

Chapter 3

Quality of Research at the Gorgas Memorial Laboratory

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INTRODUCTION

The Gorgas Memorial Laboratory (GML) engages in a wide range of public health, research, and training activities. Gorgas scientists work in the laboratory, in the field, and in the medical clinic. GML performs applied and basic research, and provides public health services in those settings. (See ch. 2 for a description of current activities.)

This chapter examines the quality of research, training, and public health activities at GML. Ideally, assessing the quality of the work at GML would be accomplished by a review of each project in each program. A multidisciplinary team of scientists would visit GML, speak with investigators, review research protocols, procedures, and publications, and evaluate the physical plant. An overall rating would then be made, pointing out strong and weak points. Such a thorough review would serve as the basis for recommending changes in current programs, and to point out areas with future potential. OTA was unable to take such an approach.

Another avenue for assessing the quality of GML activities, and one that was suggested to the Office of Technology Assessment (OTA) by a number of people, is to compare GML activities and its record of productivity with that of a similar institution. The logical choices for such a comparison might be, e.g., Institute of Nutrition of the Caribbean and Panama, International Laboratory of Research on Animal Diseases, the Department of Defense (DOD) medical research units, or the Centers for Disease Control's former field station in El Salvador. Even these institu-

tions, however, are very different from GML in their administrative structures and their research agendas. While it was possible with the time available and information at hand to make gross comparisons of GML and DOD budgets, it was not possible to make adequate comparisons of the quality of scientific activities.

For its review, OTA relied on:

1. the record of past scientific review of GML's programs;
2. a review of recent publications by GML researchers, including an in-depth analysis of a selection of active manuscripts and published articles;
3. an assessment of peer review at GML;
4. a review of recent grants and contracts held by GML; and
5. the results of a telephone survey, commissioned by OTA, of experts familiar with GML.

OTA is aware that this type of assessment is not definitive. It relies heavily on circumstantial evidence about quality (e. g., number of publications), some unsubstantiated opinions about quality (e. g., comments from the telephone survey), and the opinions of site visitors in previous years. As discussed above, other, more detailed methods of assessment are possible which would both give a better reading of the state of GML activities and serve as a guide for future directions. Such an assessment could be valuable to GML as well as its funding agencies, and might be considered as a GML priority for the near future.

SITE VISITS BY THE FOGARTY INTERNATIONAL CENTER

The Fogarty International Center (FIC) at the National Institutes of Health (NIH) has conducted two site visits to GML, one in 1976 (110) and the

other in 1980 (111). In 1978, a review of all programs was carried out by a team with representatives from FIC and the Gorgas Memorial Institute

(GMI) Executive Committee and Advisory Scientific Board. These are the only comprehensive program reviews that have taken place in recent years. A scheduled site visit for 1983 has been postponed due to the uncertainties surrounding GML's future (57). Before those site visits, committees of GMI's Advisory Scientific Board had conducted reviews of the virology and parasitology programs in 1973 and 1974, respectively.

The FIC site visits were conducted by multidisciplinary teams which evaluated the scientific activities at GML. The charge of the 1980 five-person team was:

. . . an examination of the scientific programs of the Laboratory as to their quality, adequacy, and relevance in furtherance of the mission of the laboratory, to provide advice and to make recommendations as to any alterations in priorities and program or project implementation that seemed indicated, and in the final analysis to arrive at some composite judgment as to the value of the scientific work relative to the investment by the U.S. Government.

In addition to reviewing the research programs, the site visit report comments on administrative operations and GML's program in tropical medicine training.

Both FIC site visit reports were strongly positive about the overall operation of GML, while identifying weaknesses and areas of unused potential. The 1980 report concludes:

The core long-range program emphases of the GML on parasitology, arbovirology, and ecologic studies continue to be of scientific importance, relevant to the health concerns of the United States, Panama, and the region, and appropriate to the unique location and facilities offered by GML.

The overall quality of research conducted by GML is of high standard, nationally (United States) and internationally. As with any institution undertaking a broad spectrum of projects, there are unevennesses that necessitate periodic review and reevaluation, especially in terms of priority relative to available resources. The Team felt that, in general, this [review and reevaluation] was being done conscientiously and well. It would emphasize, as the previous FIC review did, that GMI actively continue to support the GML Direc-

tor in this respect through regular site visits by members of the Executive Committee and/or the Advisory Scientific Board.

