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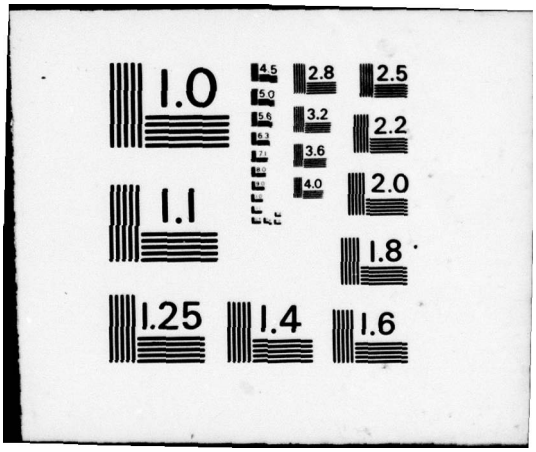
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Report Number 12

MOSQUITOES OF MIDDLE AMERICA

FINAL REPORT

For the period 1 Aug 1963 – 30 Sept 1976

John N. Belkin, Ph.D.

30 Sept 1976

Supported by

U.S. ARMY MEDICAL RESEARCH & DEVELOPMENT COMMAND

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The project "Mosquitoes of Middle America," a cooperative enterprise of the University of California, Los Angeles, the U.S. Army Medical Research and Development Command, and the National Institutes of Health, has been concerned with detailed studies on the systematics, bionomics, distribution and vector potential of the mosquitoes of Central America, West Indies and adjacent portions of North America and South America. Its principal objective has been to provide basic biological data needed for the rational control of mosquito-borne diseases in these areas,

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including the United States. The following are among the accomplishments:

Although the initial ultimate goal of the project to produce a monograph of several volumes has not been realized to date much has been accomplished to provide the material and data necessary to attain this goal in the future. A methodology for the collection, rearing and preservation of material as well as the general research procedures for the taxonomic studies, methods of illustration, presentation of data and publication have been developed. Eight graduate students have been trained in mosquito taxonomy, receiving the Ph.D. degree and 4 of them joined the project at various times, 2 others have been associated with the Southeast Asia Mosquito Project and one is a staff member of Gorgas Memorial Laboratory. One of the technical staff is now the best qualified person to identify Neotropical mosquitoes.

More than 11,500 individual collections have been made expressly for the project in all areas ~~covered by the project~~ except Cuba with more than 86,000 individual rearings from larvae or pupae. Nearly 100 individual cooperators in addition to staff personnel have participated or assisted in this field work. More than 86,000 slides of larval and/or pupal skins as well as 16,000 slides of whole larvae, 7,700 slides of male genitalia and over 175,000 mounts of adults have been prepared. The total number of specimens of all stages in the research collection probably exceeds 400,000. All this material will be transferred eventually to the Smithsonian Institution. Included in this material are reared specimens from all other countries in South America except Uruguay as well as ~~very~~ valuable material not previously studied in detail and made available to the project from various sources. To date 7 installments of the Collection Records of the Project have been prepared and will greatly simplify the compilation of data for the bionomics and distribution sections, probably the most arduous task in any taxonomic revision.

A nearly complete file of reprints of taxonomic papers dealing with the fauna has been assembled. Data on the types of all nominal species described from the New World have been assembled and the types in Europe and South America have been studied in detail.

To date 261 named species have been treated in detail with 89 of these new and with 4 new generic group taxa proposed. This probably represents no more than 25% of the total existing mosquito fauna in the area covered by the project. At least a start has been made in nearly every major group of medical importance in Middle America: *Aedes, Anopheles, Culex, Deinocerites, Haemagogus,* Sabethines. This will greatly facilitate taxonomic research on the remaining species in these groups in the future. A taxonomic review of the Culicid fauna of Jamaica has been prepared and provides a base for a treatment of the mosquito fauna of the West Indies; important to the latter is also the completed check list of Culicidae of the island of Hispaniola.

To date 55 publications, chiefly by staff personnel, have appeared in print; 4 of these have dealt with organization and methodology of the project; 6 with data on topotypic mosquitoes of the New World and their types in Europe and the Americas; 12 major taxonomic revisions; 1 major and 1 minor faunal work; 13 minor taxonomic papers; 3 on distribution and bionomics; 9 miscellaneous notes; and 6 Collection Records.

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CONTENTS

ABSTRACT

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INTRODUCTION

The mosquito fauna of Middle America has not been studied as a unit since the monumental monograph "**The Mosquitoes of North and Central America and the West Indies**" by L. O. Howard, H. G. Dyar and F. Knab (Carnegie Inst. Wash., Publication 159, 4 v., 1912-1917) which was based on field work carried out primarily from 1905 through 1908, at the time of the building of the Panama Canal, and the briefer revision and geographical supplement to this monograph, "**The Mosquitoes of the Americas**" by H. G. Dyar (Carnegie Inst. Wash., Publication 387, 616 p., 1928). In spite of the vast amount of material and information that has accumulated in the 59 years since the appearance of Howard, Dyar and Knab's monograph, little progress has been made in understanding or adequately describing this mosquito fauna. J. Lane's "**Neotropical Culicidae**" (Sao Paulo Univ. Press, 2 v., 1955), the latest general taxonomic work covering the area, is inadequate because of incomplete coverage, superficial treatment of species, unreliable keys and illustrations, and total lack of data on bionomics and disease relations. O. P. Forattini's treatment of the Culicidae in "**Entomologia Medica**" (Sao Paulo, Faculdade de Higiene e Saude Publica, v. 1-3, 1962-1965) does not differ markedly from Lane's in taxonomic coverage but includes information on bionomics and disease relations brought up to date from the unpublished manuscript of Lane's proposed third volume of **Neotropical Culicidae.** At the present time, one has to rely for identification in many groups on the earlier works of Howard, Dyar and Knab (1912-1917) or Dyar (1928). While many new species have been described and several regional lists and studies have been made, only a few groups have been studied in detail for the entire area. The immature stages of many species are not known at present and in many groups species are differentiated primarily or entirely on male genitalia. In several groups it is impossible to get accurate identification even of the common species. Our recent revisions indicate that very distinct species have been erroneously synonymized on very superficial characters and that many of the reportedly widespread species actually consist of species complexes.

In recent years a great deal of new material and data have been obtained in several localities in this area in connection with studies on mosquito-borne diseases, particularly arboviruses. Only a small portion of this material has been studied because of the pressure of other work and the data obtained have not been summarized or systematically analyzed. It is obvious that only an organized long-term systematic project dealing exclusively with the taxonomy, bionomics and distribution of the mosquitoes of the area will enable us to attain a knowledge of this complex fauna adequate to determine the vector potential of individual species and to provide the necessary biological data for rational disease control measures.

Since the beginning of this project in 1962 nearly all the necessary background information has been accumulated, much critical material has been reared and detailed revision of the mosquito fauna have been started.

Basic to all studies on mosquitoes and to the control of mosquito-borne diseases is a determination of the exact species involved. A detailed knowledge of all the life history stages and both sexes is essential to determine the species and its breeding sites and bionomics. Unequivocal association of the stages and sexes can be made only through individual rearings of field collected immature stages or eggs or through rearings of progenies from individual wild females. Our taxonomic studies have been based therefore on such associated material and are as detailed as possible

for every stage, including the complete external morphology and chaetotaxy of the larva and pupa, and all significant external features of the male and female.

A complete census and description of all species occurring in Middle America could not be accomplished in the lifetime of a single generation of investigators, even with continuous systematic collecting in every country and island in the area year after year. However, a lasting sound basis for the ultimate goal of a thorough knowledge of this mosquito fauna can be provided by concentrating on detailed comparative studies on the species originally described from the area (endemic topotypic species) and on reported populations of widespread species originally described from outside the area (extralimital topotypic species). Broadly based comparative studies of this type should provide a framework into which additional species can be incorporated and should also be of some predictive value as to the bionomics and vector potential of such species.

The project was organized in 1961 and began operation on 1 Jan 1962 with the award of Research Grant AI-04379 from the U.S. Public Health Service, National Institutes of Health. The NIH grant has continued to the present and has been approved through 31 Dec 1978. The U.S. Army Medical Research and Development Research Contract DA-49-193-MD-2478 supported the project from 1 Aug 1963 through 30 September 1976. The organization of the project has been fully outlined in Mosquito Studies I (Appendix 4, Publications, item 1).

Nearly all the professional and supporting staff (technicians, illustrators, assistants, clerical personnel) have been supported directly by the Grant or Contract (Appendix 1, Personnel). Wide use has been made of graduate and undergraduate students at the University of California, Los Angeles as assistants in the laboratory or in the field. Several graduate students have joined the professional staff or have become cooperators on the project.

From the beginning, this project has been a cooperative enterprise involving nearly everyone working with mosquitoes or mosquito-borne diseases in Middle America (Appendix 2, Cooperators). Three individuals in particular have been responsible for the acquisition of a large share of the material for the project: T.H.G. Aitken of the Rockefeller Foundation (surveys of Trinidad, most of the Lesser Antilles, French Guiana and Belem, Brazil); Pedro Galindo of the Gorgas Memorial Laboratory, Panama (surveys of Panama, Nicaragua, El Salvador, Honduras and Colombia); and W. A. Page, formerly of the University of the West Indies, Jamaica (surveys of Jamaica). Other important collections have been made by or under the supervision of the cooperators listed in Appendix 3, Cooperators.

