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DEPARTMENT OF THE ARMY
UNITED STATES ARMY INTELLIGENCE AND SECURITY COMMAND
FREEDOM OF INFORMATION/PRIVACY OFFICE
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REPLY TO
ATTENTION OF:

Freedom of Information/
Privacy Office

10 JUN 2013

This is in further response to your Freedom of Information Act (FOIA) request of October 23, 2008, and supplements our electronic message of May 12, 2010.

Coordination has been completed with another element of our command and other government agencies and records returned to this office for our review and direct response to you. We have reviewed the records and determined the records are partially releaseable to you. A copy of the records are enclosed for your use.

We have completed a mandatory declassification review in accordance with Executive Order (EO) 13526. As a result of our review information has been sanitized and 4 pages have been withheld in their entirety as the information is currently and properly classified TOP SECRET, SECRET and CONFIDENTIAL according to Sections 1.2(a)(1), 1.2(a)(2), 1.2(a)(3) and 1.4(c) of EO 13526. This information is exempt from the public disclosure provisions of the FOIA pursuant to Title 5 U.S. Code 552 (b)(1). It is not possible to reasonably segregate meaningful portions of the withheld pages for release. The records are enclosed for your use. A brief explanation of the applicable sections follows:

Section 1.2(a)(1) of EO 13526, provides that information shall be classified TOP SECRET if its unauthorized disclosure reasonably could be expected to cause exceptionally grave damage to the national security.

Section 1.2(a)(2) of EO 13526, provides that information shall be classified SECRET if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.2(a)(3) of EO 13526, provides that information shall be classified CONFIDENTIAL if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.4(c) of EO 13526, provides that information pertaining to intelligence activities, intelligence sources or methods, and cryptologic information shall be considered for classification protection.

In addition, information has been sanitized from the records and 4 pages have been withheld in their entirety as the release of the information would reveal sensitive intelligence methods. This information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(7)(E) of the FOIA. The significant and legitimate governmental purpose to be served by withholding is that a viable and effective intelligence investigative capability is dependent upon protection of sensitive investigative methodologies. It is not possible to reasonably segregate meaningful portions of the withheld pages for release.

The withholding of the information described above is a partial denial of your request. This denial is made on behalf of Major General Stephen G. Fogarty, the Commanding General, U.S. Army Intelligence and Security Command, who is the Initial Denial Authority for Army intelligence investigative and security records under the FOIA. You have the right to appeal this decision to the Secretary of the Army. Your appeal must be postmarked no later than 60 calendar days from the date of this letter. After the 60-day period, the case may be considered closed; however, such closure does not preclude you from filing litigation in the courts. You should state the basis of your disagreement with the response and provide justification for a reconsideration of the denial. An appeal may not serve as a request for additional or new information. An appeal may only address information denied in this response. Your appeal is to be made to this office, for forwarding, as appropriate to the Secretary of the Army, Office of the General Counsel.

Coordination has been completed and we have been informed by the Central Intelligence Agency (CIA) that information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(1) and (b)(3) of the FOIA.

The withholding of the information by the CIA constitutes a denial of your request and you have the right to appeal this decision to the Agency Release Panel within 45 days from the date of this letter. If you decide to file an appeal, it should be forwarded to this office and we will coordinate with the CIA on your behalf. Please cite CIA #F-2010-01292/Army #57F-09 assigned to your request so that it may be easily identified.

Coordination has been completed and we have been informed by the Defense Intelligence Agency (DIA) that their information is exempt from public disclosure pursuant to Title 5 U.S. Code § 552 (b)(1), (b)(2) (b)(3) and (b)(4) of the Freedom of Information Act and Executive Order (EO) 13,526 § 1.4 (c) (d) and (h). The statute invoked under Title 5 U.S. Code 552 (b)(3) is 10 U.S.C. §424, which allows for the protection of organizational and personnel information for DIA.

The withholding of the information by the DIA constitutes a partial denial of your request and you have the right to appeal this decision directly to the DIA. If you decide to file an appeal, it should be forwarded to the Director, Defense Intelligence Agency, ATTN: DAN-1A-FOIA, Washington, DC 20340-5100. Please cite MDR #0155-2010 assigned to your request so that it may be easily identified.

You have received all Army intelligence investigative records pertaining to this request.

There are no assessable FOIA fees.

If you have any questions regarding this action, feel free to contact this office at 1-866-548-5651, or email the INSCOM FOIA office at: INSCOM_FOIA_ServiceCenter@mi.army.mil and refer to case #57F-09.

Sincerely,

Brad S. Dorris
Director
Freedom of Information/Privacy Office
Investigative Records Repository

Enclosure

~~SECRET~~

May 1973

Publication No.
ST-CS-03-35-73

ST-CS-03-35-73
US ARMY MATERIEL COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
Federal Office Building, Charlottesville, Va. 22901

BIOLOGICAL WARFARE CAPABILITIES—NONALIGNED COUNTRIES (U)

Publication No. ST-CS-03-35-72, April 1972, is superseded by the inclosed document, ST-CS-03-35-73.

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BIOLOGICAL WARFARE CAPABILITIES–NONALIGNED COUNTRIES (U)

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ST-CS-03-35-73

DIA Task No. T72-03-12

May 1973

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PREFACE

(U) This study was prepared in response to guidance from DIA requesting a series of studies on selected nonaligned countries. Countries treated here are those that have the technological base and possess a scientific expertise which give them the potential to engage in biological warfare programs. Sweden, Finland, and Japan have been assessed on this basis. Other countries will be included in subsequent amendments.

(U) Pertinent information except in R&D matters is scarce. In this regard, it is recognized that there are major gaps in our knowledge of: doctrine and procedures controlling the use of biological weapons; materiel for both offensive and defensive operations; production and storage facilities for biological agents; and existing agent/weapon stockpiles.

(U) The data base and analyst experience committed in support of this effort are not available at any single office within the intelligence community. Accordingly, inputs for this report were solicited from various groups. The US Army Foreign Science and Technology Center was responsible for basic coverage by area and subject matter; the Naval Intelligence Support Center was tasked for information dealing with naval offensive and defensive biological warfare capabilities; the Foreign Technology Division, US Air Force was queried for inputs covering aerospace offensive and defensive applications; and appropriate elements of DIA were responsible for information involved with order of battle, training, doctrine, policy, production, and stockpiling.

(U) Although the cutoff date for information in this document was December 1972, items of major significance have been incorporated up to the date of final approval for printing.

(U) This revised study is being disseminated devoid of bibliographic material to facilitate wider distribution. A compiled bibliography has been prepared separately and can be made available to authorized recipients upon written request to the Defense Intelligence Agency, ATTN: DT-1A, Washington, D. C. 20301. Individuals making such requests are cautioned that the addition of the bibliography to (or its association with) the study makes mandatory a more restricted distribution. When the bibliography is attached, the study must carry the additional caveat NO DISSEMINATION ABROAD.

(U) As the prime producer of this study, the Foreign Science and Technology Center was charged with the final collation, preparation, and editing of copy material.

(U) Constructive criticism, comments, and suggestions for changes are solicited. Critical evaluations from readers of this report will provide direct guidance so that future updatings of this study will result in a product which is most responsive to the varied needs of the users. Additional information concerning this study may be addressed to the Defense Intelligence Agency, ATTN: DT-1A, Washington, D. C. 20301.

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List of Tables	xiv	Original
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SUMMARY

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Section I.

SWEDEN

A. INTRODUCTION

1. (U) Background on Swedish Biological Warfare (BW)

Sweden is extremely competent and progressive in the fields of public health and safety. Her health service is a model for other countries throughout the world.