The 1980 report noted a strengthening and consolidation of research activities since the previous (1976) site visit. A major factor facilitating that improvement was the relatively stable funding through the core grant, after several years of "uncertainty and adjustments" associated with GML's absorption of the former NIH Middle America Research Unit (MARU). At this time, adjustments are continuing, as described in chapter 2. Equilibrium has not yet been reached, and the research programs may be affected to some degree, particularly in terms of long-range planning, until the reorganization is complete.

Review of Research Programs

The FIC team critiqued each program as to its quality and relevance, and developed specific recommendations for each. The findings and recommendations of the 1980 site visit report are summarized below.

Parasitic Infections

Programs in leishmaniasis, trypanosomiasis, malaria, and toxoplasmosis are critiqued separately. In general, these diseases are considered to be important in Panama. The site visit report, however, pointed out the need for refocusing some of the studies.

The report stressed the unique availability of large numbers of patients with leishmaniasis, and the potential for expanding and redirecting efforts in clinical investigations. Ongoing research with a known major animal reservoir of leishmaniasis, the two-toed sloth, is promising, and could also be more carefully focused.

GML has conducted research on Chagas' disease (American trypanosomiasis) for many years. Although GML is in possession of a large pool of clinical data, little has been published. The site visitors suggested that a major contribution to understanding the importance of Chagas' disease in Panama could result from analysis and publication of clinical observations. GML had made some interesting observations about treatment of

Chagas' disease with metronidazole, which the site visit team thought worthy of followup by other laboratories. Studies of vectors and animal reservoirs, and longitudinal prevalence studies in one population had provided interesting information, but the goals of those projects required reevaluation.

Malaria

The main activities in malaria research are drug testing for the U.S. Army, in *Aotus* monkeys. This work is considered important, but the site visitors recommended expanding the scope of malaria research to make greater use of the expertise and resources at GML.

Toxoplasmosis

Toxoplasmosis is a major cause of chorioretinitis (inflammation of parts of the eye) in Panama, and as such is important, although, according to the site visit report "not of the highest priority." While the site visit team thought contributions could be made toward understanding toxoplasmosis, "the principal focus of the project as described seems somewhat lacking in relevancy."

Arbovirus Program

Yellow fever, Venezuelan equine encephalomyelitis, and St. Louis encephalitis are the major arboviral diseases studied at Gorgas, though GML retains the capability to investigate and evaluate outbreaks of other diseases.

Yellow Fever

The site visit report deemed the yellow fever surveillance "one of the most important programs of GML." Panama is the key location for early detection of spreading yellow fever from Colombia into Central America. Gorgas has developed a proven method for surveillance of wild howler and spider monkeys, the animal reservoirs of yellow fever. At this time there is no alternative method. The report favored continuation of monitoring seasonal variations in known mosquito vectors of yellow fever, and expanded efforts in studying transmission of yellow fever.

Venezuelan Equine Encephalomyelitis (VEE)

Past efforts in VEE research have produced useful information. The site visit report suggests expanding in this area,

St. Louis Encephalitis (SLE)

Comments on the SLE research program indicate that they are headed in productive directions and the work should be continued.

Environmental Assessment Program

Assessments of two major hydroelectric schemes have been carried out under contract to the Panamanian power authority. Although very different in nature from most of the activities taking place at GML, these assessments were considered successful and useful by the site visitors. They concluded:

In addition to their technical and social importance, such environmental assessment projects can help provide a model for similar studies in other parts of the developing and developed world. Furthermore, they can readily be perceived by the public as dealing with actual concerns of that country's society. We feel that more than anything else in recent years, these projects in Panama have probably helped improve the image of the GML in the eyes of Panamanians.

Diarrheal Diseases Program

Several projects in diarrheal diseases were in progress at the time of the site visit. They were of variable quality and relevance, according to the report. For instance, a project demonstrating the efficacy of oral fluid therapy in the treatment of dehydration secondary to acute diarrhea duplicated research done elsewhere, but the project appeared to be beneficial nonetheless. The report states:

Although the merits of the project as original research are relatively low, the project served as an educational effort of considerable importance.

A study of travelers' diarrhea in Panamanian visitors to Mexico was considered of only secondary importance and not central to the mission of GML.

At the time of the site visit, a collaborative arrangement with the Johns Hopkins University School of Medicine had produced worthwhile results in studying the incidence of acute diarrheal disease in the San Bias Islands with respect to the availability of water. However, the Hopkins unit was not refunded beyond 1980 and the research was terminated.