The following institutions and organizations have provided facilities for our staff in the field: (1) Gorgas Memorial Laboratory in Panama; (2) Environmental Health Division, U.S. Army Forces Southern Command and Division of Sanitation, Canal Zone Government, Canal Zone; (3) Instituto Interamericano de Ciencias Agricola in Turrialba, LSU-ICMRT, Organization for Tropical Studies and Universidad de Costa Rica; (4) SNEM-AID in Guayaquil, Ecuador; (5) Health Departments in Guyana and Surinam; (6) Instituto Venezolano de Investigaciones Cientificas in Caracas, Division de Endemias Rurales and Faculdad de Agronomia, Universidad Central de Venezuela in Maracay and Rancho Grande in Venezuela; (7) Mosquito Research and Control Unit, Grand Cayman Island; (8) Institut Pasteur in Guadeloupe, Martinique and French Guiana; (9) United Fruit Company in Guatemala and Honduras; (10) Trinidad Regional Virus Laboratory; (11) University of the West

Indies and the Institute of Jamaica in Jamaica; (12) Department of Medical Zoology, University of Puerto Rico, San Juan; (13) Direccion de Investigaciones Cientificas, Universidad Autonoma de Santo Domingo, Dominican Republic; (14) Agricultural Research and Education Center, Homestead, FL; (15) Museu de Zoologia da Universidade de Sao Paulo, Instituto Adolfo Lutz in Sao Paulo and Instituto de Microbiologia, Universidade Federal de Rio de Janeiro, Brazil.

TECHNICAL OBJECTIVES

This project, in a broader basic biological concept, and its methodology are fully outlined in Mosquito Studies I and II (Appendix 4, Publications, items 1 and 2). While the methodology has remained unchanged the scope of the project was restricted in 1971 to the subfamily Culicinae (in the broad sense) which contains the true bloodsucking mosquitoes involved in the transmission of human pathogens and the maintenance of reservoirs of some of these in wild animals, particularly birds.

The overall objective of the project has been to obtain detailed data on the systematics, bionomics, distribution and vector potential of the bloodsucking mosquitoes occurring in Middle America, the subtropical and tropical areas extending from the southern United States to the edge of the Amazon basin. The ultimate goal was to produce a monograph of several volumes containing the basic biological information needed for the rational control of mosquito-borne diseases in the area, including the United States.

The specific aims of the project and its general methodology have been:

(1) To undertake and publish comparative studies of various natural groups of mosquitoes as sufficient topotypic material became available. Every species treated to be described and illustrated in every available stage in as great a detail as the material would allow. Data on bionomics and distribution to be summarized from standard collecting forms and from the literature, and from these data the disease vector potential of every species to be evaluated. Keys to be provided for adults, male genitalia, larvae and pupae. Emphasis to be given to the study of species groups of importance as disease vectors.

(2) To undertake and publish interim regional faunal studies for critical portions of the area.

(3) To carry out additional field collections, observations and rearings (individual, progeny, mass) to obtain topotypic material in areas not adequately surveyed in the past and for groups requiring additional information.

PRINCIPAL ACCOMPLISHMENTS

Although the initial ultimate goal of the project to produce a monograph of several volumes has not been realized to date much has been accomplished to provide the material and data necessary to attain this goal in the future.

Organization. Originally designed as a personal research project, the program "Mosquitoes of Middle America" has been an informal cooperative effort of many individuals and organizations in the area. Its magnitude and usefulness have depended to a large extent on the efforts of individ-

ual cooperators (Appendix 2, Cooperators). To date much of the material for study has been obtained through voluntary cooperators by the provision of field facilities and assistance for the staff personnel.

Methodology. The collection, rearing and preservation of material and the recording of ecological data on a standard form by staff members and/or cooperators according to uniform procedures were developed specifically for the project and have been explained in detail in Mosquito Studies II,IIa (Appendix 4, Publications, items 2,6). The emphasis in the field work has been on obtaining topotypic material. The general research procedures for the taxonomic studies, the methods of illustration, presentation of data and publication have been outlined in Mosquito Studies I,Ia (Appendix 4, Publications, items 1,5). This methodology in a modified form has been followed by SEAMP and MEP.

Training of Taxonomists, Technicians and Illustrators. Nearly all the major taxonomic studies of the project have been accomplished by graduate students at the University of California, Los Angeles under the supervision of John N. Belkin. Four of these: Hogue, Schick, Zavortink and Berlin, joined the staff of the project for varying periods of time. Two of these, Adames and Valencia, returned to their countries of origin, Panama and Chile respectively, and Adames has remained as an important cooperator of the project to this time. Two others have been associated with other mosquito taxonomic research projects, Dr. Shivaji Ramalingam as a consultant and contributor of a large number of individually reared material to SEAMP (1966-1974) and investigations on the Culicidae of Malaysia; Dr. Sunthorn Sirivanakarn, a staff member of SEAMP (1968-1974) and MEP (1974-present). John N. Belkin served as an external member of the Ph.D. committee for J. Hal Arnell at the University of Utah and sponsored his postdoctoral traineeship at UCLA which led to the appointment of Arnell on the project. Dr. Zavortink was a consultant to SEAMP (1966-1971) and contributed a paper on *Orthopodomyia* in Southeast Asia while on the staff of the project Mosquitoes of Middle America.

All the professional personnel have been trained in the techniques used by the technical personnel and the methods used by the illustrators. Similarly the technical personnel and illustrators, being in constant contact with the professional personnel, have acquired considerable competence in taxonomy, especially Sandra J. Heinemann who has done all the preliminary sorting, grouping and identification for the project, has participated in taxonomic studies and is now without doubt the best qualified person to identify Neotropical mosquitoes.

Collections and Rearings. Topotypic and/or other material has been collected and reared and general ecological data recorded on a standardized form by staff members and/or cooperators in all the countries and major islands of the area except Cuba (Appendix 3). More than 11,500 individual collections have been made expressly for the project with more than 86,000 individual rearings from larvae or pupae.

Individually Reared Topotypic Material. Represented in the above-mentioned collections is individually reared topotypic material of about 55% of the 752 species previously described from the area (exclusive of U.S.A.).

Material from Other Sources. Additional reared material needed for comparative studies has

been obtained for the project in Argentina, Bolivia, Brazil, Chile, Paraguay, Peru. Very valuable material not previously studied in detail was acquired for the project, primarily collections accumulated by E. Abonnenc, T.H.G. Aitken, D. S. Bertram, S. J. Carpenter, P. Galindo, D. C. Geijkes, K. L. Knight, J. F. Reinert, F. M. Root, L. E. Rozeboom and especially W.H.W. Komp.

Processing and Preparation. To date more than 86,000 slides of larval and/or pupal skins from individual rearings have been prepared as well as more than 16,000 slides of whole larvae, 7,700 slides of male genitalia and a large number of slides of female genitalia and over 175,000 mounts of adults. All this material has been provided with printed labels.

Status of Research Collection. The total number of specimens of all stages in the research collection at UCLA probably exceeds 400,000. More than two-thirds of this material has been tentatively identified to species groups and it appears that well over 500 species may be represented in this material, with more than 100 species undescribed. It is expected that this collection will be transferred to the Smithsonian Institution over a number of years as taxonomic work on mosquitoes is phased out at UCLA.

Documentation. A nearly complete file of reprints of taxonomic papers dealing with the fauna of the area has been assembled and made available to all workers in the area.

Study of Type Material. Data on the types of all the nominal species described from the New World have been assembled and published (Appendix 4, Publications, items 3,4,9,10,24,25, 30,32,33). Type specimens located in museums in Europe, Argentina and Brazil have been studied and necessary lectotypes designated except for those species whose type specimens have to be studied carefully in connection with a taxonomic revision not undertaken as yet (Appendix 4, Publications, items 8,10,33).

Identification Services. Identification of material has been provided for individuals and organizations working in the area, notably the following: Prof. D. S. Bertram, London School of Tropical Medicine and Hygiene, material from Belize; Dr. H. Disney, material from Belize; Dr. M.E.C. Giglioli, Mosquito Research and Control Unit, Grand Cayman Island; Dr. H.A.M. de Kruijf, Centraal Laboratorium, Paramaribo, Surinam; Dr. W. D. Sudia, Center for Disease Control, material from Honduras, Mexico and Venezuela; Dr. C. J. Marinkelle, Universidad de Los Andes, material from Colombia; Dr. John E. Porter, U.S. Public Health Service, material from Haiti; Dr. H. C. Barnett, Brazilian-American Biomedical Program, Salvador, Brazil; Dr. H. G. Henning, Munster, West Germany, material from Colombia.

Illustration Facilities. In all publications emphasis has been placed wherever possible on the illustrations of all kinds (drawing, tables, maps) by staff illustrators in preference to words. These facilities have been available to cooperators and have been used by Zavortink (Appendix 4, Publications, item 7), Arnell and Nielsen (item 35), Adames and Galindo (items 39,47), Boreham and Baerg (item 45) and Hogue (item 49).

Publication Facilities. Arrangements were made with the American Entomological Institute to have the major papers by staff members and cooperators issued in a separate series, Mosquito Studies (Diptera, Culicidae) as separate numbers of the Contributions of the Institute. Shorter papers have appeared in Mosquito Systematics. Printing has been done by the photo-offset method.

The text copy has been prepared in the Los Angeles laboratory under constant supervision and control at the same time that the final illustrations were assembled and labeled. This method of publication is the quickest and least costly, favors graphic presentation and allows maximum control of accuracy.

Taxonomic Studies. Detailed taxonomic revisions with illustrations of the complete larval and pupal chaetotaxy and pertinent details of adults of every species have been completed and published for the following groups (Appendix 4, Publications):

1. Subgenus *Howardina* of *Aedes* (35 sp, 15 new) by O.G.W. Berlin (items 12,46).
2. Terrens Group of *Aedes* (29 sp, 20 new) by R. X. Schick (items 23,28).
3. Varipalpus Group of *Aedes (Ochlerotatus)* (5 sp, 2 new) by J. H. Arnell and L. T. Nielsen (item 35) and T. J. Zavortink (item 19).
4. Subgenera *Abraedes, Aztecaedes, Gymnometopa, Kompia,* and part of *Protomacleaya* and *Ochlerotatus,* all of genus *Aedes* (19 sp, 7 new) by T. J. Zavortink (items 36 and 27).
5. Scapularis Group of *Aedes (Ochlerotatus)*(22 sp, 8 new) by J. H. Arnell (item 55).
6. Treehole *Anopheles* of the New World (6 sp, 3 new) by T. J. Zavortink (items 14,22).
7. Subgenus *Kerteszia* of *Anopheles* (9 sp, 2 new) by T. J. Zavortink (item 38).
8. Subgenus *Micraedes* of *Culex* (7 sp, 4 new) by O.G.W. Berlin (items 21,44).
9. Subgenus *Carrollia* of *Culex* (16 sp, 2 new) by J. D. Valencia (item 40).
10. Genus *Deinocerites* (18 sp, 8 new) by A. J. Adames (item 29) and Adames and C. L. Hogue (item 20).
11. Subgenus *Conopostegus* of *Haemagogus* (4 sp) by T. J. Zavortink (item 36).
12. Nominate subgenus of *Haemagogus* (24 sp, 3 new) by J. H. Arnell (item 41).
13. Genus *Orthopodomyia* (9 sp) by T. J. Zavortink (item 7).