2. (C) Vulnerability

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a. (U) The Swedes' awareness of their vulnerability to attack has resulted in intensive research efforts on the problem of defense against CBR agents.

b. (U) Sweden has had the necessary organizational facilities, qualified professional and technical personnel, and funds to support BW research and development. The country has long had a vigorous defensive BW program centered about activities at two principal installations where BW research has been performed. These are the Försvarets Förskningsanstalt (FOA) and the Bacteriological Institute of the Royal Caroline Medical-Surgical Institute, Stockholm, more commonly known as the Karolinska Institute. Defensively oriented research and development activities have emphasized the need for rapid detection and identification systems. FOA has studied the use of ultraviolet absorption phenomena to measure the fluorescence of biological agents. The aim of this and related research has always been to develop an automated BW agent detection system that will collect, fix and stain a sample, respond to characteristic fluorescence photometrically, and provide specific identification (fig 1). Research has also been underway on a decontamination device for tents, clothing, weapons, and equipment.

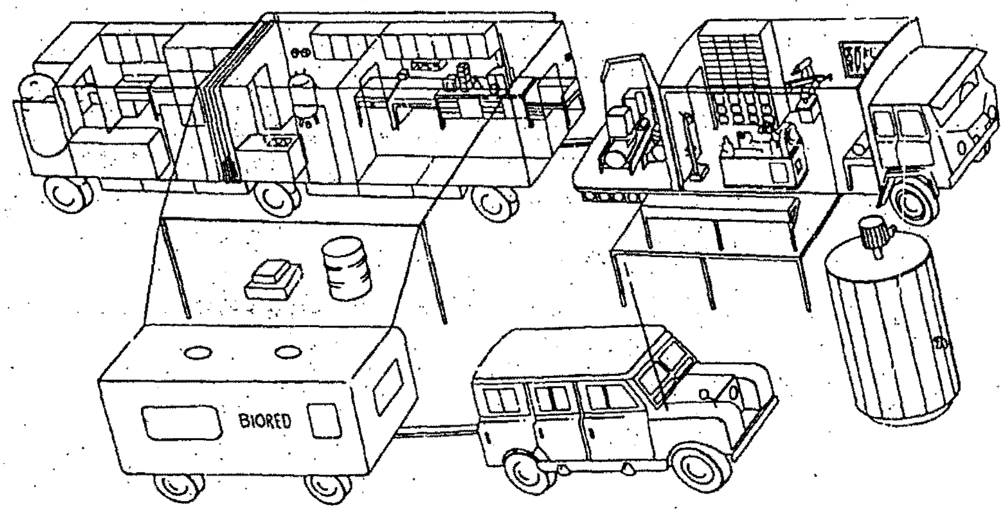

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Figure 1. Mobile biological laboratory, Sweden (U).

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d. (U) The Swedes have conducted microbiological research at the State Bacteriological Laboratory where they have successfully produced microorganisms in mass culture. Fermentation work leading to the development of a "portable"* fermentor was carried out at the Karolinska Institute under the direction of Dr. Karl Goran Heden, who has become a very active participant in international peace movements. The Swedes have also done and are continuing to do research on human and animal disease agents such as those causing tularemia, Russian spring-summer encephalitis (RSSE), myxomatosis, leptospirosis and foot-and-mouth disease.[1]

*"Portable" is a misleading term because the weight of some equipment exceeds 4000 lb. One report indicates that the Heden fermentors originally called mobile or portable may have been small units of 100 liters capacity or less. Any unit containing 100 liters or more is not a truly portable piece of laboratory equipment even though it is mobile (on wheels) as opposed to a fixed installation type. Another report includes a factory technical description of the Biotechnical Work Unit, Model Heden, a 400 liter fermentor unit fitted with wheels "for easy transport." Unless a unit is clearly defined, it is suggested that the description of "portable," be used guardedly or replaced by "mobile."

e. (U) Disciplines of microbiology are explored by highly qualified scientists working at modern, well-equipped facilities, and a vigorous exchange of scientific information at international conferences is encouraged.

f. (U) Swedish biomedical research in general is outstanding, because of the overall excellence of medical talent, education, training, and leadership. Moreover, considerable sums of money have been appropriated for basic and applied research. Medical research is linked closely with teaching and is carried out principally at the laboratories of the Karolinska Institute, which is twice as large as any of the other four medical schools situated respectively within the Universities of Goteborg, Lund, Uppsala, and Umea.[1]

3. (U) Military Medical and Veterinary Capabilities

Capabilities for military medical research are excellent and Swedish veterinary research compares very favorably with that of other European countries. Serious animal diseases have been almost totally eliminated. Sweden has over 1000 veterinarians and hundreds of these are engaged in some form of basic or applied veterinary research.[1]

B. ORDER OF BATTLE

4. (C) Organization

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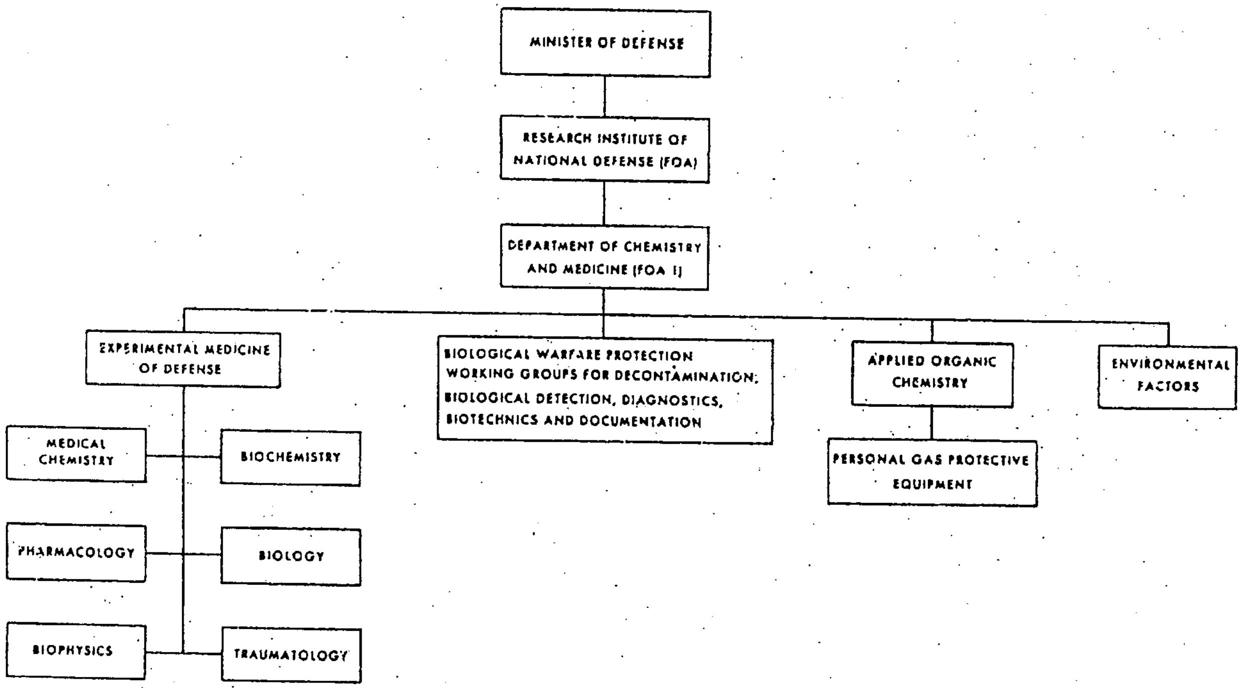

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Figure 2. Swedish BW research organization (U).

