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MOSQUITO INFORMATION MANAGEMENT PROJECT (MIMP):  
APPLICATION OF A COMPUTER. (U) SMITHSONIAN INSTITUTION  
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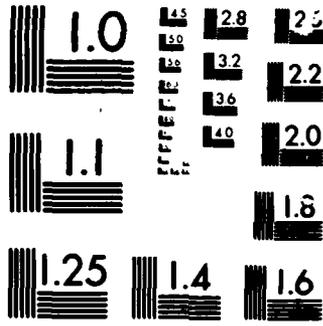
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APPLICATION OF A COMPUTERIZED GENERAL PURPOSE  
INFORMATION MANAGEMENT SYSTEM (SELGEM) TO MEDICALLY  
IMPORTANT ARTHROPODS (DIPTERA: CULICIDAE)

Annual Report

Terry L. Erwin

August 1984

**DTIC**  
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**APR 24 1985**  
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supported by

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND  
Fort Detrick, Frederick, MD 21701

Grant No. DAMD17-84-G-4021  
and Contract No. DAMD17-79-C-9149

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER	
	AD-A167043		
4. TITLE (and Subtitle) MOSQUITO INFORMATION MANAGEMENT PROJECT (MIMP): APPLICATION OF A COMPUTERIZED GENERAL PURPOSE INFORMATION MANAGEMENT SYSTEM (SELGEM) TO MEDI- CALLY IMPORTANT ARTHROPODS (DIPTERA: CULICIDAE)		5. TYPE OF REPORT & PERIOD COVERED Annual Report September 1983 to August 1984	
		6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s) Terry L. Erwin		8. CONTRACT OR GRANT NUMBER(s) DAMD17-84-G-4021 and DAMD17-79-C-9149	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Smithsonian Institution Washington, D.C. 20560		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62770A.3M162770A870.AO.002	
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Medical Research and Development Command Fort Detrick, Frederick, Maryland 21701-5012		12. REPORT DATE August 1984	
		13. NUMBER OF PAGES 16	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, distribution unlimited.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Mosquitoes, Culicidae, Malaria, Arbovirus, Systematics, Distribution, Vectors			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Mosquito Information Management Project is a collaborative venture between the Walter Reed Biosystematics Unit, Walter Reed Army Institute of Research, and the Department of Entomology, Museum of Natural History, Smithsonian Institution. The project was established in September 1979 to develop a computer-based systematic and ecological data base for the approximately one million mosquito specimens in the National Museum of Natural History collection. This collection is the largest and most complete mosquito collection in the world and represents a national treasure.			

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During this reporting period data from an additional 5,302 collection forms, representing 85,793 specimens, were entered into the computer data base.

Development continued for the seven separate geographic files, incorporating data for Mexico and Central America, South America, the Caribbean region, and Eastern Africa. A new file was started for the Middle East. The file for South America was recently made current with the entry of collection data for the final country, Brazil. These files allow for a rapid and inexpensive search capability that will be a major advantage as the data base expands.

ANNUAL REPORT  
MOSQUITO INFORMATION MANAGEMENT PROJECT

SUMMARY

The Mosquito Information Management Project is a collaborative venture between the Walter Reed Biosystematics Unit, Walter Reed Army Institute of Research, and the Department of Entomology, National Museum of Natural History, Smithsonian Institution. The project was established in September 1979 to develop a computer-based systematic and ecologic data base for the approximately one million mosquito specimens in the National Museum of Natural History collection. This collection is the largest and most complete mosquito collection in the world and represents a national treasure. The data management system, SELGEM (SELF-GENERATING MASTER), was selected as the primary data storage/management system. Data recorded on collection forms are submitted to a Honeywell® Series 60 Level 66/80 computer system via a Nixdorf®600/55 minicomputer data entry system.