Regional Faunal Studies. A taxonomic review of the Culicid fauna of Jamaica by J. N. Belkin, S. J. Heinemann and W. A. Page has been completed and published (item 26). This book treats 68 named species (12 new) and provides the base for a treatment of the mosquito fauna of the West Indies which is in the course of preparation. A tentative annotated list of the Culicidae of the island of Hispaniola (Haiti and Dominican Republic) has been prepared and published by J. N. Belkin and S. J. Heinemann (item 37). This list is based primarily on collections made by staff members as well as on all previous collections available to the project.

Summary of Taxonomic Research. To date 261 named species have been treated with 89 of these new and with 4 new generic group taxa proposed (Appendix 5, New Taxa). This probably represents no more than 25% of the total existing mosquito fauna in the area covered by the project. At least a start has been made in nearly every major group of medical importance in Middle America: *Aedes, Anopheles, Culex, Deinocerites, Haemagogus,* Sabethines. This will greatly facilitate taxonomic research on the remaining species in these groups in the future.

Collection Records of the Project. In 1973 a series of publications was begun to summarize the data from record forms pertaining to each collection made specifically for the project together with preliminary identifications of species. Treated in the same manner are miscellaneous valuable unlabeled collections made available to the project from various sources and provided with varying amounts of data as to source, date, habitat and so on (Appendix 3, Collections). The principal reason for these publications is to put this information on permanent record and to make it readily available to current and future workers in the fields of taxonomy, bionomics, ecology, biogeog-

raphy, disease relations and control. It has been our experience, as has been the case with many other investigators, that valuable private field notes are either inaccessible to others or are completely lost. Since this project will be terminated soon, its present records may not be intelligible in the present form to future workers. To date 6 installments of the Collection Records have been published (Appendix 4, items 42,48,51,52,53,54) and together with the published records for Jamaica (item 26) cover all the collections from the West Indies. Preliminary drafts have been prepared for the collections from Central America exclusive of Mexico and Panama. The publication of all the Collection Records will greatly simplify the compilation of data for the bionomics and distribution sections, probably the most arduous task in any taxonomic revision.

Publications. To date 55 publications, chiefly by staff personnel, have appeared in print (Appendix 4). Four of these have dealt with organization and methodology of the project (items 1,2, 5,6); 6 with data on topotypic mosquitoes described from the New World and the study of their types in Europe and Brazil (items 3,4,8,9,10,33); 12 major taxonomic revisions (items 7,12,21,22, 23,29,35,36,38,40,41,55); 1 major (item 26) and 1 minor (item 37) faunal work; 13 minor taxonomic papers (items 13,14,19,20,27,28,39,44,45,46,47,49,50); 3 on distribution and bionomics (items 11,16,34); 9 miscellaneous notes (items 15,17,18,24,25,30,31,32,43); and 6 Collection Records of the project (items 42,48,51,52,53,54).

REVIEW OF PROGRESS FOR THE PERIOD JAN 1975–SEPT 1976

Taxonomic Studies

J. H. Arnell completed the study of the Scapularis Group of *Aedes (Ochlerotatus)* and prepared the manuscript for publication which will take place before the end of 1976.

J. N. Belkin and S. J. Heinemann continued their study on the mosquito fauna of the West Indies. The manuscript is expected to be completed in late 1976 or early 1977. They also described a new species of *Psorophora (Janthinosoma)* from the United States, formerly considered to be *P. varipes.*

Cooperator O.G.W. Berlin described the immature stages of *Aedes (Howardina) lorraineae,* completed the studies of the subgenus *Anoedioporpa* and a new subgenus of *Culex* and prepared the first drafts of the manuscripts on these studies.

Cooperator T. J. Zavortink neared the completion of the first part of his study on the composite genus *Trichoprosopon* which should be finished by the end of 1976.

Cooperator C. L. Hogue described a new species of *Culex (Cu.)* breeding in bromeliads on Cocos Island, Costa Rica.

Cooperator T. E. Rogers prepared the first draft of the manuscript on the study of the genus *Limatus.* This manuscript will require considerable revision as well as editing before publication.

Cooperators A. J. Adames and P. Galindo described the immature stages of *Galindomyia leei* from Colombia.

Cooperators M. M. Boreham and D. C. Baerg described the egg, larva and pupa of *Anopheles (Lophopodomyia) squamifemur.*

Graduate students M. E. Faran, K. J. Linthicum and G. K. Bryce undertook for their PhD dissertations the revisions of the following groups of Neotropical *Anopheles* respectively: "*Tarsimaculatus*" and *Argyritarsis* of the subgenus *Nyssorhynchus* and *Arribalzagia* of the subgenus *Anopheles.* Since early 1976 their studies have been supported by the Medical Entomology Project at the Smithsonian Institution.

Illustration

L. M. Kowalczyk and/or N. Kitamura prepared final illustrations for the majority of the species from the West Indies, all the final illustrations for the Scapularis Group of *Aedes (Ochlerotatus)*, the species of *Culex* with short palpus in the males, and for the papers by cooperators O.G.W. Berlin, C. L. Hogue, A. J. Adames and P. Galindo, M. M. Boreham and D. C. Baerg. N. Kitamura began the preparation of final drawings of the "*Tarsimaculatus*" Group of *Anopheles (Nyssorhynchus)*.

Collecting and Rearing

Topotypic surveys of the mosquitoes of Brazil were carried out in the Sao Paulo area by J. H. Arnell, M. E. Faran, K. J. Linthicum and T. E. Rogers in Jan-Mar 1975 and by J. N. Belkin, M. E. Faran and G. K. Bryce in the Rio de Janeiro area Dec 1975-Mar 1976.

Processing

W. A. Powder processed 2,221 collections. This involved the preparation of 5,282 slides of individual rearings and 540 slides of whole larvae. S. J. Heinemann and assistants prepared 721 slides of genitalia and 106 slides of whole adults and assistants made 8,899 pin mounts of adults and labeled 16,253 adult mounts and 5,611 slides.

Collection Records

The publication of the collection records of the project begun in 1973 was resumed in 1975. S. J. Heinemann prepared the data for publication for the remainder of the West Indies. This involved careful checking of all entries on the record cards or other original notes as well as the checking of the provisional identifications. Four additional papers by J. N. Belkin and S. J. Heinemann appeared in 1975 and 1976 in Mosquito Systematics, completing the collection records for the West Indies.

Publication

Twelve papers have been published or are in press at this time (Appendix 4, Publications, items 44-45).

RECOMMENDATIONS

Although there are several advantages in flexibility for a research project to be supported by a contract funded annually there are some very serious problems associated with this arrangement. These have been repeatedly discussed in the past without bringing any change in the manner of support. The only way this project has been able to operate is because it has been supported also by a research grant from NIH with the level of financial support approved in general for a period of 5 years at a time. It is recommended that a similar procedure be followed by USAMRDC to assure continuity of a program and to enable the project to secure adequate professional and technical personnel.

It is also recommended that a broad program on the entire mosquito fauna of a large natural area, as in the present project, be followed in the future rather than support of a crash program of a limited group in a limited area. A broad approach would be much more productive and less costly and would probably lead to a better understanding of the complex problems involved in the ecology and control of mosquito-borne pathogens, especially arboviruses.

APPENDIX 1 PERSONNEL RECEIVING SUPPORT FROM PROJECT

	Dates of Service	Source of Support
Adames, Abdiel J.	1-10-68 - 31-8-70	NIH
Arnell, J. Hal	1-2-72 - 31-3-76	Army
Barr, Sylvia	7-11-67 - 31-12-67	Army, NIH
Belkin, John N.	1-1-62 - 30-9-76	UCLA, NIH, Army
Berlin, O.G.W.	16-6-66 - 30-6-70	Army, NIH
	1-10-74 - 31-1-75	Army
Bernstein, Sheila E.	20-2-67 - 4-7-69	NIH
Chew, Stephen J.	1-6-72 - 1-9-72	Army
Demos, Angeliki	24-10-72 - 31-12-73	Army, NIH
Dieckman, Sally A.	22-1-68 - 31-5-69	NIH
Drake, Eugene F.	1-7-71 - 24-9-71	Army
DuPont, Frances M.	27-1-69 - 30-12-70	Army
Faran, Michael E.	1-9-71 - 31-12-71	NIH, Army
	1-7-74 - 20-9-74	
	1-1-75 - 28-2-75	
	1-7-75 - 30-9-75	
Goldmann, Dan	1-6-64 - 30-9-64	NIH
Heinemann, Dennis W.	10-2-69 - 31-12-70	Army
Heinemann, Sandra J.	1-7-65 - 30-9-76	NIH, Army
Hogue, Charles L.	1-1-62 - 30-6-64	NIH, LACM
Ishida, Christopher	20-6-66 - 30-9-68	NIH, Army
Kitamura, Nobuko	19-5-69 - 30-9-76	Army, NIH
Kowalczyk, L. Margaret	10-2-69 - 11-2-76	NIH, Army
Kwan, David K-H.	1-10-71 - 31-12-71	Army
Lerten, Lisa R.	2-7-74 - 5-11-74	Army
Linthicum, Kenneth J.	1-7-75 - 19-9-75	Army
Lui, Kevin	5-10-70 - 31-12-70	Army
Mamalito, George E.	7-11-72 - 31-12-72	Army
Manley, Ronald G.	22-11-71 - 31-12-71	Army
Martsch, Nancy L.	18-12-67 - 13-2-70	NIH, Army
McRaven, Gerald A.	8-11-72 - 31-12-72	Army
Metzner, Kathryn S.	4-2-75 - 30-9-76	Army
Moody, Marjorie	2-1-63 - 31-12-65	NIH
Nelson, Michael J.	22-9-66 - 31-12-70	Army, NIH
Nishio, Jane	2-1-63 - 31-1-67	NIH, Army
Ooi, Wan Hin	1-10-71 - 31-12-71	Army
Powder, William A.	1-1-62 - 11-2-76	Army, NIH
Price, Claire	1-2-71 - 20-5-71	Army
Rogers, Thomas E.	1-7-71 - 24-9-71	Army
San Bartolome (Arny), Katherine M.	1-11-72 - 31-12-72	Army
	1-10-73 - 31-12-73	
Schick, Aiko	15-10-63 - 15-11-63	Army
Schick, Robert X.	15-11-63 - 30-6-70	NIH, Army