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5. ~~(C)~~ Training

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C. BW MATERIEL

6. (C-NFD) Offensive Materiel

(b)(1)

7. (C-NFD) Defensive Materiel

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(1) (C-NFD) Protective masks.

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Figure 3. Swedish M-51 military protective mask (U).

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(2) (U) Collective protection. Swedish military vehicles are now designed with CBR protection as a consideration. The IKV-91, infantry gun vehicle produced by Haegglunds, has a device which maintains a slight excess pressure within the vehicle.[18] Similar protection has been reported for the VK/155 self-propelled automatic gun L50, the PBV-302 armored personnel carrier, and the "S" tank.

(b)(1)

(b) (U) Technical requirements for the Trelleborg mask. Swedish civil defense authorities set the following requirements for private companies bidding on the protective mask contract:

1. Respiratory organs must be protected against CB agents and radioactive dust.

2. The mask must be easy to don—within 5 seconds.

3. The mask shall be light in weight, comfortable to wear, and easy to breathe in so that it can be worn for several hours without inconvenience.

4. The mask shall be provided with a single strap which keeps the mask in such a position that the dustproofing is kept intact during moderate movements.

(c) (U) Degree of protection.

1. The amount of impregnated activated charcoal quality should exceed 100 cm^3, and material used should be of high quality.

2. Maximum aerosol penetration: 0.05%

3. Maximum leakage of the valve: 0.001%

4. Minimum average of leakage: 0.01%

(d) (U) Development by AB Trelleborg (Gummifabrik). Starting with the above standards, the civil defense authorities asked four different Swedish industries to develop prototypes of normal-sized protective masks. After careful testing in cooperation with FOA Research Institute and the University of Göteborg, the Trelleborg mask proved superior in meeting stated requirements, and this product was selected as the new civil defense mask for Sweden. Certain alterations were made subsequently as a result of the experience achieved by these tests.

(e) (U) Civil defense budget for mask purchase. Subject to the availability of civil defense funds, it was planned to purchase the mask at the rate of one million per year for the next 8 years. Since Sweden's population was about eight million in 1969, a mask would be available for every person in 1977. Sweden's civil defense budget for 1969 approximated 147 million Swedish Kronor (S. Kr.) ($39,690,000), an increase of 18.3 million S. Kr. ($4,900,000) over the civil defense budget for the previous year. This amount is ample to allow purchases of the mask as planned.

(b)(1)

(g) (U) Unit costs and suppliers. It was thought that the production order for 200,000 masks per annum would be divided between two companies, the Trelleborg Group, and Forsheda. Further assuming a Trelleborg production rate of 100,000 per year, the Trelleborg civil defense masks would cost $6.00 each. It seems doubtful that the price could ultimately be reduced below this level. The $6.00 unit price would appear to be the Trelleborg "sticking point," should others be interested in making sizeable purchases.

(2) (C-NFD) Collective protection.

(b)(1)

D. DOCTRINE, POLICY, AND PROCEDURES

8. (C) Doctrine

(b)(1)

9. (C) Policy

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E. PRODUCTION FACILITIES AND CAPABILITIES

10. (C-NFD) Institutes and Laboratories

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*Possibly this should read "Biological Warfare (Protection) Department, FOA-165."

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11. (C) Industry

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b. (U) AB BIOTEC, Stockholm. BIOTEC is a small (50 people) design, assembly, and sales outlet for laboratory fermentors, manufactured primarily by Getinge Mechanical Works. The research is provided by Dr. Heden (who is on the BIOTEC board of directors) and his staff at the Karolinska Institute. BIOTEC is a division of LKB Producter and has a US outlet in Rockville, Maryland.

c. (U) *Forenade Fabriksverken* (United Factories). The FFV is an industrial concern at Eskilstuna which oversees about 25 undertakings of various kinds all over the country, from Boden in the north to Lund in the south. The plants were established to produce war materiel in the event of mobilization, and, therefore, have a considerable over-capacity. The peacetime production of this state-owned facility competes with private industry. The production slack is taken up by manufacturing civilian products of high quality. Public capital is invested and profits are handed to the Crown. As an industrial concern, the FFV consists of five factories, located respectively at Eskilstuna, Karlsborg, Karlstad, Motala, and Aker. Only 7 of the 25 enterprises are engaged in the production of military materiel. FFV employs 8000 people, directly or indirectly, and has an estimated per annum of 500 million S. Kr. ($135 million). Six to seven percent of FFV's total budget is spent on research and development. The FFV manufactures CBR protective equipment and a wide variety of other military materiel.

d. (U) Kabi, Inc., Stockholm. This facility, a well-equipped biological plant, could be modified for the production of BW agents.

e. (U) Astra Chemical and Pharmaceutical Plant, Inc., Sodertalje. With some modification, this plant probably could manufacture BW agents.[3]

F. STOCKPILES AND STORAGE FACILITIES

12. (C) BW Stockpiles-Agents

(b)(1)

13. (C) Defensive Materiel or Medicines

(b)(1)

G. RESEARCH, DEVELOPMENT, AND TESTING

14. (S-NFD) Organization, Institutes, and Facilities

a. (U) Organization and Coordination.

(1) (U) Economic data indicate that the government supports a substantial part of industrial R&D efforts, mostly through military and other governmental contracts. According to other statistical sources, approximately 25% of all governmental support for R&D went to universities and schools, 11% to research councils and funds, 22% to government agencies, including the AB Atomenergi and the Defense Research Institute while the remainder was diverted to service diverse contracts let mostly for defense purposes.

(2) (U) Traditionally, the overwhelming part of scientific research in Sweden has been conducted at the universities and technical schools, but there has been a gradual development of government supported technical organizations which specialize mainly in applied research. After World War II, when the need for an increased research effort became more pressing, several research councils were established to provide a supplementary and more flexible system of channeling government support to projects and programs. The councils were attached to several different ministries, and there was little or no coordination at the national level. The Science Advisory Council was established in 1963 to help formulate and develop a national research policy.[9]

(3) (U) The Technical Research Council has a somewhat different status. It deals more with applied research than any other council, and its bylaws emphasize its charter to collaborate with industry. This council initiates and supports research in areas of

special interest by appointing special advisory commissions. Such commissions are, for the present, active in biotechnology, graphic arts, and medical engineering. In 1964-65, the money allocated by the government to the Research Councils amounted to more than 80 million Swedish Kronor (S. Kr.) (approximately $15,200,000). Of this amount, 25 million were earmarked for the Malmfonden and Norrland Foundations. Both of these nonprofit organizations were created in 1961. Government funds allocated to the natural sciences, atomic and technical research councils increased from 4.3 million S. Kr. in 1950-51 to 36 million in 1964-65.

(4) (U) As previously noted, the bulk of fundamental research in Sweden is in the universities, institutes of technology, and similar schools. Such research is funded partly through the regular budget, partly by grants from research councils and public and private foundations, and to some extent by contributions from the United States, which are now gradually decreasing. At the institute of technology, where applied research is more favored than at the universities, research is also financed to a certain extent by contracts.[9]

b. (U) Technical Institutes.