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## INTRODUCTION

The National Museum of Natural History, Smithsonian Institution (SI), houses a mosquito collection of over one million specimens from all over the world. This collection is the largest of its kind and is well curated. During the last 20 years the collection has grown 5-fold, primarily due to several U.S. Army Medical Research and Development Command contracts, i.e., the Southeast Asia Mosquito Project (SEAMP), the Mosquitoes of Middle America Project (MMAP) and the Medical Entomology Project (MEP). World areas that are particularly well represented in the collection are the Nearctic, Neotropical, Oriental and South Pacific faunal regions. These specimens, combined with their associated collection data/records, represent a major scientific resource for Medical Entomologists, Epidemiologists and Public Health Workers. Unfortunately, the collection has received very little attention to date (except by taxonomists).

The Mosquito Information Management Project (MIMP) was established in 1979 to develop this outstanding source of data on known and potential vectors of human pathogens into a computer-based systematic and ecologic data base. This computer file is based on data from specimens identified by taxonomic authorities and (1) provides important, easily accessible, systematic and ecologic data for species of known or potential importance to the military, public health organizations and other scientific and environmental agencies; (2) enhances current and future laboratory and field mosquito research efforts; (3) provides knowledge of deficiencies in the National Mosquito Collection and suggests new collection strategies; (4) alleviates managerial problems by providing a timely and cost-efficient collection inventory; and (5) serves as a model for the storage/analysis of mosquito biological data on a world-wide level.

The project is located at the Smithsonian Institution and works in close association with: (1) Walter Reed Biosystematics Unit (WRBU), from the Walter Reed Army Institute of Research (WRAIR); (2) the Systematics of *Aedes* Mosquitoes Project (SAMP); (3) Department of Entomology, Smithsonian Institution; and (4) Systematic Entomology Laboratory, U.S. Department of Agriculture. It was designed to be responsive to the needs of these organizations, as well as other governmental or institutional scientific organizations.

REVIEW OF PROGRESS FOR THE PERIOD  
1 SEPTEMBER 1983 TO 30 AUGUST 1984

I. Personnel

- A. Museum technician Dolores T. Chalfant (IS-5) resigned from her position as of 8 June 1984. Recruitment for a replacement is currently underway.

II. Data Input

- A. During this report period, data from an additional 5,302 collection forms, representing 85,793 specimens, were entered onto computer tape. Of these, 5,127 collection forms representing 76,762 specimens originated from the John N. Belkin collections.

In addition to western hemisphere collections, data from 175 collection forms from Israel and Egypt representing 9,031 specimens, were entered into the computer data base for the Middle East.

With the above entries, data from a total of 15,624 collection forms and 403,697 individual specimens have been entered into the data base. Data from most of the Belkin Central American and South American collections, including those from Mexico and Brazil, have been entered onto computer tape (see Figure A).

- B. Seven separate geographic master files have been established to simplify and speed up the efficiency of queries. The use of such files quickly reduces the search effort for specific queries, and will greatly reduce computer charges as the data base expands. The 8 files established to date are:

1. Mexico and Central America
2. Western South America
3. Northeastern South America
4. Southeastern South America
5. Greater Antilles
6. Lesser Antilles
7. Eastern Africa
8. Middle East

III. Queries and/or Requests

During the year, the MIMP staff received and answered over 40 requests for information from computer files, data entry into computer files, computer/word processor communications, and information from data standards and map and

gazetteer collections. An additional 25 requests were for computer-generated maps from World Data Bank II. Some of these were modified by hand, adding place names, titles, captions, inking boundaries and mounting on heavy backing for photography.