PERSONNEL RECEIVING SUPPORT FROM PROJECT

	Dates of Service	Source of Support
Stallard, Caryle L.	14-7-69 - 31-8-70	NIH, Army
	7-6-71 - 15-4-73	
Stave, Melvin	7-11-72 - 31-12-72	Army
	17-6-74 - 30-9-76	
Tometich, Nancy E.	14-9-70 - 14-1-71	Army, NIH
Walker, Richard	1-10-71 - 31-12-71	Army
Woodley, Laurel G.	1-6-64 - 18-9-67	NIH, Army
Zavortink, Thomas J.	15-6-64 - 31-5-65	NIH
	2-1-68 - 31-7-74	Army

APPENDIX 2 COOPERATORS

Abonnenc, E., ORSTOM, Bondy, France.–Donations of specimens from French Guiana, 1964.

Adames, Abdiel J., Gorgas Memorial Laboratory, Panama.–Mosquitoes of Panama; *Deinocerites;* collections in Colombia and Central America, 1966-1976.

Aitken, Thomas H. G., Yale Arbovirus Research Unit, New Haven, CT.–Culicidae of West Indies, Trinidad, Guyanas and Belem, Brazil, 1962-1976.

Alvarez V., J. M., Direccion de Investigaciones Cientificas, Universidad Autonoma de Santo Domingo, Dominican Republic.–Facilities for topotypic survey of mosquitoes in Dominican Republic, 1971.

Arnell, J. Hal, Department of Biology, University of California, Los Angeles.–Completion of paper on Scapularis Group of *Aedes (Ochlerotatus),* 1976.

Arnett, Ross H., Biological Research Institute of America, Baltimore, MD.–Specimens from Panama and Canal Zone; topotypic survey of mosquitoes in Ecuador, 1966.

Arzube R., Manuel E., Instituto Nacional de Higiene, Guayaquil, Ecuador.–Specimens from Ecuador, 1972.

Austin, Joseph R., Insecticide Field Testing Team (AMRO-0209), Pan American Sanitary Bureau, San Salvador, El Salvador.–Collections of mosquitoes in El Salvador, 1965, 1966.

Baranowski, Richard M., Agricultural Research and Education Center, Homestead, FL.–Facilities for mosquito survey in South Florida, 1972.

Barnett, Herbert C., Instituto de Microbiologia, Universidade Federal do Rio de Janeiro, Brazil.–Facilities for topotypic survey of mosquitoes in Rio de Janeiro area, Dec 1975-Mar 1976.

Barr, A. Ralph, School of Public Health, University of California, Los Angeles.–Pupae of North American *Psorophora.*

Barreto, Pablo, Departamento de Medicina Preventiva, Facultdad de Medicina, Universidad del Valle, Cali, Colombia.–Translation of Mosquito Studies I; mosquitoes of Colombia, 1965.

Batista del Villar, G., Direccion de Investigaciones Cientificas, Universidad Autonoma de Santo Domingo, Dominican Republic.–Facilities for topotypic survey of mosquitoes in Dominican Republic, 1971.

Bergold, G. H., Departamento de Virologia, Instituto Venezolano de Investigaciones Cientificas (IVIC), Caracas, Venezuela.–Facilities for topotypic surveys in Venezuela, 1966-1967.

Berlin, O.G.W., School of Public Health, University of California, Los Angeles.–Review of subgenera of *Culex* with short male palpus, 1975-1976.

Berrios Arias, Aurelio, Ministerio de Salubridad Publica, San Jose, Costa Rica.–Topotypic survey of mosquitoes in Costa Rica, 1971.

Bertram, D. S., Department of Entomology, London School of Hygiene and Tropical Medicine.–Collections of mosquitoes in Belize, 1967.

Bonnet, David D., Communicable Disease Center, Atlanta, GA.–Specimens from Virgin Islands.

Bonne-Wepster, Jean, Instituut voor Tropische Hygiene, Amsterdam, Netherlands.–Information on type material and Bonne-Wepster and Bonne collections in Surinam.

Boreham, Melvin M., Division of Sanitation, Canal Zone Government.–Specimens from Canal Zone and Virgin Islands, 1969-1974.

Breeland, Samuel G., Central America Malaria Research Station, Sal Salvador, El Salvador.–Mosquitoes of El Salvador, 1971.

Burger, John F., Department of Entomology, University of Arizona.–Collections from Arizona, 1965-1970.

Carpenter, Stanley J., Santa Rosa, CA.–Collections from Canal Zone and U.S.A.

Casal, Osvaldo H., Departamento de Entomologia Sanitaria, Instituto de Microbiologia, Buenos Aires, Argentina.–Mosquitoes of Argentina, 1965-1971.

Chiriboga, Jorge, Puerto Rico Nuclear Center, San Juan, Puerto Rico.–Facilities in Puerto Rico, 1970; contacts in Dominican Republic, 1971.

Clastrier, Jean S., Museum d'Histoire Naturelle, Paris, France.–Specimens from French Guiana.

Conover, R. A., Agricultural Research and Education Center, Homestead, FL.–Facilities for mosquito survey in South Florida, 1972.

Cornely, Guy, Raizet, Abymes, Guadeloupe.–Topotypic survey of mosquitoes in Guadeloupe, 1971-1974.

Cotrim, Maria das Dores, Faculdade de Saude Publica, Universidade de Sao Paulo, Brazil.–Mosquitoes of Brazil, 1969-1975.

Courmes, Edouard, Institut Pasteur, Guadeloupe.–Facilities for topotypic survey of mosquitoes in Guadeloupe, 1964-1966.

Cova Garcia, Pablo, Division de Endemias Rurales, Ministerio de Sanidad y Asistencia Social, Maracay, Venezuela.–Topotypic survey of mosquitoes in Venezuela, 1969.

Cowsill, Vincent P., Department of Zoology, University of California, Los Angeles.–Topotypic survey of mosquitoes in Guatemala and Honduras, 1964.

Darsie, Richard F., Center for Disease Control, Atlanta, GA.–Specimens from West Indies and Central America.

Diaz Najerra, Alfonso, Laboratorio de Entomologia, Instituto de Salubridad y Enfermedades Tropicales.–Mosquitoes of Mexico, loan of material for study, 1964-1976.

Drennan, L. M., General Medical Department, United Fruit Company, New Orleans, LA.–Facilities for topotypic surveys for mosquitoes in Guatemala and Honduras, 1964, 1967.

Elliott, Roy, Pan American Sanitary Bureau.–Assistance in Colombia, Central America and Brazil, 1964-1973.

Farr, Thomas H., Science Museum, Institute of Jamaica, Kingston.–Assistance in topotypic survey of mosquitoes in Jamaica.

Fauran, Pierre, Institut Pasteur, Guadeloupe; Institut Pasteur, Cayenne, French Guiana.–Topotypic survey of mosquitoes in Guadeloupe, 1964-1966; mosquitoes of French Guiana, 1970-1972.

Fisher, Eric M., Long Beach, CA.–Collections in Mexico, 1963, 1964.

Fize, Jack M., Bureau Municipal d'Hygiene, Martinique.–Topotypic survey of mosquitoes in Martinique, 1971-1972.

Floch, Herve A., Institut Pasteur, Guadeloupe.–Facilities for topotypic survey of mosquitoes in Guadeloupe, 1971.

Forattini, Oswaldo P., Faculdade de Saude Publica, Universidade de Sao Paulo, Brazil.–Loan of type and other material; assistance in topotypic survey of mosquitoes in Sao Paulo area, 1974-1975.

Fox, Irving, Department of Medical Zoology, University of Puerto Rico, San Juan.–Facilities for topotypic survey of mosquitoes in Puerto Rico, 1970.

Fowler, Jerry L., Brazilian-American Bio-medical Program, Salvador, Bahia, Brazil.–Survey of mosquitoes in vicinity of Salvador, 1972.

Gabaldon, Arnoldo, Direccion de Malariologia y Saneamiento Ambiental, Ministerio de Sanidad y Asistencia Social, Caracas, Venezuela.–Organization of topotypic survey of mosquitoes in Venezuela, 1968, 1969.

Galindo, Pedro, Gorgas Memorial Laboratory, Panama.–Mosquitoes of Panama, 1962-1976; supervision of topotypic surveys of mosquitoes in Central America.

Garcia, Miguel, Departamento de Entomologia Sanitaria, Instituto de Microbiologia, Buenos Aires, Argentina.–Mosquitoes from Argentina, 1965-1976.

Gardner, Clark, Department of Biology, University of Utah, Salt Lake City.–Collections in Colombia and Peru, 1975.

Geijskes, D. C., Stichting Surinaams Museum, Paramaribo, Suriname.–Collections from Surinam, 1963-1964.

Gerberg, Eugene J., Biological Research Institute of America, Baltimore, MD.–Topotypic survey of mosquitoes in Ecuador, 1966; mosquitoes of Cayman Islands, 1964-1976.

Giglioli, George, Mosquito Control Laboratory, Ministry of Health, Georgetown, Guyana.–Facilities for topotypic survey of mosquitoes in Guyana.

Giglioli, Marco E. C., Mosquito Research and Control Unit, Grand Cayman.–Mosquitoes of Cayman Islands, 1966-1976.

de Goes, Paulo, Instituto de Microbiologia, Universidade Federal do Rio de Janeiro, Brazil.–Sponsor of topotypic survey of mosquitoes in Rio de Janeiro area, 1975, 1976.