Sexually Transmitted Diseases

Studies in sexually transmitted diseases (STDS) were carried out in collaboration with the Panamanian Ministry of Health. They have focused on the epidemiology and etiology of STDS, and have led to further studies bearing on the very high rate of cervical cancer in Panama. The site visit report commented that STD research was of "secondary importance" to the other major programs in parasitology, arbovirology, and environmental impact studies.

Cancer Registry/Cancer of the Cervix

GML has worked with the Panamanian national cancer registry in epidemiologic studies of cervical cancer. Analysis of registry data indicated that Panama has one of the highest rates of cervical cancer in the world, and that geographic clusters in certain provinces have extremely high rates. Though not considered of the highest priority by the site visitors, they rated the work of high quality and recommended that it be continued.

Training

The site visit team was enthusiastic about the excellence of training provided in the "Medicine in the Tropics" course. To be more consistent with the mission of GML, however, it was suggested that Panamanians be included in the course on a regular basis* and that GML take over the direction of the course entirely, rather than the director being a U.S. Navy assignee. They concluded:

. . . it appears that the training capabilities and opportunities offered by GML, including the Lister Hill fellowships of GMI itself, warrant wider notice in the scientific community.

● According to the Director of GML, only one or two Panamanians take the 6-week course each session (121).

Publications

Research and scientists are often judged on their publication records. The number of publications, the journals in which they are published, and the number of other authors who later cite the papers are some objective, though indirect, indicators of quality. However, there are no fixed standards against which to make a judgment of excellence. Research activities, in general, are aimed toward publishing results, while public health service activities do not have publication as a primary goal. Even in research, each field of study and type of research varies greatly, and may result in a different array of publications. Long-term field surveillance studies may result in a major publication only after several years. Clinical observations may be published as case reports after only a single visit.

Environmental assessments are performed under contract to development agencies or companies, and may result in few external publications, though they may be quite successful. Surveillance activities are routine until something is found. In Panama, yellow fever outbreaks have occurred every 8 or 9 years, but surveillance must go on continuously.

Given the above perspective, OTA examined the GML publication record by looking at the number of publications in recent years and the journals in which they were published, and by evaluating the quality of a sample of recent publications and active manuscripts.

Number of Publications and Journals of Publication

Over the years of its existence, GML researchers have been authors or coauthors of about 950 published scientific papers, about 200 of them since 1975. (App. C lists publications since 1975.) Though it is impossible to rate the number of publications on a meaningful, objective scale, GML's record is indicative of continuous publishing activity. Table 8 shows the number of publications by GML staff by year. Whether more publications should have been expected is a subjective matter. A comparison of GML scientists' publishing record to that of six of the

Table 8.—Total Publications of the Gorgas Memorial Laboratory, 1975-83

Year	Total articles appearing
1975	34
1976	18
1977	14
1978	7
1979	16
1980	24
1981	10
1982	17
1983 (to date)	6

SOURCE Office of Technology Assessment, 1983 Based on data provided by Gorgas Memorial Laboratory, Office of the Director, Raymond Watten, July 1983

centers supported by the Rockefeller Foundation's Great Neglected Diseases program shows GML to be at an acceptable but rather low level. GML scientists should certainly give more attention to publishing the results of their work, and GMI/GML management should be aggressive in urging such activity (the Director of GML and the President of GMI have indicated they share this view).

GML researchers publish in a variety of scientific journals. Table 9 lists the journals in which papers have appeared since 1980. These are largely refereed journals, meaning that papers are scrutinized in some formal way before acceptance, and generally there is some competition for publication.

In most cases, Gorgas investigators were the principal authors (listed first among the authors, and generally taken to mean that the ideas and most of the work can be attributed to that individual). Publications appear in both English and Spanish language journals. In general, papers of direct relevance to medical practice in tropical America appear in Spanish language publications (e.g., *Revista Medica de Panama*). Those of more global interest have appeared in journals with more international circulation (e.g., *The American Journal of Tropical Medicine and Hygiene*). An example of a subject of interest both locally and internationally is oral dehydration therapy of infantile diarrhea. On the basis of clinical research carried out at GML, a paper was published in 1980 in *Revista Medica de Panama* (6). The research and resulting publication was of great value to local physicians in demonstrating the value of oral

