newport News, Virginia
Mrs. Nancy Gillette	Fillmore, N. Y.	Ruston, Louisiana
E. McDonald	Port Hope, Ontario	Duncanville, Pa.
Donny and Larry Parsons	Hiram, Ohio	Akron, Ohio
Randy Reese	Newark, N. Y.	Rohrerstown, Pa.
Mrs. S. Reuter	Bradenton, Fla.	St. Petersburg, Fla.
Paulette Samuelson	Pleasantville, Iowa	Lake Jackson, Texas
Nicholas Schaefer,	Bodega Bay, Cal.	Vacaville, Cal.
Miss Audrey Wilson	Cobourg, Ontario	Ripley, N. Y.

The above records of recaptures represent a very small proportion of the hundreds of tagged butterflies that are returned to us here at Scarborough College. We mention these few just to give you some idea of the flights involved and the different parts of the continent that are covered by the associates of our project.

No matter what the length of the flight of a tagged monarch may represent, we keep all tagged butterflies here for use in our data.

* * *

TAGGING REPORTS

We would like to thank those who have already returned their tagging reports to us.

However, some reports have not as yet been submitted and we would like you to send them in as soon as possible.

Even if none of your tagged specimens was recaptured, we are still interested in keeping your reports on file in order to be able to estimate the amount of tagging done compared with the number of tagged specimens that are recaptured.

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 1969.

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

RETURN OF THE MONARCH

Throughout most parts of North America, the monarch butterfly has been of rare occurrence for the past three or four years. This, we believe, was due to a virus epidemic. This past summer saw a return of the monarch in goodly numbers in most parts of North America and, as we predicted some time ago, we anticipated a return to "vast numbers" in the summer of 1969.

These fluctuations in numbers form somewhat irregular cycles, as happens in populations of many different species of animals. Although one may postulate a virus as the causative factor in reducing the numbers in a relatively short period of time, there is a lack of adequate controlled research to prove the validity of such a conception. We suspect the virus as the causative agent and on this basis we further hypothesized a mutant resistant strain of the monarch butterfly which, now immune to the disease, could repopulate the continent. To obtain factual data on this possibility, we retained in our deep freeze virus-infected specimens of every stage of development. This past summer, we inoculated the monarch butterflies, which we theorized were immune to the virus, with completely negative results. The experiments will be repeated, using a slightly different technique and with better control facilities. However, it may quite likely be shown that the virus is not the operative factor, although one would like to think of such a simple solution.

In the meantime, we will be obtaining a great deal more information on migration as a result of the "return of abundance".

* * *

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.

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.

There are certain areas of the continent where monarch butterflies are much more common than in others and it is not unusual for us to send 500 or 1,000 tags to those who are in these areas, to be used in one season. This will give you some idea of the number of tags that we are prepared to supply to those who can use them. There is no extra charge for the tags, no matter how many are used.

* * *

RENEWAL FEE

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.

* * *

NATIONAL GEOGRAPHIC SOCIETY DONATION

As a result of the increased lecture load, (I now have 400 students to look after - I research under the National Research Council - and we now receive a tremendous volume of mail,) we had considered a drastic reduction on our commitments in the field of migratory studies. A letter was sent to you, informing you of our dilemma and asking you for any suggestions concerning grant support. We did receive a number of suggestions. As a result of a request by one of our Associates, Stephen Auburn of Rochester, New York, directed to the National Geographic Society, we received application forms. I am most happy to inform you that the National Geographic Society has donated a sum sufficient for us to carry on by adding part-time stenographic and clerical help. We are now able to keep pace with many hundreds of letters we receive and to report on captured specimens within a week or so.

It is possible, if our program continues on its present high level, that the National Geographic Society may agree to further assistance for the next two years, at the end of which time we should have completed most of our tagging program and to have had much of the data published in various scientific journals.

I know you join me in extending our most sincere thanks to the National Geographic Society for their interest in our project. A letter from you would, I am sure, be appreciated.