Gomez Perez, Jose D., Universidad Autonoma de Santo Domingo, Dominican Republic.–Topotypic survey of mosquitoes in Dominican Republic, 1971.

Gonzalez, Roberto H., Estacion Experimental Agronomica, Maipu, Chile.–Mosquitoes of Chile, 1966.

Goodbody, Ivan M., Department of Zoology, University of the West Indies, Mona, Jamaica.–Facilities for topotypic survey of mosquitoes in Jamaica, 1966, 1967.

Gout, Michel, Institut Pasteur, Martinique.–Facilities for topotypic survey of mosquitoes in Martinique, 1971-1972.

Guerra, Ambrose, Trinidad Regional Virus Laboratory, Port-of-Spain, Trinidad.–Topotypic surveys of mosquitoes in Lesser Antilles, 1965-1967.

Guerreo, Lacenio, Division de Endemias Rurales, Ministerio de Sanidad y Asistencia Social, Maracay, Venezuela.–Facilities for topotypic surveys of mosquitoes in Venezuela, 1966, 1967, 1969.

Haber, William H., Biology Department, University of Puerto Rico, Mayaguez, Puerto Rico.–Mosquito collections in Puerto Rico, 1970, 1971.

Hansell, Roger I. C., Department of Entomology, University of California, Riverside.–Topotypic survey of mosquitoes in Guyana and Venezuela, 1967.

Hayes, Jack, Department of Preventive Medicine and Community Health, Texas Tech University School of Medicine.–Collections in Costa Rica, 1975, 1976.

Heinemann, Dennis W., Los Angeles, CA.–Topotypic survey of mosquitoes in Costa Rica, 1971.

Henning, Hans Gero, Zoologisches Institut, Munster, West Germany.–Collections from Colombia, 1969-1970.

Hochman, Robert H., Southeast Asia Mosquito Project, Smithsonian Institution, Washington, DC.–Mosquito collections in Jamaica (Aug 1968), Dominica (Aug 1974) and Martinique (Sept 1974).

Hogue, Charles L., Los Angeles County Museum of Natural History.–Collections in Costa Rica, 1962-1969, 1975.

Huettel, Milton D., USDA Laboratory, Gainesville, FL.–Mosquito collections in Texas and northeastern Mexico, 1965-1966.

Hunter, George W., III, LSU-ICMRT, San Jose, Costa Rica.–Facilities for topotypic survey of mosquitoes in Costa Rica, 1962.

Johnston, H. B., Mosquito Control Organization, Ministry of Health, Kingston, Jamaica.–Assistance in topotypic survey of mosquitoes in Jamaica, 1964, 1965.

Johnston, Laurence, Environmental Health Division, U.S. Army Forces Southern Command, Canal

Zone.–Facilities for topotypic survey of mosquitoes in Canal Zone, 1972.

Keenan, Marvin, Environmental Health Division, U.S. Army Forces Southern Command, Canal Zone.–Assistance in topotypic surveys of mosquitoes in Canal Zone, 1963-1972.

Kitzmiller, James B., Florida Medical Entomology Laboratory, Vero Beach, FL.–Collections from Colombia, Peru, 1974, 1975.

Knight, Kenneth L., Department of Entomology, North Carolina State University, Raleigh, NC.–Mosquitoes from West Indies.

Kramer, Rene, Institut Pasteur de la Guyane Francaise, Cayenne.–Assistance in topotypic survey of mosquitoes in French Guiana, 1967.

Kruijf, Hans A. M. de, Centraal Laboratorium, Paramaribo, Surinam.–Cooperation in topotypic survey of mosquitoes in Surinam, 1967.

Kuyp, Edwin van der, Bureau voor Openbare Gezondheidszorg, Paramaribo, Surinam.–Facilities for topotypic survey of mosquitoes in Surinam, 1967.

Lee, Vernon H., Rockefeller Foundation, Facultad de Medicina, Universidad del Valle, Colombia.–Supervision of collections in Colombia, 1964-1966.

Lewis, C. Bernard, Institute of Jamaica, Kingston, Jamaica.–Assistance in topotypic survey of mosquitoes of Jamaica and in publication of Culicidae of Jamaica, 1967-1970.

Linam, Jay H., Biology Department, University of Southern Colorado.–Collections in southwestern U.S.A.

Lopes, Oscar de Souza, Instituto Adolfo Lutz, Secretaria de Estado da Saude, Sao Paulo, Brazil.–Collections in state of Sao Paulo; assistance in topotypic survey, 1974-1975.

Lopes, Lea, Instituto Adolfo Lutz, Secretaria de Estado da Saude, Sao Paulo, Brazil.–Assistance in topotypic survey, 1974-1975.

Lopez Dominguez, Carlos, Direccion de Investigaciones Cientificas, Universidad Autonoma de Santo Domingo, Dominican Republic.–Facilities and assistance in topotypic survey of mosquitoes in Dominican Republic, 1971.

Lutz, Bertha, Museu Nacional, Rio de Janeiro, Brazil.–Information on type material of Adolpho Lutz and location of type material in Brazil, 1969-1973.

MacLaren, James P., Division of Sanitation, Canal Zone Government.–Assistance to topotypic surveys in Canal Zone, 1963-1972.

Marinkelle, C. J., Universidad de los Andes, Bogota, Colombia.–collections in Colombia, 1965-1971.

Martin S., Felipe J., Departamento de Zoologia Agricola, Faculdad de Agronomia, Universidad Central de Venezuela, Maracay, Venezuela.–Facilities for topotypic survey of mosquitoes in Venezuela, 1967, 1969.

Martinez, Antonio, San Isidro, Buenos Aires, Argentina.–Mosquitoes of Argentina and Bolivia, 1963-1966.

Martinez, Raymond, Trinidad Regional Virus Laboratory, Port-of-Spain, Trinidad.–Topotypic surveys of mosquitoes in Lesser Antilles, 1965-1967.

Mattingly, Peter F., British Museum (Nat. Hist.), London, England.–Consultation on type material; loan of material, 1962-1976.

Miskimen, George W., Entomological Pioneering Research Laboratory, University of Puerto Rico, Mayaguez.–Facilities for collection and rearing of mosquitoes in Puerto Rico, 1970-1971.

Moore, Chester G., Entomological Pioneering Research Laboratory, University of Puerto Rico, Mayaguez.–Supervision of mosquito collection and rearing in Puerto Rico, 1970-1971.

Morales Alarcon, Alberto, Instituto Nacional Para Programas Especiales de Salud, Bogota, Colombia.–Topotypic survey of mosquitoes in Colombia, 1964-1966.

Morales Ayala, Francisco, Departamento de Microbiologia y Parasitologia, Universidad Nacional

de Trujillo, Peru.–Collections in Peru, 1972, 1973.

Murdoch, Wallace P., Office of the Chief Surgeon, U.S. Army Forces Southern Command, Canal Zone.–Supervision of topotypic survey of mosquitoes in Canal Zone, 1963-1965.

Nathan, M. B., Mosquito Research and Control Unit, Grand Cayman.–Collections in Cayman Islands.

Nelson, Michael J., Department of Zoology, University of California, Los Angeles.–Collection and rearing of mosquitoes in Peru, 1968, 1969.

Nielsen, Lewis T., Department of Zoology, University of Utah.–Collections and rearings from southwestern U.S.A., Utah, Mexico, Puerto Rico.

Oliver-Gonzalez, Jose, Department of Medical Zoology, University of Puerto Rico, San Juan.–Facilities for topotypic survey of mosquitoes in Puerto Rico, 1970.

Osorno-Mesa, Ernesto, Instituto Nacional Para Programas Especiales de Salud, Bogota, Colombia.–Topotypic survey of mosquitoes in Colombia, 1964-1966.

Osorno, Fenita de, Instituto Nacional Para Programas Especiales de Salud, Bogota, Colombia.–Topotypic survey of mosquitoes in Colombia, 1964-1966.

Otero, Luiz, Instituto de Microbiologia, Universidade Federal do Rio de Janeiro, Brazil.–Assistance in topotypic survey of mosquitoes in Rio de Janeiro area, 1975-1976.

Page, William A., Department of Zoology, University of the West Indies, Mona, Jamaica.–Topotypic survey of mosquitoes in Jamaica, 1964-1967; Culicidae of Jamaica, 1969; collections in Colombia, 1969.

Pamphile, Francois, Institut Pasteur, Martinique.–Topotypic survey of mosquitoes in Martinique, 1972.

Papavero, Nelson, Museu de Zoologia da Universidade de Sao Paulo, Brazil.–Facilities for topotypic survey of mosquitoes in Sao Paulo area, 1974-1975.

Pena G., Luis E., Santiago, Chile.–Collections in Ecuador, 1965.

Peters, T. Michael, Department of Entomology, University of Massachusetts.–Dixinae of North America.

Porter, Charles H., Department of Entomology, University of Wisconsin.–Collections from Colombia, 1970.

Porter, John E., Public Health Service, U.S. Quarantine Station, Miami, FL.–Collections from West Indies, 1971-1973.

Pratt, Harry D., Insect and Rodent Control Branch, Public Health Service, Atlanta, GA.–Mosquitoes from the West Indies.

Pulido, Juan, Division de Endemias Rurales, Ministerio de Sanidad y Asistencia Social, Maracay, Venezuela.–Assistance in topotypic survey of mosquitoes in Venezuela, 1969.

Quinonez, Audiberto, Gorgas Memorial Laboratory, Panama.–Topotypic surveys of mosquitoes in Panama, Nicaragua, Honduras and Colombia.

Rabello, Ernesto X., Faculdade de Saude Publica, Universidade de Sao Paulo, Brazil.–Assistance in topotypic survey of mosquitoes in Sao Paulo area, 1969, 1973-1975.

Rauch, Peter, Department of Entomology, University of California, Riverside.–Topotypic survey of mosquitoes in Guyana and Venezuela, 1967.

Reinert, John F., Walter Reed Army Institute of Research.–Specimens from Florida and collections from Amazon basin, Brazil.