(1) (U) For technical education at the university level, there existed as early as 1961 two institutes of technology, the Royal Institute of Technology in Stockholm, and Chelmers University of Technology in Gothenburg. Both have departments of technical physics, mechanical engineering, shipbuilding, electrical engineering, civil engineering, chemistry, and architecture.[9]

(2) (U) Other scientific and technical research is emphasized to varying degrees at such establishments as the Research Institute of National Defense (with a staff of more than 250 graduate scientists), the National Road Research Institute, the Royal Geotechnical Institute, the Geological Survey, the Aeronautical Research Institute, the National Institute for Consumer Information, the Building Research Institute, the State Shipbuilding Experimental Tank, the Meteorological and Hydrological Institute, and the National Institute of Materials Testing.[9]

c. (U) Industrial Research. Statistics indicate that Swedish industry spent about 540 million S. Kr. on research and development programs during 1963. This figure is lower than previous estimates (800 million). The greatest part of this research was undertaken by industries dealing with hardware, electrical engineering, transportation equipment, machinery, and shipbuilding. Some limited direct support is given by the development foundations and through the Technical Research Council. In 1963-64 the Technical Research Council allocated to industrial firms 0.87 million S. Kr., which amounted to

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Figure 4. Medical defense research in Sweden (U).

CONFIDENTIAL

e. (C) Department of Defense Research Institute (FOA).

(b)(1)

f. (S-NFD) Caroline Medical-Surgical Institute (Karolinska).

(1) (U) General. The Karolinska Institute is the most prestigious bioengineering research facility in all of Sweden. Well known scientists and engineers on the faculty there include K. G. Heden, B. Malmgren, T. Holme, R. Brookes, L. Rutberg, S. Warenius, and S. Goranson. At Karolinska, bioengineers under the supervision of Heden, the former director, have worked since the early 1950's on systems for the continuous

*Possibly this should read "Biological Warfare (Protection) Department, FOA-165."

cultivation of microorganisms. Scientists there conduct basic research primarily, and pathogenic microorganisms are handled routinely (?).[9] Although the institute is still excellent, many of its facilities have become antiquated by current standards and its past glories are more notable than its present achievements. This may be attributed, at least in part, to Dr. Heden's preoccupation with SIPRI rather than with efforts to guide basic microbiological research at the institute. Unless Heden returns to full time work at the institute or he is replaced by someone able to provide direction, it is doubtful if Karolinska will regain its preeminence.

(2) (U) Project for Applied Microbiology. The Project for Applied Microbiology occupies a new temporary building at the Karolinska Institute. There, an Institute of Applied Microbiology was expected to be operable in 1971. Project members are to examine opportunities for research in nonmedical bioengineering, for contract work for industry, and for applied microbiology relevant to international needs, especially to those of the developing countries. This new venture is supported by the Swedish government's Council for Applied Research.[11]

(3) (U) Bioengineering unit.

(a) (U) In 1960, a bioengineering group had been created in the Karolinska's bacteriological department for Heden.[11/19] He will continue to direct the efforts of that unit although he takes less interest in the unit than in his activities in the Stockholm International Peace Research Institute (SIPRI).

(b) (U) With the risks of biological warfare in mind, the Swedish Medical Research Council, which deals with military as well as civilian matters, established the bacteriological bioengineering unit. In addition to advising the government, Heden was to study and develop techniques for the large-scale handling of pathogenic microorganisms, particularly in connection with the preparation of vaccines. The work was not classified, and was deemed compatible with the unit's status as a university department; Heden had a free hand in selecting research projects.

(c) (U) The group's interests have broadened continuously. Current work on methods for large-scale tissue culture was originally prompted by the probable need for the rapid production of viral vaccines in the event of biological warfare. Other studies involve fundamental research on the physical properties of DNA; findings coming from these investigations may prove relevant to the identification of unknown nucleic acids. As expected, the Karolinska pilot plant has proved useful for purposes other than experiments related to vaccine production. Its scale made possible the preparation of rare metabolites and enzymes in sufficient quantities for fundamental research both in Sweden and abroad; its flexibility permitted wide-ranging experimental work on the culture of microorganisms. Now that the Swedish Defense Research Institute (FOA) has its own group to work on problems concerned with biological warfare, the Institute for Applied Microbiology, using the same Karolinska pilot plant, will eventually take over the remaining defense activities from the bioengineering group.[3]

(4) ~~(C)~~ Pilot fermentation plant.

(a) (U) A special attraction for the Medical Research Council has been the big pilot-scale fermentation plant completed by the Karolinska in 1958 for its own purposes. As a facility for growing in mass both pathogenic and nonpathogenic species, it is unusually large for academic biological work. Indeed, in light of the present trend to continuous culture techniques, some of the older equipment looks cumbersome. Heden had played a leading part in the planning and design for the pilot plant, recognizing that existing industrial techniques were inadequate. The plant features instrumentation for extensive automation and remote control, and can be easily adapted to reduced-pressure operations so that pathogens may be studied safely. Much versatility has been built into this equipment due to the use of steam-sterilized "stericonnectors" invented by Heden. These devices allow vessels to be quickly and safely linked by flexible tubing.

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[redacted]

assigned to SIPRI. It must be assumed that all results will be available to the Swedes since the work is being done in their facilities and Dr. Heden is intimately involved in SIPRI CBW research.

S

(b)(1)

(6) (U) Department of Virus Research. This department, directed by Sven Gard, shares a building with the virus diagnostic laboratory and with the vaccine production facilities of the National Bacteriological Laboratory (paragraph 10.d.). The Department is well equipped and precautions are taken to isolate the work from other parts of the building. There are separate air duct systems for each floor, air pressure in the rooms is higher than in the corridors to diminish chance of contamination, workers change shoes and gowns when entering and leaving work areas through air locks, and waste fluids are chlorinated or heat treated/chlorinated before disposal. Research and teaching are conducted in the Department.[2]

S

(b)(1)

[2] Possibly this should read "Biological Warfare (Protection) Department, FOA-165."

h. (U) Publication of Research Work.

(1) (U) Journals. The results of Swedish research are published largely in foreign journals, in monograph series, such as the Scandinavian Acta publications, or in others emanating from the academies, universities, and research institutes. Swedish publications are satisfactorily covered by the main foreign abstract publications. Abstracts of articles printed in Swedish scientific and technical journals are also distributed through the Reference Service of the Swedish Society for Technical Documentation while abstracts of reports to the Technical Research Council are published in TVF, a journal published by the Swedish Academy of Engineering Sciences. Specialized abstract services are also provided by research institutes, industrial libraries, the Swedish Building Center and other agencies. The Swedish scientific library system is built around a core consisting of the university libraries and the Royal Swedish Library. Besides these, specialized libraries are connected with both the institutes of technology and the other specialized colleges at university level. The libraries at the various institutes closely support diverse research programs. Some of these collections are of considerable size.[9]

(2) (U) Documentation. There is no central documentation institute in Sweden, although the need for one has often been pointed out. Certain documentation activities common to the whole country are carried out by the Information Service of the Swedish Academy for Engineering Sciences and by the Swedish Society for Technical Documentation. For some industrial sectors there are information centers connected with central research institutes. Interest in documentation is growing in Sweden, as shown by the establishment of the Swedish National Committee for Documentation in 1964, and by the fact that the government's budget of 1965-66 included a sum of 77,000 S. Kr., which was used at university level to begin training specialists in documentation.[9]

i. (U) International Scientific Relations.

(1) (U) Sweden cooperates internationally with organizations for scientific research on the governmental level: *CERN, IAE,* and *ESRO.* Sweden also participates in the other international research activities, and under its cooperative research program supplies experts to many groups.

(2) (U) Collaboration with international unions is achieved through a number of national committees, namely those for astronomy, biology, physics, geodesy and geophysics, geography, geology, pure and applied chemistry, crystallography, mathematics, theoretical mechanics, scientific radio, and documentation. Through the activities of the Nobel Foundation, Swedish scientists are also brought into close contact with foreign colleagues.