Table 9.—Gorgas Memorial Laboratory: Publication Location for Articles Written by Staff; 1980 to July 1983

Journal or other location:	Number of publications
American Journal of Tropical Medicine and Hygiene	15
Revista Medica de Panama	13
Revista Medica de la Caja de Seguro Social	3
Applied and Environmental Microbiology ..	2
Infection and Immunity	2
American Museum of Novitates	2
Journal of Medical Virology,	2
Journal of Medical Entomology	1
Mosquito News	1
Epidemiological Bulletin	1
Ecological Entomology	1
Bulletin of the WHO	1
Revista de Biologica Tropical	1
Journal of Pacific Insects	1
Transactions of the Royal Society of Tropical Medicine and Hygiene	1
Entomological and Ecological Studies ...	1
International Journal for the Study of Animal Problems	1
Journal of Infectious Diseases	1
Journal of the National Cancer Institute ...	1
Journal of Wildlife Diseases	1
New England Journal of Medicine	1
Journal of Economic Entomology	1
Revista Medico Cientifica	1
Annals of Internal Medicine	1
Mosquito Systematic	1
PAHO Workshop	1
BOOKS	2
<i>Bacteria/ Infections of Humans</i>	
<i>Pediatric Cardiology</i>	
Presentations at Symposia/Conferences	3
Total articles appearing	64

SOURCE: Office of Technology Assessment, 1983 Data from Office of the Director, Gorgas Memorial Laboratory, Raymond Watten, July 1983

rehydration. Subsequently, the same research served as a basis for the Panamanian arm of a controlled study of oral dehydration therapy of children in the United States and Panama, which was published in the *New England Journal of Medicine* (95). An editorial accompanying the article (12) highlighted the importance of this work, making the point that "Western-trained pediatricians . . . have created major impediments . . . to the promulgation of oral-dehydration treatment . . . Indeed, local herb doctors, quick to recognize the value of oral dehydration, have often been more helpful than their Western-trained colleagues in disseminating the concept of oral dehydration." The contribution of GML in this case was to facilitate a "technology transfer" to medical practice in the developed world.

Quality of Articles

OTA commissioned a review, * summarized here, of five currently active manuscripts and four recently published articles written by Gorgas staff members (the articles and manuscripts are listed in table 10). The articles are not necessarily a representative sample of the total GML output. They were selected by OTA to cover as diverse a group of topics as possible, subject to the practical constraint of what was available immediately. The review assessed the process of the research, including the adequacy of study design, extent of data collection, and methods of presenting the research findings. Presented below is an examination of the overall features which characterize the research reports, and assessment of the methods of presentation of the data.

● The review was carried out for OTA by Richard K. Riegelman, M. D., Ph. D., author of *Studying a Study; Testing a Test*, and a member of OTA's Health Program Advisory Committee. This section is based entirely on that review.

Table 10.—Articles and Manuscripts Reviewed for the Office of Technology Assessment by Richard K. Riegelman, M. D., Ph. D.

Articles

1. Christensen, H., and DeVasquez, A. M., "The Tree-Buttress Biotope: A Pathobiocenose of *Leishmania braziliensis*," *American Journal of Tropical Medicine and Hygiene* 31(2):243-251, 1982.
2. Dietz, E., Galindo, P., and Johnson, K., "Eastern Equine Encephalomyelitis in Panama: The Epidemiology of the 1973 Epizootic," *American Journal of Tropical Medicine and Hygiene* 29(1):13;1-140, 1980.
3. Dietz, W., Peralta, P., and Johnson, K., "Ten Clinical Cases of Human Infection With Venezuelan Equine Encephalomyelitis Virus, Subtype I-D," *American Journal of Tropical Medicine and Hygiene* 29(2):329-334, 1979.
4. Young, M., Baerg, D., and Rossan, R., "Studies With induced Malarial in *Aotus* Monkey s," *Institute Animal Sciences* 25(6):1 131-1137, 1976.

Manuscripts

5. Petersen, J., "identification of Phlebotomine Sand Flies (Diptera: Psychodidae) by Cellulose Acetate Electrophoresis" (in press).
6. Piesman, J., Sherlock, I., and Christensen, H., "Triatomine Density and Host Availability" (in press).
7. Seymour, C., Kramer, L., and Peralta, P., "Experimental St. Louis Encephalitis Virus Infection of Sloths and Cormorants" (in press).
8. Seymour, C., Peralta, F., and Montgomery, G., "Serologic Evidence of Natural Togavirus Infections in Panamanian Sloths and Other Vertebrates" (in press).
9. Seymour, C., Peralta, P., and Montgomery, G., "Viruses Isolated From Panamanian Sloths' '(in press).