DONATIONS TO MONARCH RESEARCH FUND

Since we first explained to you the critical situation which we faced in our research due to lack of funds, and the possibility that we might have to curtail our activities on this account, the situation is vastly improved. Through the efforts of our associates in contacting outside sources for support, and through the generosity of those associates who have made direct donations to the research fund, we have been able to expand our program of research far beyond our former program.

We would like to thank very warmly those whose contributions have helped to make this expansion possible: -

Mrs. Fred Armstrong, Little Silver, N.J.	Miss Fran Maby, Kittery, Maine
Mr. Brent Beam, Burlington, Ontario	Mrs. Frederick Marsi, Binghamton, N.Y.
Mrs. Gladys Black, Pleasantville, Iowa	Mr. Phillip McArdle, Detroit, Mich.
Mr. John Boutotte, Houma, Louisiana	Mr. Jack Minger, Canton, Ohio
Mrs. Faye Boyles, Ft. Lauderdale, Fla.	Mr. Joseph Moss, Roanoke, La.
Mrs. George Brewer, Auburndale, Mass.	Mrs. C. R. Orr, Houston, Texas
Mr. Wm. Casello, Ann Arbor, Mich.	Mr. Franz L. Pogge, Morgantown, W. Va.
Mr. Boughton Cobb, Falls Village, Conn.	Mrs. Francis Rafool, East Peoria, Ill.
Mr. Donald Davis, Colborne, Ontario	Mrs. Dale Reichert, Abbottstown, Pa.
Mrs. Harold Dodge, Hamburg, N. Y.	Mr. Nicholas Schaefer, Walnut Creek, Cal.
Mrs. Paul Elliott, Muskegon, Mich.	Mrs. John C. Schmid, Greenwich, Conn.
Mr. Glenn Feiszli, Vermilion, Ohio	Mr. N. O. Sibley, Whittemore, Mich.
Mrs. Ruby Fender, Riverton, Iowa	Mrs. S. W. Spack, Salem, Ohio
Mr. & Mrs. E. F. Fergus, Lampe, Mo.	Miss Brenda Stovall, Dallas, Texas
Mrs. Jessie Glynn, Limehouse, Ontario	Mr. Samuel S. Sweet, Manchester, Conn.
Mrs. Franklin Hirst, Linwood, N. J.	Mrs. Laneil B. Teed, Wichita, Kansas
Mrs. G. Juengel, Hampton, Iowa	Mr. W. E. VanAtte, Burlington, Ontario
Mr. Edward Keith, Windsor, Ontario	Mrs. Frank Throm, Overland Park, Kansas
Mrs. Richard P. Klein, Geneva, Ohio	Mrs. Maryanne West, Gibsons, B. C.
Litton Industries, Rexdale, Ontario	Mrs. Sterling White, Whitney, Texas
Mrs. Jacob Ludwig, Bethlehem, Pa.	Mr. E. A. Wilson, Island Lake, Manitoba
Mrs. Lester Luxenberg, Tonopah, Arizona	Mrs. Marie Wren, Fillmore, Cal.

PUBLICITY GIVEN MONARCH BUTTERFLY TAGGING PROJECT

Steve AUBURN of Rochester, N. Y. was the subject of an article in the Times Union of April 27, 1968, in connection with his work as a research associate in the monarch butterfly tagging project.

Mrs. Gladys BLACK and Miss Paulette SAMUELSON, both of Pleasantville, Iowa, were quoted in an article in the Des Moines Register, May 13, 1968, in connection with their interest in the migration of Painted Ladies and also their work as research associates in our project.

Mr. Wm. CASELLO, of Ann Arbor, Michigan - work as a research associate connected with insect migration was mentioned in an article published in the Ann Arbor News.

Mr. Harold DODGE, of Hamburg, N. Y., wrote an article for the October, 1968, issue of the 'Audubon Outlook' published by the Buffalo Audubon Society, describing the migration project and our work in the laboratory at Scarborough College.

Mrs. Paul A. ELLIOTT, Muskegon, Mich., gave lectures to students at three local schools about the insect migration studies and her work as a research associate.