(3) (U) For liaison purposes, the Royal Swedish Academy of Engineering Sciences has maintained two scientific attaches; one in Washington since 1944, and one in Moscow since 1960. A third scientist has been "temporarily" on station in Japan since 1962. These representatives observe and report developments and current trends in the engineering fields and in the related fields of pure science.

(4) (U) Swedish scientists are able to obtain travel grants for short study trips or for longer visits to research establishments, and they actively take part in international conferences. A list of scientific conferences and exhibitions is published three times a year by the Royal Academy of Engineering Sciences.[9]

15. (C-NFD) Biological Agent Development*

a. (C-NFD) Agents.

(b)(1)

b. (C) Stabilization of Agents.

(b)(1)

*Possibly this should read "Biological Warfare (Protection) Department, FOA-165."

interest in the stabilization of viruses causing Venezuelan equine encephalitis (VEE) and Eastern equine encephalitis (EEE), neither disease being indigenous to Sweden. Both have been suggested to be excellent candidate BW agents; VEE virus is an excellent incapacitating agent, while EEE virus causes one of the most fatal of the encephalitides.[3] This interest expressed by a member of the Swedish Defense Medical Council in the stabilization of viruses might suggest an interest in military applications for such biological materiel. If the concern of this official was to provide increased protection against deleterious environmental factors (drying, storage, aerosol dissemination, etc.), the inference is justified.

(2) (U) A different interpretation may be the need to stabilize viral preparations used in the production of vaccines, and to protect the antigenicity throughout the preparation procedure and storage. This interpretation has a more definite defensive connotation.

(b)(1)

16 (C) Process Research

(U) Swedish scientists and engineers are in the forefront in developing bioengineering techniques for both continuous cultivation and batch processes. Sweden's technological base is broad and deep, its instrumentation is among the best, and its fermentation equipment is of high quality. The Swedish research community in this field is highly capable. Dr. Karl Goran Heden and Dr. Bengt Zacharias are recognized authorities in the continuous cultivation of microorganisms. Scientists in Sweden maintain close professional ties with their colleagues in Czechoslovakia, the Soviet Union, the United Kingdom, the United States, Japan, West Germany, and elsewhere.

a. (C) Biphasic Polymer System.

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(b)(1)

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d. (U) Tissue Culture Apparatus. The FL203 tissue culture apparatus was developed to meet an obvious requirement for a more efficient means of growing mammalian diploid cells on a large scale (fig 5). The original apparatus contains a series of titanium plates (disks) having a total surface area of 15.8 square feet. These disks rotate within a small glass vessel of 3 liters capacity which contains the culture medium. A drive mechanism, operating through a magnetically coupled shaft, slowly rotates the disks so that the cells adhering to them are alternately exposed to the culture medium and the air. The FL203 can also be utilized for culturing fungi and other surface growing microorganisms.

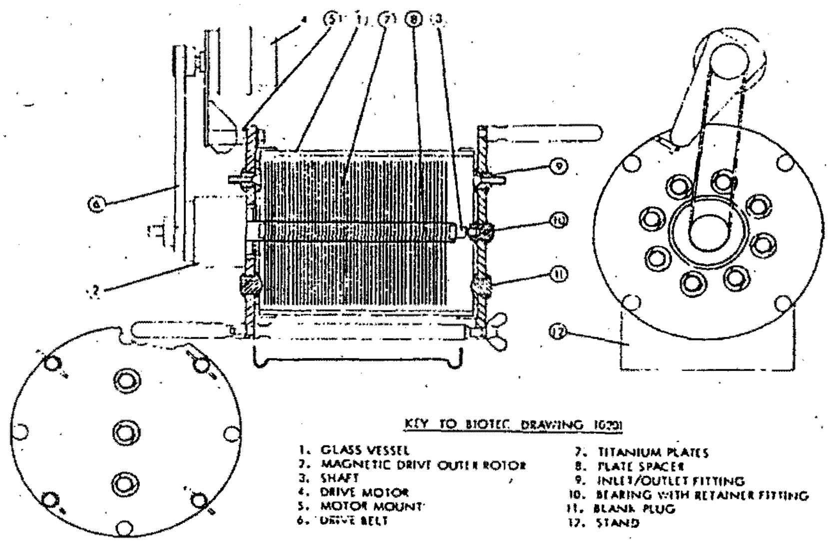

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Figure 5. BioTec titanium disk equipment FL203 (U)

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17 (C-NFD) Agent Dissemination

(b)(1)

b. (C-NFD) Cloud Studies.

(b)(1)

(3) (U) Extensive theoretical studies on cloud travel have also been completed. The hazard of CBR agents expressed as a function of distance and other parameters has been carefully evaluated.

(b)(1)

16. (C-NFD) Agent Detection and Identification

(b)(1)

(b)(1)

d. (U) Also see paragraph 14.f.(5), SIPRI research.

H. NAVAL OPERATIONAL BW CAPABILITY

19. (S-NFD) Organization

(b)(1)

20 NFD) Ships and Equipment

(b)(1)

(b)(1)

(b)(1)

(b)(1)

21. ~~(CNFD)~~ Summary of Naval Capabilities

(b)(1)

I. CONCLUSIONS

23. ~~(C)~~ Offensive Capability

(b)(1)

(b)(1)

24. (C) Defensive Capability

a. (U) The Swedes have one of the strongest CBW defense capabilities among the nations in Western Europe. Their traditional concern with defense has been accentuated by their estimate of the Soviet threat. They seem firmly convinced that CBW would be used against them, and are taking all measures economically feasible to protect themselves against chemical and biological attack.

(b)(1)

J. TRENDS AND FORECASTS

25. (U) Trends

Swedish R&D in recent years has involved modifications and improvements to existing equipment. Examples of this are the improvement and replacement of the protective mask and improvement in controls and instruments on fermentation equipment. Work in BW detection is not novel and is exploiting present technology. No technological breakthroughs have been reported from Sweden although the Swedes are abreast of current work in BW related areas.

26. (C) Forecasts

a. (U) Short Range (5-Year Projection). The Swedish record of excellence in the biological and medical fields will continue and improvement in disease prophylaxis/treatment should result. Techniques and equipment will be developed. Work in BW defense will receive impetus from the BW Disarmament Convention regardless of Sweden's official policy towards it. Sweden will be able to provide technical competence applicable to the onsite inspection and monitoring necessitated by BW disarmament.

(b)(1)

Section II.

FINLAND

A. INTRODUCTION

1. (U) General Background

a. Although the government of Finland recognizes the importance of science and technology and encourages research and development activities, the limited financial resources of the country restrict both the size and the scope of scientific programs. Finnish scientific activities in general lag behind those of Sweden.[1]

b. Finland has a long tradition of fostering scientific research at the universities. Scientific societies and academies are insignificant as research centers but are primarily and most prominently concerned with the dissemination of scientific information. Medical research of high quality is underway, but investigations are limited to a few fields.[1]

c. Finland participates actively in international scientific activities through its membership in specialized agencies of the United Nations and in collaboration with all Scandinavian organizations concerned with research.[11]

d. The government and the scientific community guide research and development indirectly by soliciting the voluntary cooperation of personnel and institutions. Research is carried out at facilities operated by various governmental ministries, in universities and other institutions of higher education, and at cooperative research institutes maintained by industry. The National Science Council serves as a permanent link between government and scientists and is concerned with long term plans to promote research objectives. The National Research Councils are primarily consultant bodies of experts who can focus research efforts toward goals of high priority.[1]

e. Scientific education, manpower, and facilities are adequate to meet the needs of the country. Most of the best facilities are located in Helsinki.[1]

2. (U) Competence in Public Health

The quality of medical and related research is comparatively high in selected fields. The finest research is approximately equal to the best research conducted in either Western Europe or in the United States. Basic and applied research receive equal emphasis and are strongly supported by both the national government and private foundations. Significant work has been done on cardiovascular diseases, lung cancer, anemia, health physics, antibody formation, Vitamin B research, eye surgery, and epidemiological investigations. Tick-borne encephalitis which is endemic in two regions of Finland has been given special attention. Finnish scientists have actively investigated the role of interferon resistance to viral infections. Veterinary researchers, although few in number, are disciplined workers doing research of an internationally recognized standard.[1]

3. (U) Military Medicine

a. There is little information available on the status of Finnish military medicine. It matches the high standards of civilian medical practice, however.

b. The Finnish Army maintains a CBR school at which medical aspects of CBR warfare are taught.[1]

B. ORDER OF BATTLE

4. (C-NFD) Organization u

(b)(1)

b. (C-NFD) Military.