- A. Data entry requested for various collections included:
1. Collections of mosquitoes from Israel and Egypt collected by LTC Bruce A. Harrison (WRBU) and CPT Ralph E. Harbach (WRBU).
  2. Collections of *Culicoides* specimens collected in Egypt by LTC Charles L. Bailey [U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID)] and identified by Mr. Jayson Glick (USAMRIID).
  3. All available collections from Grenada and Barbados as requested by MAJ Edward S. Saugstad (AFMIC).
- B. Special requests for information and printouts of collections from the computer included:
1. MAJ Edward S. Saugstad requested information on *Aedes* species found in septic tanks to corroborate data in published paper.
  2. MAJ Edward S. Saugstad requested information on maximum altitude at which *An. (Nys.) pseudopunctipennis* has been collected in Mexico for comparison with malaria risk chart.
  3. Dr. Terry L. Erwin (SI) requested a printout of all mosquito species collected in Peru.
  4. MAJ Edward S. Saugstad requested a printout of species and numbers of specimens found in Grenada and the Barbados.
  5. Dr. Ronald A. Ward (WRBU) and Mr. E. L. Peyton (WRBU) requested a printout of species of *Culiseta* in Panama.
  6. Dr. Ronald A. Ward requested a list of collections of *Aedes aegypti* in fruit husks in the Caribbean.
  7. Dr. William W. Steiner (University of Illinois) requested a printout of collections of mosquitoes in Belize.
  8. Dr. Durland Fish (Fordham University) requested a printout of natural habitats and bromeliad habitats of mosquitoes in Central America and Costa Rica.
  9. A printout of the mosquito collections from Honduras was requested by the U.S. Navy to accompany a packet of information assembled by WRBU.
  10. LTC Bruce A. Harrison and CPT Ralph E. Harbach requested a printout of their mosquito collections in Israel and Egypt.
  11. CPT Ralph E. Harbach requested a computer-generated list of species and associated habitats from his collections in Egypt.
  12. LTC Bruce A. Harrison requested a computer-generated list of all mosquito species collected in each of the seven Central American countries and Mexico.

13. Dr. Jack Hayes (Texas Tech University Health Science Center) requested a list of mosquito species collected in Peru.

C. Computer-generated maps, some with distribution points for mosquito collections for countries were requested. The 25 requests for maps included:

1. Dr. Norman E. Peterson (University de Brasilia, Brazil) requested a map of the Tres Bracos Leishmaniasis area of Brazil.
2. A map of Honduras was requested by the U.S. Navy to accompany a packet of information assembled by WRBU.
3. Dr. Yiau-Min Huang (SAMP) requested a set of maps of the African countries of her research interest--Cameroon, Sierra Leone, Ivory Coast and Kenya.
4. CPT Jim Estep (AFMIC) requested a map of Brunei with associated rivers.
5. CDR Fred Santana [Defense Pest Management Information Analysis Center (DPMIAC)] requested maps of North and South America; and Europe, Asia and Africa.
6. MAJ Edward S. Saugstad requested a map of Suriname.
7. Dr. William W. Steiner requested a map of mosquito distribution in Belize.
8. COL Charles L. Bailey requested a map of Africa.
9. CPT Kenneth J. Linthicum (WRBU) requested a map of Africa.
10. LTC Bruce A. Harrison requested a map of Egypt with distribution points of his mosquito collections.
11. Dr. John L. Petersen (Gorgas Memorial Laboratory, Panama) requested a map with distribution points of collections of *Haemagogus equinus* in Mexico, Central America and Northern South America.
12. Dr. Jack Hayes requested maps of each of the seven Central American countries.

#### IV. On Site-Review

At the request of the Medical Entomology subcommittee of the U.S. Army Medical Research and Development Committee, MIMP was examined and reviewed on 9 February 1984 by an External Review Committee composed of Dr. Bruce F. Eldridge and Dr. H. D. Newson. Also present were COL Donald R. Roberts and LTC Bruce A. Harrison.

A. The following recommendations were made:

1. That the MIMP devotes its activities, to the greatest degree possible, to mosquito research in support of its military and governmental collaborating agencies.