Rios, Ricardo Iglesias, Instituto de Biologia, Universidade Federal do Rio de Janeiro, Brazil.–Assistance in topotypic survey of mosquitoes in Rio de Janeiro area, 1975-1976.

Rozeboom, Lloyd E., School of Hygiene and Public Health, Johns Hopkins University, Baltimore, MD.–Collections from Panama, Canal Zone and Colombia; F. M. Root material.

Schroeder, Donald A., Los Angeles, CA.–Collections in Mexico, Central America, Ecuador, Galapagos.

Serie, Charles, Institut Pasteur de la Guyane Francaise, Cayenne.–Facilities and cooperation in topotypic survey of mosquitoes in French Guiana, 1967.

Solis, M., Associate of John E. Porter.–Collections in Haiti, 1970-1971.

Spielman, Andrew, School of Public Health, Harvard University, Boston, MA.–Mosquitoes from Grand Bahama.

Stivers, John O., SNEM-AID, Guayaquil, Ecuador.–Facilities for topotypic survey in Ecuador, 1966.

Stone, Alan, Systematic Entomology Laboratory, USDA, Washington, DC.–Consultation on type material, loan of material, 1962-1972.

Suarez, Octavio M., Instituto Venezolano de Investigaciones Cientificas (IVIC), Caracas, Venezuela. –Supervision of topotypic survey of mosquitoes in Venezuela, 1966-1967.

Sudia, W. Daniel, Center for Disease Control, Atlanta, GA.–Specimens from Florida, Mexico, Central America, Ecuador, Venezuela.

Telford, Sam R., Department of Zoology, University of California, Los Angeles.–Collections in Mexico, 1963.

Trapido, Harold, Rockefeller Foundation, Faculdad de Medicina, Universidad del Valle, Cali, Colombia.–Organization of collections in Colombia.

Tucker, H. L., Mosquito Control Organization, Ministry of Health, Kingston, Jamaica.–Assistance to topotypic survey of mosquitoes in Jamaica.

Tyson, Edwin L., Florida State University.–Assistance to topotypic survey of mosquitoes in Canal Zone and Panama, 1971.

Vanzolini, Paulo Emilio, Museu de Zoologia da Universidade de Sao Paulo, Brazil.–Sponsor of topotypic survey of mosquitoes in state of Sao Paulo, 1974-1975.

Vargas, Luis, Mexico, D.F., Mexico.–Mosquitoes of Mexico, 1963-1976.

Vargas V., Mario, Facultad de Microbiologia, Universitad de Costa Rica, Ciudad Universitaria, Costa Rica.–Facilities for topotypic survey of mosquitoes in Costa Rica, 1970-1972.

Verity, David S., Department of Botany, University of California, Los Angeles.–Collections in Mexico, 1964.

Villarejos, Victor M., LSU-ICMRT, San Jose, Costa Rica.–Transportation for topotypic survey of mosquitoes in Costa Rica, 1971.

Walsh, Robert D., *Aedes aegypti* Eradication Program, Public Health Service.–Collections in St. Croix, Virgin Islands (1966) and Texas (1966-1967).

Ward, Ronald A., Walter Reed Army Institute of Research, MEP, Smithsonian Institution.–Consultation on type material, loan of material, 1974-1976.

Watson, Dennis C., Kingston, Jamaica.–Collections in Jamaica, Haiti, Dominican Republic and Antigua, 1965-1968.

Xavier, Sebastiao Hamilton, Centro de Pesquisas Rene Rachou, Belo Horizonte, Brazil.–Loan of material.

Young, Martin D., Gorgas Memorial Laboratory, Panama.–Facilities for topotypic surveys of mosquitoes in Panama and Canal Zone.

Zavortink, Thomas J., Department of Biology, University of San Francisco.–Revision of *Trichoprosopon.*

APPENDIX 3 COLLECTIONS

Country	Source
VARIOUS COUNTRIES	
KO 1-207E	USNM
KO-H 13-12 to 24-19	USNM
ARGENTINA	
ARG 1-777 (in part)	Casal, Garcia
IGU 10-65 (in part)	Casal, Garcia
IMR 29	Casal, Garcia
BAHAMA ISLANDS	
BAH 1-66	Staff; Spielman
BELIZE	
BH 1-508 (in part)	Bertram; Staff
BOLIVIA	
BOL 1-48	USNM
Bolivia-Carr No. (in part)	USNM
BRAZIL	
BRA 1-307	Staff; Aitken
BRAK 1-10	USNM
BRAP 1-492 (in part)	O. Lopes
BRAW 8-75 (in part)	USNM
BRB 1-65	Aitken
BRR 1-5	Rozeboom
BRS 44-777 (in part)	Barnett, Fowler
CHILE	
CH 1-121 (in part)	Staff; Gonzalez
COLOMBIA	
COA 1-102 (in part)	Staff; Henning
COB 1-111	Osorno-Mesa
COK 1-66	USNM
COL 1-447	Lee; Page; Gardner
COM 10-653 (in part)	Marinkelle
COP 100-203 (in part)	C. Porter
COR 52-2264 (in part)	USNM
COT 1-68	USNM
COZ 12-105 (in part)	Kitzmiller
CV 2-1022 (in part)	Rozeboom; USNM
CV-P 1-43	Rozeboom
COSTA RICA	
CR 1-661	Staff; Hogue; Hayes
CRK 50-1010 (in part)	USNM
CRM 1-34	USNM
CRR 1-58	Rozeboom
ECUADOR	
ECU 1-232	Staff; Pena; USNM; Sudia
ECUK 1-67	USNM

Country	Source
EL SALVADOR	
SAL 1-56	Galindo; Austin; Staff
SALK 817-1456 (in part)	USNM
FRENCH GUIANA	
FG 1-193	Staff; Aitken
FGA 1-223	Abonnenc
FGC 70-4042 (in part)	Clastrier
FGK 1-3	USNM
GALAPAGOS	
GAL 1-128	Staff
GREATER ANTILLES	
SEVERAL ISLANDS	
Knight coll. nos. 237-574 (in part)	Knight
CAYMAN ISLANDS	
CAY 1-214 (in part)	G. Giglioli; Gerberg; Staff
CUBA	
CUB 1-35	USNM
DOMINICAN REPUBLIC	
RDO 4-298	Staff; Watson
HAITI	
HAC 1-25	Rozeboom
HAR 1-43	Rozeboom
HAT 1-138 (in part)	Watson; J. Porter
JAMAICA	
JA 1-962	Page; Staff; Hochman
JAX 1-30	USNM
PUERTO RICO	
PR 1-1967 (in part)	Staff; Haber; Moore
PRA 1-73	Aitken
PRX 1-25	USNM
GUATEMALA	
GUA 1-151	Staff
GUA K1-36	USNM
GUYANA	
BGR 1-9	Rozeboom
GUY 1-74	G. Giglioli; Staff
GUY K 1-51	USNM
HONDURAS	
HON 1-124	Staff; Galindo
HONK 1-17	USNM
LESSER ANTILLES	
VARIOUS ISLANDS	
LAR 1-67	Rozeboom
ANGUILLA	
ANG 1-18	Aitken

Country	Source
LESSER ANTILLES (contd.)	
ANTIGUA	
ANT 1-124	Aitken; Darsie
FWIA 1-2	Fauran
BARBADOS	
BAR 1-83	Aitken
BARBUDA	
BAB 1-11	Aitken
DOMINICA	
DOM 1-233	Aitken; Hochman; Darsie
GRENADA	
GR 1-121	Aitken
GRR 3-146 (in part)	Rozeboom
GUADELOUPE (including DESIRADE, MARIE GALANTE and ILES DES SAINTES)	
FWI 182-1067 (in part)	Cornely; Fauran
GDA 1-26	Abonnenc
MARTINIQUE	
FWIM 1-4	Fauran
MAR 1-118 (in part)	Staff; Fize; Pamphile; Hochman
MONTSERRAT	
MNT 1-134	Aitken
NEVIS	
NVS 1-60	Aitken
ST. KITTS	
KIT 1-94	Aitken
ST. LUCIA	
LU 1-166	Aitken; Darsie
ST. VINCENT	
VT 1-94	Aitken
MEXICO	
MEX 1-902 (in part)	Staff; Hogue; Nielsen; Sudia
MF 1-16	Staff
MT 1-10	Telford
MX 1-22	USNM
UCLA 1-933 (in small part)	Staff
NICARAGUA	
NI, NIC 1-135	Galindo; Staff
NICK 1-15	USNM
NIR 1-28	Rozeboom
PANAMA AND CANAL ZONE	
ASM 1-681	Arnett
CZ 1-321	Murdoch
CZ-MB (30 colls.)	Boreham
GG 1-124 (in part)	Galindo
PA 1-1078	Galdino; Staff

Country	Source
PANAMA AND CANAL ZONE (contd.)	
PAR 1-136	Rozeboom
PAX 1-248	USNM
PC 1-4936 (in part)	Carpenter
PARAGUAY	
PGY 1-13	USNM
PERU	
PER 1-215 (in part)	Staff; Morales Ayala; Gardner
PERK 1-11	USNM
SURINAM	
SUR 1-259	Staff; de Kruijf; Geijskes
TOBAGO	
TOB 1-224	Aitken; Darsie
TRINIDAD	
TR 1-1623	Aitken
TRK 1-36	USNM
TRM 1-19	USNM
TRR 1-64	Rozeboom
TRVL (large number of collections)	Aitken
TRX 1057-1469 (in part)	USNM
UNITED STATES	
FLA 1-68	Staff
NER 1-8	Rozeboom
SE 1-479 (in part)	Staff
TEX 1-45	Huettel; Walsh
UCLA 1-933 (in large part)	Staff; USNM; Nielsen; Carpenter; Burger
VIRGIN ISLANDS	
VI 1-29	Bonnet; Boreham; Walsh
VIA 1-3	Aitken
VENEZUELA	
VZ 1-433	Staff; Suarez; Sudia
VZK 1-53	USNM
VZR 2-269	Rozeboom

Collections made especially for project

Total number of collections (lots)	11,500
Number of slides of larval and/or pupal skins from individual rearings	86,000
Number of slides of whole larvae	16,000
Number of slides of male genitalia	7,700
Number of pin mounts of adults	175,000

APPENDIX 4 PUBLICATIONS

1. **Belkin, J. N., R. X. Schick, P. Galindo and T.H.G. Aitken.** 1965. Mosquito Studies (Diptera, Culicidae). I. A project for a systematic study of the mosquitoes of Middle America. Am. Entomol. Inst., Contrib. 1(2):1-17.