(b)(1)

(b)(1)

(CONFIDENTIAL)

Figure 6. Finnish BW research organization (U).

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Figure 7. Finnish BW defense organization (U).

CONFIDENTIAL

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c. (U) Civil Defense. The Civil Defense Act of 1959 upgraded the civil defense requirements in Finland. The Civil Defense Section within the Ministry of Interior is responsible for implementing all routine and wartime civil defense actions. The exact structure of this organization is not known, but reports indicate that because of this organization the civil defense posture during peacetime is considered poor. FDF support is presently required for rescue, search, and other incidents. What changes and improvements there would be in time of hostilities is not known.

5. Training

(b)(1)

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d. (U). CBR subjects are taught in the reserve officer's and NCO schools. Students enrolled in this curriculum receive approximately 10 hours of CBR defense training. During these hours the students are taught the duties of a platoon leader and company commander operating in a CBR environment. They are also taught the CBR defense organization of an Infantry Brigade. Upon graduation from school 10 officers are selected to attend a 5-week special training course at the ABC Defense School to qualify them as CBR defense officers; CBR defensive responsibilities are probably additional duties.

(b)(1)

C. BW MATERIEL

6. (S-NFD) Offensive Materiel

(b)(1)

7. (U) (S) Defensive Materiel

a. (S) Military.

(b)(1)

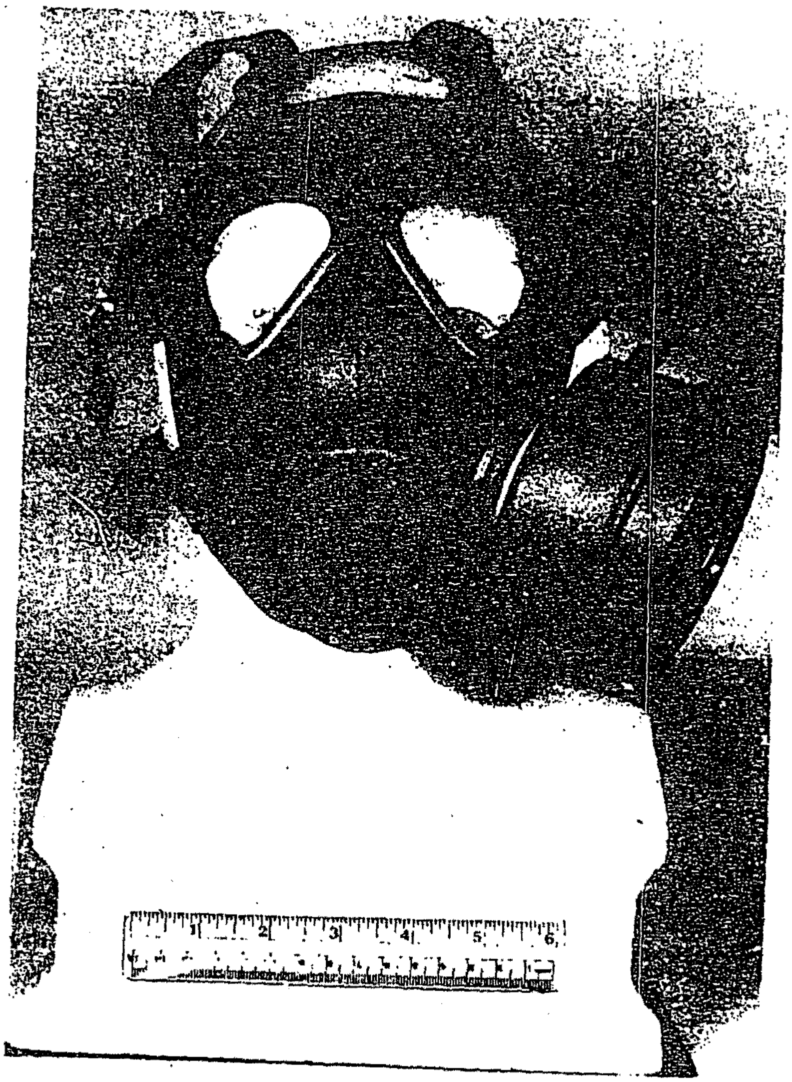

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Figure 8. Finnish protective mask Model 61 (U).

(b)(1)

(6) (U) Decontamination. A prototype field decontamination tent was demonstrated in 1970. The facility provides for twenty showers plus changing areas. The heated water supply is provided by a 20,000-liter per hour pump utilizing any local source for water, including the sea. It is not known if this is now in the inventory of the Defense Forces.

(7) (U) Readiness. An official publication of the Finnish Defense Forces, "Operation Report for 1970," states that the materiel situation in the CBR service is deteriorating mainly because the 30–40 year old rubber material in the protective masks and clothing is losing its elasticity. In many cases defective masks have not been replaced.

b. ~~(S)~~ Civilian

(1) (U) Protective masks. Protective masks are not known to have been issued to the civilian population.

(b)(1)

D. DOCTRINE, POLICY, AND PROCEDURES

8. (~~C-NFD~~) Doctrine

(b)(1)

9. ~~(C)~~ Policy

a. (U) Finland ratified the 1925 Geneva Protocol Agreement on 26 June 1929 and is a signatory of the April 1972 BW Disarmament Convention. Finland's official policy has been to not use biological agents at any time.[7]

(b)(1)

E. PRODUCTION FACILITIES AND CAPABILITIES

10. (C) Agent Production

(b)(1)

11. (C-NFD) Vaccine Productio

a. (U) The State Serum Institute produces approximately 90% of all vaccines produced in Finland (a 1972 figure). Contrary to previous reports, the Orion Pharmaceutical Company does not produce but only sells those they have purchased from the institute. There are only two live virus vaccines produced at the institute: mumps vaccine, which is produced solely for the Finnish Defense Forces, and smallpox vaccine, which is produced for all of Finland as well as the World Health Organization. All other vaccines are prepared using killed microorganisms to include vaccines for influenza, diptheria, tetanus, salmonella, and typhoid. Polio, cholera, and yellow fever vaccines are imported.

(b)(1)

F. STOCKPILES AND STORAGE FACILITIES

12. (C) BW Stockpiles

(b)(1)

13. (C) Medical Supplies

(b)(1)

G. RESEARCH, DEVELOPMENT, AND TESTING

14. (S-NFD). Organization, Institutes, and Facilities

a. (U) Organization and Coordination.

(1) (U) Research activities are carried out within industry itself, in research institutes maintained by industry, at governmental research institutes, in the various universities, and at the Finland Institute of Technology. Industrial enterprises owned by the government and other private concerns oversee a small amount of scientific and technical research.[3]

(2) (U) In 1964, the total expenditure for research and related activities in all fields of learning amounted to 104 million Finnish Marks (Fmk) ($2.6 million), or 0.9% of the gross national product of Finland. Of this sum, the government contributed 71 million Fmk, an amount which constituted 1.76% of the State budget for that year.[3] Figures for more recent years are not available.