Miss Doris FRITCHMAN, Allentown, Pa., was the subject of an article published in 'The Morning Call' on September 5, 1968, in connection with her work as a research associate and her interest in promoting her students' activities in the tagging of monarchs and in making insect collections.

Miss Margaret FUZEK of Kingsport, Tennessee, was the subject of an article in the local newspaper because of her work as a research associate. Margaret was also interviewed on a television program from WCYB - TV in Bristol, Virginia, on August 29th, 1968.

Mrs. Helen OCHS of Columbus, Indiana, was the author of an article published in 'The Republic' of November 7, 1968, re the rearing of monarchs and her work as a research associate with this project.

Mrs. Suzanne REUTER of Bradenton, Florida, was the subject of an article in the local newspaper of October 3, 1968, because of her tagging of monarch butterflies. Mrs. Reuter has also presented a lecture about the monarch migration to the Sarasota Audubon Society and has had contacts with the Science Centre in St. Petersburg, and the Florida Audubon Society in West Palm Beach re setting up groups to help with tagging butterflies.

Miss Audrey WILSON, Cobourg, Ontario, presented a slide series on the life cycle of the monarch and the method of tagging monarchs to some 1,000 elementary pupils during orientation sessions for their visits to a new field studies centre. Tagging monarchs was one of the most popular activities pursued by the children at the centre.

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."

* * *

MONARCH BUTTERFLIES RELEASED OVER PACIFIC OCEAN

The question as to whether monarch butterflies are capable of flying over large bodies of water is one which still has to be answered. We are fortunate in having Paul Cherubini again working in cooperation with his father, who sails between California and Hawaii, releasing specimens when the ship is well out to sea.

The object of this experiment is to see whether or not some of the butterflies might be able to fly to some of the islands of the South Pacific. So far, we have not had any returns, although 258 specimens have been released at sea at the time of writing this Newsletter.

If you have any contacts on islands in the South Pacific, we would appreciate your letting them know of the possibility of finding a tagged specimen.

* * *

HELP NEEDED IN TAGGING NEW SPECIES OF BUTTERFLIES AND MOTHS

In addition to our interest in following the migratory pattern of the monarch butterfly, we are also keenly interested in gathering data about the flight of other species of butterflies and moths.

It is true that the flights of the other species may not be nearly as long or dramatic as those of the monarch, but nevertheless, the tagging of new species should appeal to you as a challenge to gather data which have never been recorded before. Any information we can gather about species other than monarchs will be new to science and therefore will be unique.

To date you have responded well to our request for tagging new species and we can now record recapture information for swallowtails, viceroys, red admirals, mourning cloaks, Queens, nymphalids, painted ladies and cecropia moths.

We now need many more specimens tagged so that we shall be able to accumulate enough data for publication. At the moment we have only 42 records of specimens recaptured other than monarchs and we shall need hundreds before we can publish any meaningful data.

N O T E - 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"
W. C. Brown Publishers, Dubuque, Iowa; and
"A Field Guide to the Butterflies" by A. B. Klots, published by Houghton,
Mifflin, Co., Boston, Mass.

* * *

" AT TEXAS "

When our associates receive this Newsletter we will most likely be at the University of Texas, enjoying the hospitality of our colleagues. We hope to return to the University of Toronto by mid-April, at which time we will answer the many letters that will have accumulated during our absence. Mrs. Urquhart and I will report on our trip in the next Newsletter. We hope to have much of interest to tell you.

* * *

MEMBERSHIP for 1969 - 70

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, Ontario, Canada.

Please enclose your fee for renewal 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.

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RESEARCH ASSOCIATE FORM 1969 - 70

NAME - Mr.
Mrs.
Miss

Age (if under 18)

Mailing Address
.

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

Occupation

Year in which you were first registered as a research associate

Enclosed please find \$2.00 for annual fee

Number of tags required

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

RESEARCH ASSOCIATES 1968 - 69

1.