SOURCE: Office of Technology Assessment, 1983.

Overall Features of the Articles and Manuscripts

The articles and manuscripts reviewed reflect a wide spectrum of scientific activities. These activities include:

- study of a naturally occurring epidemic with potential for human transmission;
- development of new animal models for studying human disease;
- investigations of the mechanisms for transmission and reservoirs of disease in their natural field environment;
- laboratory investigations designed to assess the susceptibility of animal hosts as intermediaries in the transmission of human disease;
- reporting on a series of human cases of disease collected over more than 15 years;
- development of a new technique for performing enzymatic studies on disease vectors;
- field studies of the effect of a human living environment on the transmission of disease; and
- correlation of biochemical genetic characteristics of disease vectors with the epidemiology of disease.

Important features of these investigations include the ability to collect and coordinate data from a variety of sources. The ability of the investigators at GMI to bring together data from a variety of sources is demonstrated in these studies in at least the following ways.

- correlation of their laboratory investigations with findings from their field research and knowledge of the epidemiology and natural history of disease;
- cooperation with other laboratories, including CDC and a number of U.S. university, public health, and military programs;
- ability to respond to a naturally occurring epidemic, collecting data requiring cooperation with public health control programs, hospitals, and correlation with laboratory investigations; and
- ability to collect and test large numbers of disease vectors from a variety of natural environments.

The majority of the investigations represent unrelated studies. Three of the investigations how-

ever, include coordinated studies using two- and three-toed sloths found in the Panamanian forests,

These three studies reflect the ability of investigators at the laboratory to:

- collect a large spectrum of species of birds and mammals from a variety of natural environments;
- track the natural history of disease by placing radio transmitters on selected animals and recapturing them for sequential testing;
- perform viral isolation and serological testing needed to correlate with the epidemiology and natural history of disease found in the Panamanian forests;
- relate the field and laboratory findings to human disease potential; and
- use knowledge gained from earlier studies to improve the design and performance of subsequent studies.

Presentations of Data

Background and Hypotheses.—The authors frequently introduce their presentations by a succinct discussion of their study's purpose and its relationship to existing knowledge. These introductions are well referenced and place the studies in a context which does not require the reader to have a previous detailed knowledge of the field.

The study hypotheses are usually clearly stated and their relationship to previous studies are, on the whole, well outlined.

Study Methods.—The authors of the field laboratory studies provide detailed discussions of the location of their collections and the methods of preservation and preparation of their materials. The experimental studies provide an adequate description of the study methods, including references to the specific techniques employed. These presentations appear to fulfill the essential criteria that other investigators are provided adequate information to attempt to reproduce the findings.

When judgments as to technique and criteria for positive results are required the authors appropriately present the justifications for their choice. When the methods themselves possess limitations in their ability to measure the intended phenomena, the authors clearly identify these limitations,

Results.—The authors present the results of their studies in adequate detail. They consistently present and acknowledge their failures and the limitations of their results as well as presenting their positive findings. This practice should add to the value of these investigations by identifying areas for further research, appropriately limiting the conclusions, and preventing other investigators from pursuing unproductive approaches.

The statistical methods used in the articles require only basic methods. However, the methods used are appropriate and appear to be properly employed.

When interpreting the results of their studies the authors usually present a variety of potential explanations for their findings, including the explanation they favor.

In presenting their results, the authors generally are able to relate their findings to current scientific thinking as well as their implications for immediate disease prevention or control. The articles often suggest areas for further investigations.

Summary

In summary, the articles and manuscripts reviewed reflect a high level of expertise in designing and carrying out scientific research. The investigators demonstrate an ability to collect and coordinate data from a variety of sources, present data in an analytical manner, and build on and contribute to the worldwide scientific literature. The authors are able to take advantage of the unique features of their setting and experiments to contribute to knowledge of basic and applied biological science.