(3) (U) The central authorities who formulate national research policy in Finland are the President of the Republic, and constituent members of the Parliament; the ministries, the National Science Council, the six research councils, and the Academy of Finland, together with representatives from the private sector and from learned societies.

(4) (U) The National Science Council forms a permanent link between the government and the scientists. The Prime Minister is chairman of the council and the members consist of the Ministers of Finance, Education, Agriculture, and Commerce and Industry, and additionally the chairmen of the six research councils.

(5) (U) The six research councils listed below are all under the jurisdiction of the Ministry of Education: The Finnish Scientific Research Council, The Finnish Medical Research Council, The Finnish Research Council for Forestry and Agriculture, The Finnish Technical Research Council, The Finnish Research Council for the Humanities, and The Finnish Social Science Research Council.

(6) (U) Each council has a part-time secretary and about ten well-known scientists, all of whom are active in their field. The common aims of the six councils are to promote research and to encourage the publication of its results. Investigations and advisory functions on behalf of the authorities are among other duties of the councils. The councils also make grants for the purchase of equipment, for the employment of personnel to assist in research projects, and for travel and personal expenses incurred by scientists while supervising research projects. Recruitment and postgraduate training of scientists are promoted through the employment of young scientists as scientific assistants and by the placement of scientists in positions of responsibility.[3]

(7) (U) The Delegation of the National Research Councils coordinates council activities, and the presidents and vice presidents of each council are ad hoc members of this body.

(8) (U) It is clear that the research councils have a great responsibility, and financial means also are available to implement their decisions. In distributing allocations, each council is in a key position to influence the lines of research toward goals having the highest priority. At present, however, a shortage of staff hampers the planning of research policy in general, the coordination of research activities, and the direct support of major investigations.

(9) (U) Six universities and other institutions of higher learning report to the Ministry of Education; activities at the Institute of Veterinary Science are overseen by the Ministry of Agriculture; while Schools of Business Administration and the Institute of Technology are under the control of the Ministry of Commerce and Industry.

b. (S-NFD) Scientific Commission for National Defense. (U)

(b)(1)

(b)(1)

d. (U) Publication of Research Work.

(1) (U) Research results are disseminated through traditional channels by means of technical periodicals, journals, scientific series, reports, papers presented at scientific meetings, etc. Special documentation and information services are available.

(2) (U) The Department for Technical Information of the State Institute for Technical Research serves industry as well as the staff of the Research Institute. This department also administers the Scandoc Office of The Finnish Academy of Technical Sciences, functioning as the Finnish liaison office for the Scandinavian Documentation Center in Washington. The Finnish Association for Documentation also is active and provides a central forum for discussions of problems in the field of documentation.

(3) (U) At present a national investigation of documentation and information activities is being conducted by a committee appointed by the government.

e. (U) International Scientific Relations.

(1) (U) Finnish participation in international affairs is assured by its membership in the United Nations specialized agencies, UNESCO, FAO, and IAEA. Further, Finland is a member of the International Council of Scientific Unions as well as of most of the other separate unions that are affiliate members of ICSU. Hitherto, Finland has remained unaffiliated with those intergovernmental international organizations which aim at economic integration. Their activities have included the OECD/ENEA Halden Project in Norway.[3]

(2) (U) In Scandinavian scientific matters, Finland is an active collaborator by virtue of its membership in the Nordic Council, The Nordic Cultural Commission, Nordforsk, The Nordic Institute for Theoretical and Nuclear Physics (NORDITA) and the Scandinavian Building Research Congress, for example.[3]

15. (U) Biological Agent Development

a. (U) Evidence indicates that the Finns investigate organisms that are a problem in Finland including tick-borne encephalitis (TBE) viruses, *Fusarium*,[4] barley yellow dwarf virus,[5] potato viruses, bovire tick fever agent,[6] rabies virus, influenza virus, West Nile virus, and anthrax bacilli, although the last disease is not much of a problem in Finland.

b. (U) Most of the plant disease research is aimed at developing resistant strains of crops or improving chemical means of plant disease control.[4] Plant disease vectors are of interest.[5] The Agricultural Research Center at Tikkurila is a federally supported agency concerned with applied problems of plant pathology, entomology, plant protection, and soils. Its facilities and equipment are excellent and compare with those available at US institutions of similar size. The plant pathology and entomology departments at the University of Helsinki, which deal with the problems of winter injury in plants caused by a number of fungi that grow under the snow, work closely with the center. Among insects, leafhoppers cause the most damage in Finland. No indications of anticrop research have appeared.

(b)(1)

17. (U) Vaccines, Sera, and Chemotherapeutics

The Department of Virology of the State Serum Institute, under the direction of (b)(6) (b)(6) produces high quality interferon at the rate of 30,000 units/ml in a 10-hour period. Some of this interferon has been used for cancer research but side effects at certain dosage levels and the limiting factor of biogenicity have hindered research.

H. CONCLUSIONS

18. (C) Offensive Capability

(b)(1)

19. (C) Defensive Capability

(b)(1)

I. TRENDS AND FORECASTS

20. (C) Trends

(b)(1)

21. (C) Forecasts

(b)(1)

Section III.

JAPAN

A. INTRODUCTION

1. (U) History

a. General.

(1) Modern Japan had its beginning in 1868 when the Emperor Mutsuhito (Meiji) recovered power from the feudal lords who had ruled for 250 years. The feudal clan system was abolished and the territories of the feudal lords were divided into prefectures, as they remain today. Industrialization of Japan was initiated by the Emperor who sent missions to Europe and the United States to study the factories and transport systems of the Western World. Japan had become highly industrialized by the early 1920's due to direct financial support from the government, an abundant labor force, and a fervent nationalism that replaced the old clan loyalties.[1-3]

(2) Before World War II, Japan exercised sovereignty over Korea, all the Kuril Islands, the Bonins, the Ryukus, Taiwan, and southern Sakhalin. Manchuria was a military satellite, and the Caroline and Marshall Islands were under Japanese mandate. The government was not content with this, and in the 1930's set out to create an East Asian military and economic sphere which was intended to stabilize the entire region and ensure Japan's security and prosperity. The United States was opposed to Japanese hegemony in China and Southeast Asia, and Japan's leaders came to see the US as the main obstacle to their success. They attempted to eliminate this obstacle by delivering a smashing blow to the US fleet at Pearl Harbor and by sweeping over Southeast Asia and into the islands of the southwest and central Pacific. The result was Japanese and US entry into World War II.[4]

b. Biological Warfare.