2. **Belkin, J. N., C. L. Hogue, P. Galindo, T.H.G. Aitken, R. X. Schick and W. A. Powder.** 1965. Mosquito Studies (Diptera, Culicidae). II. Methods for the collection, rearing and preservation of mosquitoes. Am. Entomol. Inst., Contrib. 1(2):19-72.

3. **Belkin, J. N., R. X. Schick and S. J. Heinemann.** 1965. Mosquito Studies (Diptera, Culicidae). V. Mosquitoes originally described from Middle America. Am. Entomol. Inst., Contrib. 1(5). 95 p.

4. **Belkin, J. N., R. X. Schick and S. J. Heinemann.** 1965. Mosquito Studies (Diptera, Culicidae). VI. Mosquitoes originally described from North America. Am. Entomol. Inst., Contrib. 1(6). 39 p.

5. **Belkin, J. N., R. X. Schick, P. Galindo y T.H.G. Aitken.** 1967. Estudios Sobre Mosquitos (Diptera, Culicidae). Ia. Un proyecto para un estudio sistematico de los mosquitos de Meso-America. Am. Entomol. Inst., Contrib. 1(2a):1-19. (Translated by P. Barreto, F. J. Martin and A. J. Adames).

6. **Belkin, J. N., C. L. Hogue, P. Galindo, T.H.G. Aitken, R. X. Schick y W. A. Powder.** 1967. Estudios Sobre Mosquitos. IIa. Metodas para coleccionar, criar y preservar mosquitos. Am. Entomol. Inst., Contrib. 1(2a):21-89. (Translated by E. Osorno-Mesa, F. de Osorno, F. J. Martin and A. J. Adames).

7. **Zavortink, T. J. 1968.** Mosquito Studies (Diptera, Culicidae). VIII. A prodrome of the genus *Orthopodomyia.* Am. Entomol. Inst., Contrib. 3(2). 221 p.

8. **Belkin, J. N.** 1968. Mosquito Studies (Diptera, Culicidae). IX. The type specimens of New World mosquitoes in Euorpean Museums. Am. Entomol. Inst., Contrib. 3(4). 69 p.

9. **Peters, T. M.** 1968. Mosquito Studies (Diptera, Culicidae). X. Dixinae originally described from North America. Am. Entomol. Inst., Contrib. 4(1):1-7.

10. **Belkin, J. N., R. X. Schick and S. J. Heinemann.** 1968. Mosquito Studies (Diptera, Culicidae). XI. Mosquitoes originally described from Argentina, Bolivia, Chile, Paraguay, Peru and Uruguay. Am. Entomol. Inst., Contrib. 4(1):9-29.

11. **Nielsen, L. T., J. H. Linam, J. H. Arnell and T. J. Zavortink.** 1968. Distributional and biological notes on the treehole mosquitoes of the Western United States. Mosq. News 28:361-365.

12. **Berlin, O.G.W.** 1969. Mosquito Studies (Diptera, Culicidae). XII. A revision of the Neotropical subgenus *Howardina* of *Aedes.* Am. Entomol. Inst., Contrib. 4(2). 190 p.

13. **Barr, A. R. and S. Barr.** 1969. Mosquito Studies (Diptera, Culicidae). XIII. Pupae of the genus *Psorophora* in North America and Puerto Rico. Am. Entomol. Inst., Contrib. 4(4):1-20.

14. **Zavortink, T. J.** 1969. Mosquito Studies (Diptera, Culicidae). XV. A new species of treehole breeding *Anopheles* from the southwestern United States. Am. Entomol. Inst., Contrib. 4(4): 27-38.

15. **Belkin, J. N.** 1969. Current taxonomic research on the project "Mosquitoes of Middle America." Mosq. Syst. Newslett. 1:7-8.

16. **Zavortink, T. J.** 1969. New species and records of treehole mosquitoes from the southwestern United States. Mosq. Syst. Newslett. 1:22.

17. **Belkin, J. N.** 1969. The problem of the identity of the species of *Culex (Melanoconion)* re-

lated to *opisthopus*. Mosq. Syst. Newslett. 1:26-28.

18. **Belkin, J. N.** 1969. *Culex (Melanoconion) annulipes* invalid. Mosq. Syst. Newslett. 1:68.

19. **Zavortink, T. J.** 1970. Mosquito Studies (Diptera, Culicidae). XVI. A new species of treehole breeding *Aedes (Ochlerotatus)* from southern California. Am. Entomol. Inst., Contrib. 5 (1):1-7.

20. **Adames, A. J. and C. L. Hogue.** 1970. Mosquito Studies (Diptera, Culicidae). XVII. Two new species of *Deinocerites* from Costa Rica. Am. Entomol. Inst., Contrib. 5(1):9-20.

21. **Berlin, O.G.W.** 1970. Mosquito Studies (Diptera, Culicidae). XVIII. The subgenus *Micraedes* of *Culex*. Am. Entomol. Inst., Contrib. 5(1):21-63.

22. **Zavortink, T. J.** 1970. Mosquito Studies (Diptera, Culicidae). XIX. The treehole *Anopheles* of the New World. Am. Entomol. Inst., Contrib. 5(2). 35 p.

23. **Schick, R. X.** 1970. Mosquito Studies (Diptera, Culicidae). XX. The *terrens* group of *Aedes (Finlaya)*. Am. Entomol. Inst., Contrib. 5(3). 158 p.

24. **Belkin, J. N.** 1970. Corrected type localities for *Wyeomyia abia* D. & K., 1908 and *W. fratercula* D. & K., 1906. Mosq. Syst. Newslett. 2:57-58.

25. **Belkin, J. N.** 1970. *Culex (Melanoconion) aikenii* (A. & R., 1906) a Nomen Dubium; *ocossa* D. & K., 1919 and *panocossa* Dyar, 1923 both valid. Mosq. Syst. Newslett. 2:59-60.

26. **Belkin, J. N., S. J. Heinemann and W. A. Page.** 1970. Mosquito Studies (Diptera, Culicidae). XXI. The Culicidae of Jamaica. Am. Entomol. Inst., Contrib. 6(1). 458 p.

27. **Zavortink, T. J.** 1970. Mosquito Studies (Diptera, Culicidae). XXII. A new subgenus and species of *Aedes* from Arizona. Am. Entomol. Inst., Contrib. 7(1):1-11.

28. **Schick, R. X.** 1970. Mosquito Studies (Diptera, Culicidae). XXIII. Additions and corrections to the revision of the *Aedes terrens* group. Am. Entomol. Inst., Contrib. 7(1):13-40.

29. **Adames, A. J.** 1971. Mosquito Studies (Diptera, Culicidae). XXIV. A revision of the crabhole mosquitoes of the genus *Deinocerites*. Am. Entomol. Inst., Contrib. 7(2). 154 p.

30. **Belkin, J. N.** 1971. Type locality restriction for *Wyeomyia schnusei*. Mosq. Syst. Newslett. 3:26.

31. **Belkin, J. N. and S. J. Heinemann.** 1971. *Aedes vexans* in Guatemala. Mosq. Syst. Newslett. 3:27.

32. **Belkin, J. N.** 1971. Mosquito types in East Germany. Mosq. Syst. Newslett. 3:31.

33. **Belkin, J. N., R. X. Schick and S. J. Heinemann.** 1971. Mosquito Studies (Diptera, Culicidae. XXV. Mosquitoes originally described from Brazil. Am. Entomol. Inst., Contrib. 7(5). 64 p.

34. **Nelson, M. J.** 1971. Mosquito Studies (Diptera, Culicidae). XXVI. Winter biology of *Culex tarsalis* in Imperial Valley, California. Am. Entomol. Inst., Contrib. 7(6). 60 p.

35. **Arnell, J. H. and L. T. Nielsen.** 1972. Mosquito Studies (Diptera, Culicidae). XXVII. The *varipalpus* group of *Aedes (Ochlerotatus)*. Am. Entomol. Inst., Contrib. 8(2). 48 p.

36. **Zavortink, T. J.** 1972. Mosquito Studies (Diptera, Culicidae). XXVIII. The New World species formerly placed in *Aedes (Finlaya)*. Am. Entomol. Inst., Contrib. 8(3). 206 p.

37. **Belkin, J. N. and S. J. Heinemann.** 1972. A tentative annotated list of the Culicidae of the island of Hispaniola. Mosq. Syst. 4:63-72.

38. **Zavortink, T. J.** 1973. Mosquito Studies (Diptera, Culicidae). XXIX. A review of the subgenus *Kerteszia* of *Anopheles*. Am. Entomol. Inst., Contrib. 9(3):1-54.

39. **Adames, A. J. and P. Galindo.** 1973. Mosquito Studies (Diptera, Culicidae). XXX. A new subgenus and species of *Culex* from Colombia. Am. Entomol. Inst., Contrib. 9(3):55-61.

40. **Valencia, J. D.** 1973. Mosquito Studies (Diptera, Culicidae). XXXI. A revision of the sub-

genus *Carrollia* of *Culex*. Am. Entomol. Inst., Contrib. 9(4). 134 p.

41. **Arnell, J. H.** 1973. Mosquito Studies (Diptera, Culicidae). XXXII. A revision of the genus *Haemagogus*. Am. Entomol. Inst., Contrib. 10(2). 174 p.

42. **Belkin, J. N. and S. J. Heinemann.** 1973. Collection records of the project "Mosquitoes of Middle America." 1. Introduction; Dominican Republic (RDO). Mosq. Syst. 5:201-220.

43. **Zavortink, T. J.** 1974. The status of taxonomy of mosquitoes by the use of morphological characters. Mosq. Syst. 6:130-133.