PEER REVIEW AT THE GORGAS MEMORIAL LABORATORY

One of the questions being addressed by the General Accounting Office (GAO) is about the peer review process at GML. Thus, this memorandum will not discuss peer review except for some comments on the relationship of peer review to the quality of research. By peer review, OTA is considering basically the process by which decisions are made to fund research projects with internal (core grant) money and the process of evaluating internal research. Research funded through grants and contracts is subject to peer review by the funding agencies, e.g., NIH and the World Health Organization (WHO). In those cases, GML is competing with other research organizations for support. In a sense, GML staff are competing with each other for core funds to support their projects that are not under grants or contracts. A peer review system for research proposals, and reviews of ongoing and completed work are mechanisms used to allocate resources according to merit and to assure that research quality is acceptable.

It is not uncommon for internal peer review systems to be less rigorous than externally funded systems. For instance, at NIH, researchers on the campus do not submit proposals through the same system that funds extramural research. Researchers within each institute do go through a formal process for allocation of intramural research funds, but review is basically within the institute itself. Proposals and protocols are not scrutinized by outside experts, but, at specified intervals outsiders do evaluate the work that goes on within institutes.

OTA gained some insight into the peer review process at GML through the telephone survey about Gorgas. There was a general lack of agreement about whether a peer review process—either

to review research proposals, protocols, or results—does in fact exist. It is clear that even if a process has been set up on paper, it does not function effectively on a regular basis.

The fact that GML does not seem to have a well-known system for allocating money within the organization is something that requires consideration in future plans. A truly internal system, such as NIH uses, may not be the best plan for GML. Institutes in NIH have a large core of individuals with knowledge in a specific field. For instance, all researchers at the National Cancer Institute are knowledgeable about some aspect of cancer. There is a large number of people there to provide adequate review of internal research proposals,

At GML, investigators are unique in education, training, and research areas. It would probably be difficult and perhaps not so effective to have only GML staff review each other's proposals and research results, though that is also desirable. The main peer review body could be drawn from the Advisory Scientific Board, which has good scientific representation from the relevant disciplines. A model for how such a group might operate is the peer review process of the Plum Island (New York) Animal Disease Center of the U.S. Department of Agriculture. In that case, there are five non-Government consultants who visit once each year (but may be called to visit in the interim if necessary). The consultants are selected by the laboratory director and are responsible directly to that person. The consultants produce a report assessing all programs. The consultants' expenses for the visit are paid (98). Paying for travel is even more critical for GML, since travel to Panama is relatively expensive.

GRANTS AND CONTRACTS

The record of an institution or a researcher can be measured in the number and dollar value of grants and contracts awarded from external sources. Externally funded projects are more likely

to undergo vigorous peer review than are those funded internally by an institution. (See "Peer Review at the Gorgas Memorial Laboratory," above.) This is a particularly appropriate measure

for researchers in the United States, where there is a relatively large amount of money available for research, though competition is quite keen.

Most of the research at GML is funded through the core grant, rather than through competitive grants and contracts. Addressing this, the 1980 Fogarty Site Visit Report states:

In these times of financial constraint everywhere, the Team does not feel that too many expectations should be held out that project grants and contracts could or even should supplant the necessity for the maintenance of adequate core support.

A number of past and current projects have received grant or contract funding from sources other than the core grant, including the WHO Special Programme for Research and Training in Tropical Diseases (see app. A), the U.S. Army and Navy, NIH, and private foundations, Table 11 lists current, completed, newly approved, and

pending grants and contracts. There are some grants and contracts in every GML program.

The fact that GML has competed successfully for research money is evidence that the quality of research is equal to other research projects funded by those agencies at other institutions. Support for new projects by these funding bodies is also dependent on successful past performance, giving some assurance that GML is considered dependable. An official at the National Cancer Institute (32) was very positive about Gorgas' ability to carry out a newly approved epidemiologic study involving human T-cell lymphoma virus, based on their past work. He also mentioned that GML is the obvious choice as a coordinating center for a possible future collaborative study of cervical cancer in several countries in the region.

Quality of Research at GML as Seen by Experts

Several questions in the telephone survey that was commissioned for this technical memorandum (see app. D for a more detailed discussion of the survey results) addressed the quality of research and training at GML. In response to a general question, "How would you rate the work of GML?" most of the 23 experts interviewed reacted positively. Some programs were rated excellent, including the work in virology (especially in arboviruses), malaria, medical entomology, trypanosomiasis and leishmaniasis, cancer, STDS, and environmental studies. Other programs, bacteriology, for instance, were rated lower.