2. That MIMP begins plans as soon as possible to increase their computer input capabilities.
  3. That consideration be given to buying the Nixdorf entry terminal now in use and any terminals procured in the future.
  4. That an attempt be made, with the concurrence and assistance of the Smithsonian Institution, to establish a direct computer link between the Defense Pest Management Information Analysis Center and the Smithsonian Institution that will allow DPMIAC withdrawal access to mosquito data and maps entered through the MIMP terminal(s).
  5. That attempts be made to clearly delineate the relative roles and interactions of MIMP and DPMIAC.
- B. MIMP responded to the recommendations in the following ways:

1. MIMP immediately responded to the first recommendation by establishing a general policy of accepting job requests only from military and governmental agencies, primarily WRBU, with the exception of non-military specialists (eq. university) whose research is of interest to the military or who have cooperated with military specialists. The percentage of time that MIMP spends on service requests decreased. In 1983, one technician spent 50% of her time with filling service requests; by mid-1984, this percentage decreased to 10%. Most of the backlog of non-military requests was completed at lunch time, during computer down time, and at various breaks during the day.

According to the Smithsonian's Automatic Data Processing Office (ADP), the Institution's Honeywell mainframe computer is expected to be replaced with a new IBM within one year. Within 2 years, we have been assured that our project, along with all other SI projects, will be converted from SELGEM to a new data base management system. This new system will put MIMP "on-line" and give increased flexibility and efficiency in data retrieval.

2. MIMP immediately responded to the second recommendation by following the general policy that increasing data entry is of primary importance. Figure B shows the increased rate of data entry of collection forms over the past five years. At the present rate of data entry it is expected that it will take about 1 1/2 years to enter the remaining collection forms (7,447) in the Belkin collection.

3. MIMP is presently in the process of negotiating with Nixdorf Computer Corporation to purchase the data entry terminal, with a keyboard, a central transmission interface and a terminal transmission interface.
4. The Office of Information Resource Management, SI, will allow access by DPMIAC to the MIMP data base and maps with verbal approval of MIMP personnel and the OIRM director, in addition to setting up an account and receiving a systems password. A link can be established at the request of DPMIAC. At present, a link would require some expertise in the SELGEM system by DPMIAC personnel as the system is not yet on-line. Within 2 years, however, after the establishment of a new data base management system, some expertise will be required to use the new system.

An acceptable alternative to direct link communication would be to supply DPMIAC with copies of MIMP's magnetic computer tapes which contain the data base, and the information could be put on DPMIAC's computer.

#### V. Other Activities

- A. Personnel in MIMP, or affiliated with the project, attended several scientific or computer meetings during this period: (1) Annual Meeting of the Southeast Branch of the Entomological Society of America (at no cost to the project) (2) Federal Computer Conference, Washington, DC; (3) several meetings of the Smithsonian Small Computer Group, SI; and (4) visits to Mosquito Control Boards of Orleans and Jefferson Parishes, Louisiana (at no cost to the project).
- B. A paper entitled "Computerized Information and Collection Management System for Systematic Research and Medical Entomology (Diptera: Culicidae)" and authored by personnel from MIMP, USAMRIID and OIRM personnel is currently in press. This paper will be published in Mosquito Systematics, and should bring the project to the attention of mosquito and medical researchers who would benefit from this valuable data base.
- C. Project Manager made presentation to the Department of Entomology Seminar at the Smithsonian Institution on computer-generated maps.

D. During the year MIMP received 31 visitors from the following organizations:

1) Superintendent Controle Endemias, Sao Paulo, Brazil; 2) U.S. Army Natick Research and Development Laboratories, Natick, MA; 3) Mahidol University, Bangkok, Thailand; 4) Florida Medical Entomology Laboratory, Vero Beach, FL; 5) Armed Forces Medical Intelligence Center; 6) Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, DC; 7) American Embassy, Cairo, Egypt; 8) U.S. Army Medical Research Institute for Infectious Diseases, Fort Detrick, Frederick, MD; 9) Walter Reed Army Institute of Research, Washington, DC; 10) USAMRU-Kenya; 11) AFRIMS, Thailand; 12) Gorgas Memorial Laboratory, Panama; 13) Liverpool School of Medicine, UK; 14) U.S. Naval Medical Research Unit No. 3; 15) National Institute for Tropical Disease, Eshowe, Republic of South Africa; 16) DVECC, NASJAX, FL; 17) Bernice P. Bishop Museum, Honolulu, Hawaii; 18) California Academy of Sciences, San Francisco, CA.