A

Mrs. Agnes Adams, Box 515, Canadian, Texas 79014
Mr. Jon Albertson, 1806 Westminster Pl., Oklahoma City, Okla
Graham P. Alexander, 63 Raleigh Rd., Northcote, 9, New Zealand
Mrs. Wm. L. Anderson, 1030 W. Transit Ave., St. Paul, Minn. 55113
Mrs. Evelyn Angier, Box 11, Ione, Cal.
Mr. James Anthony, 1639 Warbler Place, Orange, Cal. 92667
Master Andrew Aramburo, 15272 Upton Ave., San Leandro, Cal.
Miss Amy Archer, 10661 Kent Ave., N E, Hartville, Ohio 44632
Mrs. Fred Armstrong, 640 Point Road, Little Silver, N. J. 07739
Mr. Eric B. Arvidson, 14 Kay Street, Westboro, Mass. 01581
Mr. Stephen Auburn, 6 Fairlawn Drive, Rochester, New York 14617
Mr. Kit Axelson, 3369 McLaughlin Ave., Los Angeles, 66, Cal.
Mr. Stanley Ayers, 708 Stolp Ave., Syracuse, N. Y. 13207

B

Mr. Tom Bachert, 569 E. Benton, Aurora, Ill.
Mr. Jerry Barcelow, Box 265, South Royalton, Vermont
Master Tom Baumgartner, 21 Oak St., Grayslake, Ill. 60030
Mr. Brent Beam, 2015 Edinburgh Drive, Burlington, Ontario
Mr. Lloyd Beamer, Box 56, Meaford, Ontario
Mr. Paul Beard, 17 Cielo Vista Terrace, Monterey, Cal.
Mr. Wm. Bechtel, Director of Museum Education, Portland Society of Natural History
22 Elm St., Portland, Maine
Mr. David K. Bemus, Jefferson St. School, Salamanca, New York 14779
Mr. Larry C. Berndt, 1204 N. 17 Avenue, Melrose Park, Ill.
Mrs. Barbara Berthelsen, Troy High School, 3179 Livernois Road, Troy, Mich. 48084
Mr. Tom Bertolacini, 859 W. Porter Ave., Chesterton, Ind. 46304
Ted Bessen, 1975 East 23 St., Brooklyn, N. Y. 11229
Mr. Harry Betros, High Rock Park, Conservation Centre, Nevada Ave.,
Staten Island, New York 10306
Mark and Jim Bielick, 271 Miner St., Bensenville, Ill.
Miss Jessica Bishop, 180 Arlington Drive, Pasadena, Cal. 91105
Mrs. Gladys Black, 608 Dewitt, Pleasantville, Iowa
Mr. Jerry Blackwell, 6022 Winsome Lane, Houston, Texas
Miss Laurel Block, 17381 Santa Isabel St., Fountain Valley, Cal. 92708
Mr. John Boutotte, 309 Central Ave., Houma, Louisiana 70360
Miss Carolee Boyles, 1020 S. W. 29th St., Ft. Lauderdale, Fla.
Mr. Ray W. Bracher, 17145 Cherokee Drive, Granger, Indiana 46530
Mr. A. L. Brandhorst, 2124 So. Corona, Denver, 10, Colorado
Master Robert Brebbia, 79 Westminster Drive, Pearl River, N. Y. 10965
Mrs. George Brewer, 300 Islington Road, Auburndale, Mass. 02166
Miss Mary E. Brewer, Hawthorne School, Federal St., Brunswick, Maine 04011
Miss Diane Bridgford, 560 Green Acre Drive, Fullerton, Cal. 92632
Mr. Thomas Brisbey, 8653 Rockland Drive, Dearborn Heights, Mich.
Mr. Dan Brown, 5220 Calistoga Way, Sacramento, Cal.
Mrs. Dorothy Brown, Arcade School, 3500 Edison Ave., Sacramento, Cal.
Mr. Robert Brownlee, Stanford Research Institute, Menlo Park, Cal.
Dr. Donald H. Burt, 6595 Plesenton Dr. S., Worthington, Ohio 43085
Mrs. Roy Busby, Dilley, Texas

C

Mr. Donald Cacciapuotti, 10 Wakefield Street, Webster, Mass.

RESEARCH ASSOCIATES 1968 - 69

2.