A commonly held sentiment was that the quality of work varies from program to program, with many strong points and some weak points, but that such a state of affairs was to be expected in an institution that has been in existence for so long. In some areas the work has become routine, with slow but steady progress. Some work was described as not very original, but, technically, good. Presumably this refers to such activities as serotyping of viruses, which is of public health importance, and is done routinely at GML, but is not necessarily innovative.

Several people made the point that judgments about quality of research must be tempered by

Table 11 .—Gorgas Memorial Laboratory: Grants and Contracts as of July 1983

Current grants:

U.S. Army Drug Evaluation Contract
U.S. Navy Training Project
WHO/TDR Triatomine Blood Meal Contract
WHO Clinical Trial for Evaluation of Leishmaniasis Therapy
WHO Isozyme Lutzomyia—Sand Flies
NIH/Yale Arbovirus—Yellow Fever
WHO/TDR Chagas' Disease
UNDP/World Bank/WHO Leishmaniasis in Honduras

Completed and or terminated grants/contracts:

Tabasara Hydroelectric Environmental Impact Study
NIH/NCI Cervical Cancer Study
NIH/NIAID Epidemiology of St. Louis Encephalitis
AID In *Vitro* Malaria Culture
WHO/TDR Control of Simuliids

Approved contracts:

Panamanian Ministry of Health/Interamerican Development Bank—Malaria and Leishmaniasis
NIH/NCI Epidemiology of Human T-Cell Lymphoma Virus
WHO/PAHO Epidemiology of Childhood Respiratory Illnesses in Panama

Pending grants:

Rapid Early Serodiagnosis of Leptospirosis by Detection of Antigen in Body Fluids of Infected Persons
Epidemiologic Assessment of Preventable Illness in Honduran Refugee Camps
Effects of Two Arbovirus in the Development of Panama Regional Reference Center for Studies on New World Phlebotomine Sand Fly Host Feeding Patterns

^aUsually because of lack of funding

SOURCE Gorgas Memorial Laboratory, Off Ice of the Director, July 1983

consideration of the conditions under which work is done—field conditions make for a much different situation than that encountered at NIH. Particularly in light of working conditions in the Tropics, GML was rated highly.

The uncertainty of financial support affects the quality of research, according to a number of experts. Lacking a secure future, it is difficult to attract top scientists to work at any institution. In addition, the researchers already there are hampered in planning for all but the most immediate research.

There was a diversity of opinion about whether the quality of research at GML has changed appreciably over the years. Research emphases have changed and the whole field of scientific research has changed so greatly that such a judgment is difficult to make. Of those who did answer, some felt there was no change, others a change for the better (variously since World War II, to within the last 11/2 years). A number noted a general decline in research quality over the years, all of those respondents relating the decline to uncertain funding.

The experts contacted were asked about the quality of tropical medicine training offered at GML. Most gave it a high rating. The unique setting was considered the most important asset in the training programs. The opportunities for clinical experience were particularly important for the military. In this regard two respondents referred to a comment of General Douglas MacArthur's that in the Philippines he needed three divisions to do the work of one, since two would be in the hospital with malaria or dengue. The disease ecology is such in Panama that similar opportunities for learning about tropical diseases do not exist in many other places. One expert mentioned that training in Puerto Rico, for instance, would not be as valuable as that at GML. A few people

said that the training had gone downhill during the past few years because of financial constraints.

Summary

The research carried out at GML over the years has been of generally high quality. OTA's analysis, the survey of expert opinion, the critical review of articles and manuscripts, and past site visits are all in agreement on this general conclusion. As is the case in any institution with a long history, there are strengths and weaknesses. Research emphases have shifted over the years, and the quality has varied as well. The results of the telephone survey confirm that most of the major programs are strong and of good quality, and that there are fewer weak points.

However, mechanisms to assure continued high quality of research are not in evidence. There is a lack of an effective peer review process for allocating money to research projects funded by the core grant. While grants and contracts funded externally have passed through a competitive process designed to assure high quality, internally generated and funded projects do not necessarily receive the same degree of scrutiny. Another example of a potential problem area is collaboration with other high-quality institutions. GML must become more aggressive in seeking and in strengthening interaction and collaboration with scientists and institutions from other countries (especially the United States). And, as mentioned, GML could make a larger effort to publish study results.

OTA finds that GML is carrying out research of high quality, and that the institution enjoys a generally solid reputation in the field of tropical medicine research. The most serious threat to maintaining good research is continuing uncertainty about future financial support.