44. **Berlin, O.G.W.** 1974. A new species of bromeliad-breeding *Culex (Micraedes)* from Mexico (Diptera, Culicidae). Mosq. Syst. 6:273-278.

45. **Boreham, M. M. and D. C. Baerg.** 1974. Description of the larva, pupa and egg of *Anopheles (Lophopodomyia) squamifemur* Antunes with notes on development (Diptera:Culicidae). J. Med. Entomol. 11:564-569. (2 plates of illustrations by L. M. Kowalczyk).

46. **Berlin, O.G.W.** 1975. Description of the male and the pupa of *Aedes (Howardina) lorraineae* Berlin, with a note on the Quadrivittatus Group (Diptera, Culicidae). Mosq. Syst. 7:127-131.

47. **Adames, A. J. and P. Galindo.** 1975. Description of the immature stages of *Galindomyia leei* Stone and Barreto, 1969. Mosq. Syst. 7:132-136. (2 plates of illustrations by N. Kitamura and L. M. Kowalczyk).

48. **Belkin, J. N. and S. J. Heinemann.** 1975. Collection records of the project "Mosquitoes of Middle America." 2. Puerto Rico (PR, PRA, PRX) and Virgin Is. (VI, VIA). Mosq. Syst. 7: 269-296.

49. **Hogue, C. L.** 1975. A new species of bromeliad-breeding *Culex (Culex)* from Cocos Island. Mosq. Syst. 7:357-362.

50. **Belkin, J. N. and S. J. Heinemann.** 1975. *Psorophora (Janthinosoma) mathesoni,* sp. nov. for "varipes" of Southeastern U.S.A. Mosq. Syst. 7:363-366.

51. **Belkin, J. N. and S. J. Heinemann.** 1975. Collection records of the project "Mosquitoes of Middle America." 3. Bahama Is. (BAH), Cayman Is. (CAY), Cuba (CUB), Haiti (HAC, HAR, HAT) and Lesser Antilles (LAR). Mosq. Syst. 7:367-393.

52. **Belkin, J. N. and S. J. Heinemann.** 1976. Collection records of the project "Mosquitoes of Middle America." 4. Leeward Islands: Anguilla (ANG), Antigua (ANT), Barbada (BAB), Montserrat (MNT), Nevis (NVS), St. Kitts (KIT). Mosq. Syst. 8:123-162.

53. **Belkin, J. N. and S. J. Heinemann.** 1976. Collection records of the project "Mosquitoes of Middle America." 5. French West Indies: Guadeloupe (FWI) and Martinique (FWIM, MAR). Mosq. Syst. 8:163-193.

54. **Belkin, J. N. and S. J. Heinemann.** 1976. Collection records of the project "Mosquitoes of Middle America." 6. Southern Lesser Antilles: Barbados (BAR), Dominica (DOM), Grenada (GR, GRR), St. Lucia (LU), St. Vincent (VT). Mosq. Syst. 8:237-297.

55. **Arnell, J. H.** 1976. Mosquito Studies (Diptera, Culicidae). XXXIII. A revision of the Scapularis Group of *Aedes (Ochlerotatus).* Am. Entomol. Inst., Contrib. 13(3). 144 p.

APPENDIX 5 NEW TAXA DESCRIBED BY PERSONNEL OF PROJECT

1. *Aedes (Howardina) aureolineatus* Berlin, 1969
2. *Aedes (Howardina) grabhami* Berlin, 1969
3. *Aedes (Howardina) bahamensis* Berlin, 1969
4. *Aedes (Howardina) lorraineae* Berlin, 1969
5. *Aedes (Howardina) brevis* Berlin, 1969
6. *Aedes (Howardina) spinosus* Berlin, 1969
7. *Aedes (Howardina) guerrero* Berlin, 1969
8. *Aedes (Howardina) guatemala* Berlin, 1969
9. *Aedes (Howardina) eleanorae* Berlin, 1969
10. *Aedes (Howardina) marinkellei* Berlin, 1969
11. *Aedes (Howardina) leei* Berlin, 1969
12. *Aedes (Howardina) osornoi* Berlin, 1969
13. *Aedes (Howardina) ecuadoriensis* Berlin, 1969
14. *Aedes (Howardina) brevivittatus* Berlin, 1969
15. *Aedes (Howardina) martinezi* Berlin, 1969
16. *Anopheles (Anopheles) judithae* Zavortink, 1969
17. *Aedes (Ochlerotatus) deserticola* Zavortink, 1970
18. *Deinocerites nicoyae* Adames & Hogue, 1970
19. *Deinocerites costaricensis* Adames & Hogue, 1970
20. *Culex (Micraedes) arawak* Berlin, 1970
21. *Culex (Micraedes) schicki* Berlin, 1970
22. *Culex (Micraedes) sandrae* Berlin, 1970
23. *Anopheles (Anopheles) arboricolus* Zavortink, 1970
24. *Anopheles (Anopheles) powderi* Zavortink, 1970
25. *Aedes (Finlaya) bertrami* Schick, 1970
26. *Aedes (Finlaya) zavortinki* Schick, 1970
27. *Aedes (Finlaya) apollo* Schick, 1970
28. *Aedes (Finlaya) berlini* Schick, 1970
29. *Aedes (Finlaya) alboapicus* Schick, 1970
30. *Aedes (Finlaya) buenaventura* Schick, 1970
31. *Aedes (Finlaya) aitkeni* Schick, 1970
32. *Aedes (Finlaya) impostor* Schick, 1970
33. *Aedes (Finlaya) amabilis* Schick, 1970
34. *Aedes (Finlaya) gabriel* Schick, 1970
35. *Aedes (Finlaya) idanus* Schick, 1970
36. *Aedes (Finlaya) sumidero* Schick, 1970
37. *Aedes (Finlaya) vargasi* Schick, 1970
38. *Aedes (Finlaya) galindoi* Schick, 1970
39. *Aedes (Finlaya) campana* Schick, 1970
40. *Aedes (Finlaya) daryi* Schick, 1970
41. *Aedes (Finlaya) tehuantepec* Schick, 1970
42. *Aedes (Finlaya) schroederi* Schick, 1970
43. *Aedes (Finlaya) diazi* Schick, 1970
44. *Aedes (Ochlerotatus) calumnior* Belkin, Heinemann & Page, 1970
45. *Corethrella (Corethrella) librata* Belkin, Heinemann & Page, 1970

46. *Corethrella (Corethrella) longitubus* Belkin, Heinemann & Page, 1970
47. *Dixella scitula* Belkin, Heinemann & Page, 1970
48. *Mansonia (Mansonia) dyari* Belkin, Heinemann & Page, 1970
*49. *Mesodixa* Belkin, Heinemann & Page, 1970
50. *Mesodixa biambulacra* Belkin, Heinemann & Page, 1970
51. *Sayomyia lanei* Belkin, Heinemann & Page, 1970
52. *Wyeomyia (Wyeomyia) atrata* Belkin, Heinemann & Page, 1970
53. *Wyeomyia (Wyeomyia) corona* Belkin, Heinemann & Page, 1970
54. *Wyeomyia (Wyeomyia) juxtahirsuta* Belkin, Heinemann & Page, 1970
55. *Wyeomyia (Wyeomyia) luna* Belkin, Heinemann & Page, 1970
56. *Wyeomyia (Wyeomyia) stellata* Belkin, Heinemann & Page, 1970
*57. *Aedes (Abraedes)* Zavortink, 1970
58. *Aedes (Abraedes) papago* Zavortink, 1970
59. *Aedes (Finlaya) casali* Schick, 1970
60. *Deinocerites atlanticus* Adames, 1970
61. *Deinocerites belkini* Adames, 1970
62. *Deinocerites barretoi* Adames, 1970
63. *Deinocerites panamensis* Adames, 1970
64. *Deinocerites colombianus* Adames, 1970
65. *Deinocerites curiche* Adames, 1970
66. *Aedes (Ochlerotatus) laguna* Arnell & Nielsen, 1972
67. *Aedes (Protomacleaya) brelandi* Zavortink, 1972
68. *Aedes (Protomacleaya) burgeri* Zavortink, 1972
69. *Aedes (Protomacleaya) schicki* Zavortink, 1972
70. *Aedes (Protomacleaya) chionotum* Zavortink, 1972
71. *Aedes (Protomacleaya) niveoscutum* Zavortink, 1972
72. *Aedes (Protomacleaya) sandrae* Zavortink, 1972
*73. *Aedes (Aztecaedes)* Zavortink, 1972
74. *Anopheles (Kerteszia) pholidotus* Zavortink, 1973
75. *Anopheles (Kerteszia) lepidotus* Zavortink, 1973
*76. *Culex (Belkinomyia)* Adames & Galindo, 1973
77. *Culex (Belkinomyia) eldridgei* Adames & Galindo, 1973
78. *Culex (Carrollia) cerqueirai* Valencia, 1973
79. *Culex (Carrollia) kompi* Valencia, 1973
80. *Haemagogus (Haemagogus) chrysochlorus* Arnell, 1973
81. *Haemagogus (Haemagogus) nebulosus* Arnell, 1973
82. *Haemagogus (Haemagogus) acutisentis* Arnell, 1973
83. *Culex (Micraedes) jalisco* Berlin, 1974
84. *Culex (Culex) dohenyi* Hogue, 1975
85. *Psorophora (Janthinosoma) mathesoni* Belkin & Heinemann, 1975
86. *Aedes (Ochlerotatus) incomptus* Arnell, 1976
87. *Aedes (Ochlerotatus) bogotanus* Arnell, 1976
88. *Aedes (Ochlerotatus) deficiens* Arnell, 1976
89. *Aedes (Ochlerotatus) atactavittatus* Arnell, 1976
90. *Aedes (Ochlerotatus) phaeonotus* Arnell, 1976
91. *Aedes (Ochlerotatus) comitatus* Arnell, 1976
92. *Aedes (Ochlerotatus) synchytus* Arnell, 1976
93. *Aedes (Ochlerotatus) pectinatus* Arnell, 1976

*Genus group taxa – 4
Species group taxa – 89

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