Mr. Harold Cade, 521 North Vine St., Elkhart, Ind. 46514
 Mr. Kevin Calegari, 2586 Greenwich St., San Francisco, Cal. 94123
 Mr. Chris Callahan, 329 Oakland Park Ave., Columbus, Ohio 43214
 Mr. J. T. Carlisle, 13416 E. Mar Vista, Whittier, Cal.
 Mr. James Carll, 210 South Seventh Street, Olean, N. Y. 14760
 Mr. Alfred W. Carlson, Extension Service, Gloucester County Office
 Clayton, New Jersey 08312
 Mr. Fairbank Carpenter, High Meadow, R. F. D., Far Hills, N. J.
 Mr. William C. Casello, 315 N. Ravenna, Ann Arbor, Mich. 48103
 Mr. David Chapman, Hawksnest Beach, Old Lyme, Conn.
 Mr. Paul Cherubini, 18402 Carlwyn Drive, Castro Valley, Cal. 94546
 Miss Carol Chilson, 25457 Keeler, Detroit, Mich. 48239
 Scott Clevenger, 2345 W. Landmin Mill Rd., Piqua, Ohio 45356
 Mr. Boughton Cobb, 116 East 66, New York, N. Y. 10021
 Miss Susan Coleman, S. Londonderry, Vt.
 Mr. Thomas Corbett, 16 Hay Rich Lane, Commack, N. Y. 11725
 Mr. Stacey Cowles, Marine Route, Casco Bay, Coeur D'Alene, Idaho
 Mr. Michael Culp, R. D. 1, Box 26 A, Duncanville, Pa. 16635
 Mr. E. A. Currie, Island Science School, Toronto Island, Toronto, Ontario

D

Miss Amy Daly, Linglestown Rd., Harrisburg, Pa. 17110
 Mr. D. G. A. Daley, 24 Homewood Ave., Simcoe, Ontario
 Mrs. Donald L. Davidson, 141 Hope Street, Waterloo, Iowa 50703
 Mr. Calvin F. Davis, Latham School, Cottage Grove, Oregon
 Mr. Donald Davis, R R 4, Colborne, Ontario
 Mrs. Louis: Davis, Page, North Dakota 58064
 Mr. Ethan Dawson, 81 Upland Avenue, Mill Valley, Cal.
 Mr. Karl Dawson, 1043 Barbara Pl. Salt Lake City, Utah
 Mr. Ezra R. Day, 3789 So. 5200 West, Salt Lake City, Utah 84120
 Mr. Jonathan Day, 726 Newgate Road, West Suffield, Conn.
 Mr. Tom DeKoster, Central Elementary School, LeMars, Iowa 51031
 Mr. James DeMaio, 400 Thornycroft, Staten Island, N. Y.
 Mr. Kim Deneris, 7530 S. State, Midvale, Utah 84047
 Barbara Dodge, Back Creek Road, Hamburg, N. Y. 14075
 Mrs. Olivea Dodge, 1668 Delaware Ave., St. Paul, Minn. 55118
 Mrs. Mary Donald, Augusta Common School, 42 Taylor Road, Acton Center, Mass.
 Mr. Paul Leo Downey, Jr., 116 Ashland St., Melrose, Mass. 02176
 Mr. Bill Dufour, 7121 Manila Ave., El Cerrito, Cal. 94530
 Mrs. Ruth Duncan, Apt. 502, 35 Greenbrae Circuit, Scarborough, Ontario
 Miss Peggy Dunn, 21236 Simay Lane, Placerita Canyon, Cal. 91321
 Master Jess Dutzi, Box 336, Arealon, Catalina

E

Mr. Andrew Earle, R. D. 1, Canaseraga, New York
 Mr. Tom Eaton, Box 562, Middlefield, Ohio
 Mr. Richard H. Ebright, 5611 Stoudt's Ferry Bridge, Reading, Pa. 19605
 Mr. Chas. L. Echternacht, Knolls Elementary School, 42nd Ave. and Alameda,
 De Las Pulgas, San Mateo, Cal. 94402
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