FIGURE A

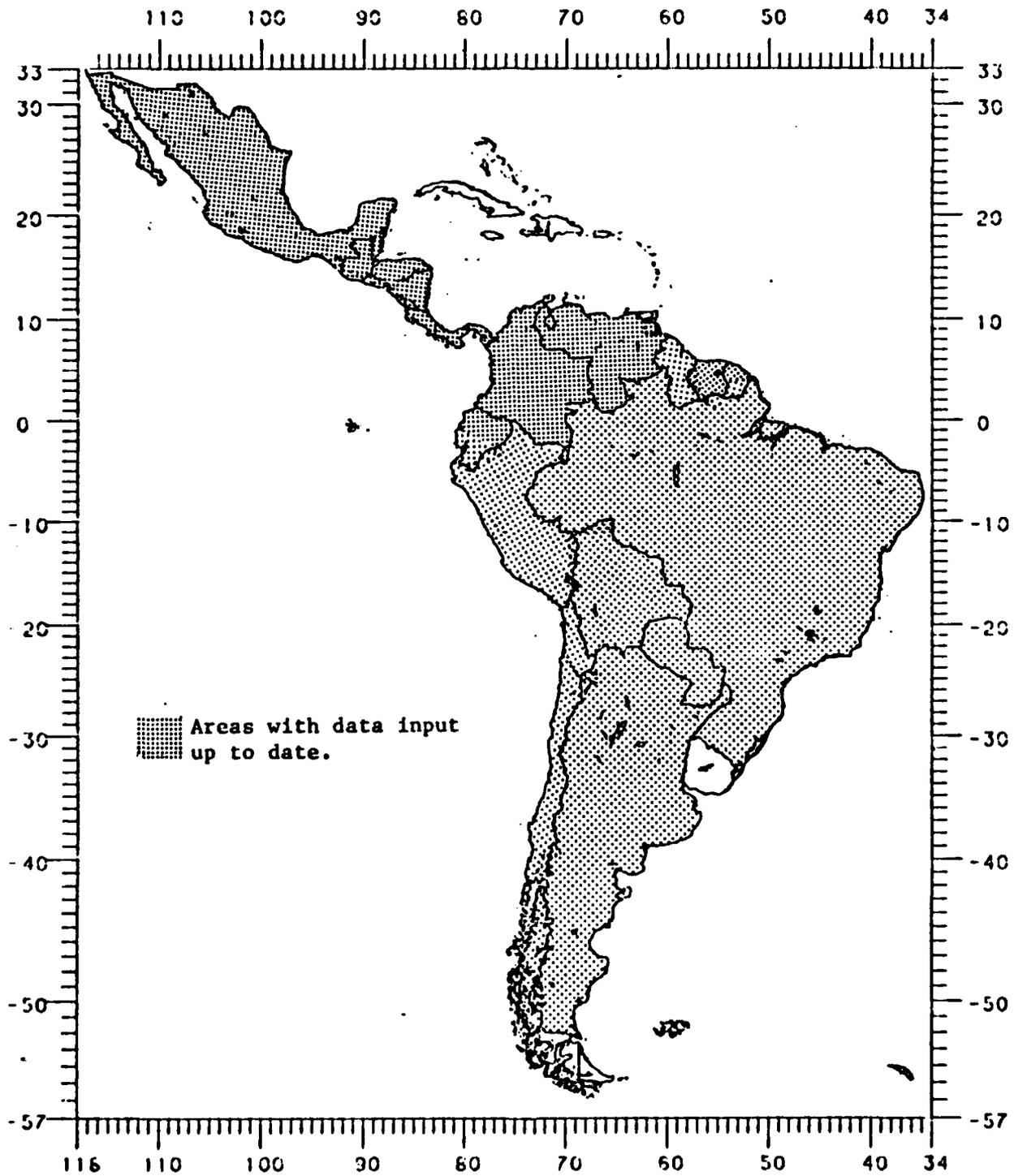
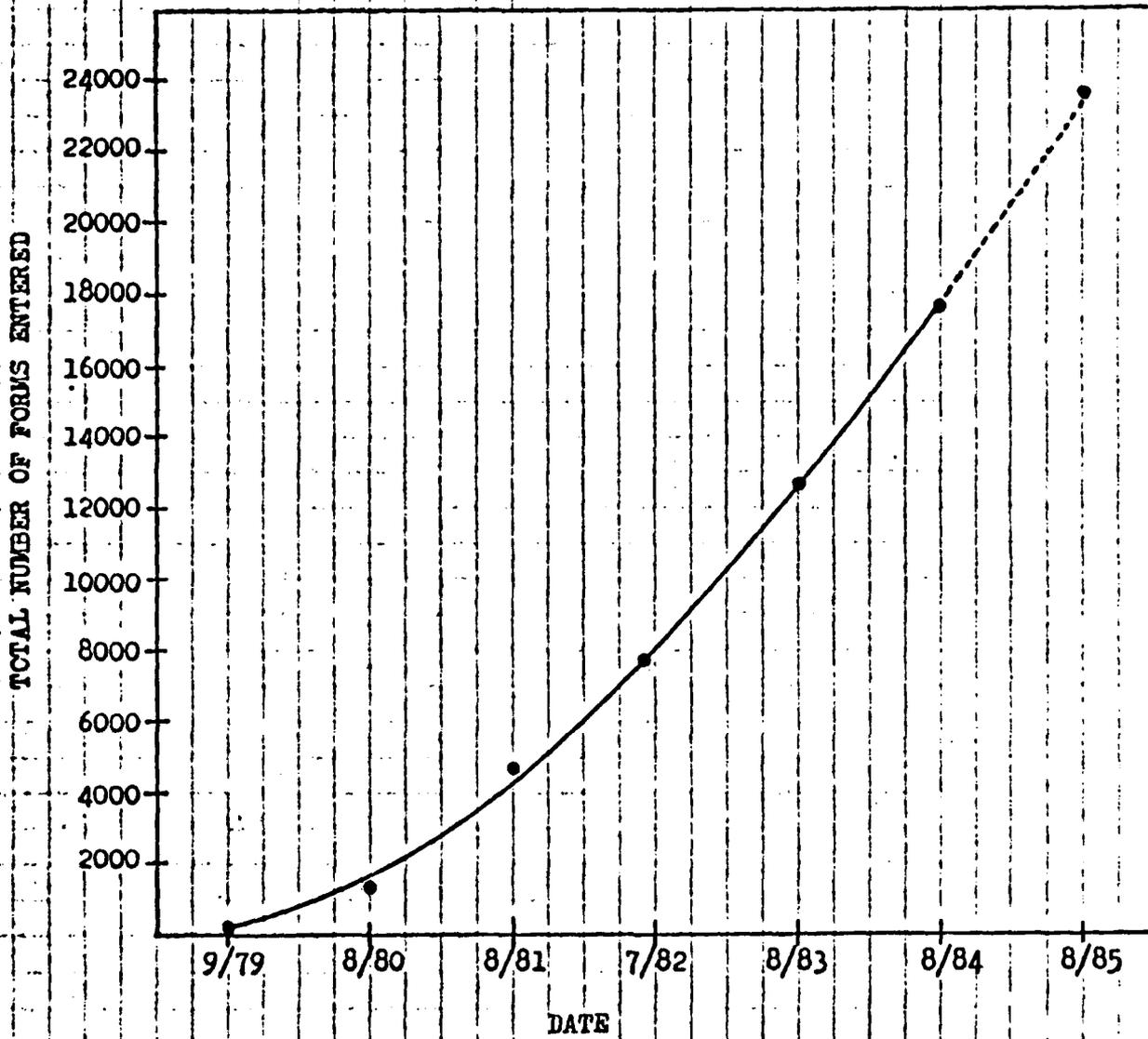


FIGURE B



Increased rate of data entry of collection forms into the computer data base over the past five years.

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