(1) A number of documents provide a unique account of the Japanese BW program in existence prior to and during World War II. These are transcripts of some of the interrogations of key figures who were in this program, and summary reports prepared by US scientists who subsequently interviewed them on technical matters. The initial interrogations were conducted shortly after the surrender of Japan in 1945. It was learned

later that the information supplied was minimal because those interrogated feared prosecution for "war crimes." In the ensuing months several anonymous letters that described a much more comprehensive program than previously revealed were received at Allied Headquarters. Experiments with humans formed a part of this effort. Early in 1947, a representative was sent from Camp Detrick (the US Biological Warfare Laboratory) to Tokyo to evaluate this later information and to conduct further interviews with a number of the medical men who had been connected with the Japanese BW organization (Bocki Kyusui Bu). Those who had participated in studies evaluating the effectiveness of various BW agents against humans had taken a vow never to reveal these experiments. When they were convinced that the information was wanted for its technical value and not for "war crimes" prosecution, they provided a comprehensive account of the program. This was done largely from memory because many of the documents and records relating to this work had been destroyed in the closing days of the war. It was known also by this time that at least two of their co-workers who were captured in Manchuria had told the Soviets all they knew about the program, including details concerning the human experiments. Although all of the documents that were generated as a result of the investigation of Japan's BW program are not available, it is thought that a fairly complete account still survives. The information of greatest interest is summarized below.[5-7]

(a) A large Japanese BW installation was built in Harbin Province within Manchuria in the mid-to-late 1930's. The main facility was at Heibo (called Pingfan by the Chinese). Subsidiary installations were also located there, including a proving ground at Anta. The main facility was known as the Department of Prevention of Diseases and Water Supply of the Kwantung Army or Manchu 731. Lt. General Shiro Ishii was actively involved in the planning and organization of the installation, and was its first commander. Available at Heibo and/or at its branches were equipment for growing large quantities of organisms, facilities for vaccine production, at least one aerosol chamber, equipment for drying organisms, and special flea-breeding facilities. A completely separate installation, also located in Manchuria at Singking (Changchun), was used for veterinary research having BW applications. This installation was known as Manchu 100 or the Kwantung Army Stables. Those interrogated claimed that no BW-related work was done in Japan, and that it was all in Manchuria.

(b) The infectious diseases that were studied most extensively at Heibo were anthrax, plague, typhoid and paratyphoid fever, bacillary dysentery, cholera, glanders, tetanus, and epidemic hemorrhagic fever. The infectious and lethal doses of these for man were established by several routes of administration, and the efficacy of vaccines prepared by several methods was determined. Other diseases receiving less intensive study included botulism, brucellosis, smallpox, gas gangrene, influenza, tuberculosis, and tularemia. A large collection of slides was available which represented pathological sections from several hundred human cases of disease caused by various BW agents. These slides had been buried rather than destroyed.

(c) The human subjects used in laboratory and field experiments were said to have been Manchurian coolies who had been condemned to death for various crimes. They were used in the same manner as other experimental animals in field trials when bacteria were disseminated by spray and bombs, in immunization experiments, and in studies to establish minimum infectious and lethal doses of various organisms.

(d) Twelve offensive operations were conducted against Chinese soldiers and civilians using plague, cholera, and typhoid organisms. Nine of the twelve operations were known to have caused definite localized epidemics. Plague infected fleas were scattered from low flying aircraft or by hand, and cholera and typhoid organisms were hand-sprayed onto the ground or into water supplies. One of the favorite tactics was to attack the Chinese at two points about a mile apart along a railroad. When the Chinese were driven back, the Japanese would tear up the track, spread the BW agent, and then stage a "strategic retreat." The Chinese would reoccupy the position, but within a few days an epidemic would be spreading through the area.

(e) The Japanese considered anthrax spores and plague-infected fleas to be the most effective BW agents. This was probably because of the difficulty encountered in maintaining the viability and virulence of other candidate pathogens. Methods had been developed for breeding fleas in kilogram quantities (3000 fleas weigh approximately one gram) and for infecting them by allowing them to feed on plague-infected rats. These fleas would survive for about 30 days and were infectious for that time. One flea bite would usually cause infection. The Japanese found that anthrax spores remained infectious for as long as ten years. This time period probably reflects the duration of the experiment.

(f) Crop destruction was conducted to study factors relating to the infectious process. Large-scale production of crop disease agents was attempted, and defensive countermeasures were ascertained. Targets for attack with agents causing plant diseases were Siberia and the US Pacific Northwest, Stinking smut of wheat and nematosis of wheat and rye were selected for the most intensive development even though plant varieties differ in their resistance to the diseases. Due to the wide-spread infection with these in Manchuria, it was felt that a ready supply of agent could be obtained as a by-product of milling operations.

(g) Dissemination of agents in aerosols was done experimentally in an octagonal chamber with a capacity of 28 cubic meters. A hand-operated atomizer was used to produce the aerosol. Only rough estimates of the number of organisms released were made. In field trials, organisms were sprayed at low altitude from airplanes or disseminated by stationary bombs that were exploded a few feet above the ground. Wearing helmets and body armor, human subjects were partially protected from the blast. A great deal of work went into developing bombs as delivery systems. Glazed porcelain bombs were considered preferable to metal ones because the former shattered into small pieces that were difficult to detect on the ground.

(2) The Heibo installation was burned by the Japanese ahead of the Russian advance into Manchuria in August 1945. Among many prisoners were twelve Japanese who were indicted and tried as war criminals at Khabarovsk in 1949 on the charge of "preparing and employing bacteriological weapons." The findings of the trial, as reported in a Soviet periodical,[8] agreed in general with the information acquired by the US investigators as far as the technical scope of the program was concerned. The Russian report claims that the Japanese testified to having used Soviet and Chinese citizens in the human experiments and that over 3000 died as a result. The US investigators were told that only Manchurian criminals were used in such experiments and that less than 1000 deaths resulted. Although the US authorities never granted documentary immunity from prosecution to those Japanese who were interviewed, none was brought to trial.

2. (U) Geographic and Political Factors

a. Geographic Factors. Present day Japan consists of four large islands, Hokkaido, Honshu, Shikoku, and Kyushu, and many small islands. Hokkaido, the northernmost, lies just south of the large Russian island of Sakhalin and is about 800 miles east of Vladivostok. Southern Japan is about 100 miles east of Korea. The islands are mountainous and only one-sixth of the land is cultivable. Japan is self-sufficient in rice production but has to import more than 70% of its other food. The population had reached over one hundred million by 1968, with more than 25% of the people living in the large industrial conurbations of Tokyo-Yokohama, Nagoya, Osaka-Kobe, and northern Kyushu.[2]

b. Political Factors.

(1) Domestic.

(a) The Allied Powers occupied Japan in 1945, and the Supreme Commander for the Allied Powers (SCAP) was the highest authority in the country for more than 6 years. A new constitution was written in 1946 that established the country as a constitutional monarchy with the Emperor, who renounced his imperial sovereignty and divinity, as head of the state but without governing power. The constitution grants executive power to the Cabinet which consists of the Prime Minister and 11-16 Ministers of State. Legislative power was vested in the Diet, composed of the House of Representatives and the House of Councillors: delegates to each of which are elected. The Supreme Court and a series of lower courts comprise the Judiciary.[2/3]

(b) The Liberal Democratic party has maintained a working majority in both Houses for the past several years. This party is conservative and is supported by big business and rural populations. There are two Socialist parties, a right-wing and a left-wing, which have the support of the intelligentsia and many of the younger urban voters. The Communist party receives large support from the labor unions and from some students but it is split into pro-Russian and pro-Chinese factions. The "Clean Government" party is the political arm of the Nichiren Buddhist sect and is strongly nationalistic in character. Formed in 1964, it has benefited from popular disenchantment within the ranks of both the long-tenured conservatives and the radical left.[1/3]

(c) The Korean War marked the beginning of economic prosperity for Japan. The return to independence in 1952 found the economy rising and the people united in their goal of increased productivity. The gross national product (GNP) increased at an average annual rate of roughly 10% between 1958 and 1967, and in 1969 became the third largest in the world, ranking only behind the US and USSR. This phenomenal economic growth was accompanied by massive social changes. There was a great shift of population to urban areas, incomes rose providing a market for the wide range of consumer goods being produced, and the younger people in particular no longer accepted many of the traditional ideas of older generations. These factors have helped to create a society no longer united in its aims regarding national and international affairs.[3/4]

(2) International.

(a) At the end of the war, the US had occupied the Ryukyus and the Bonins and had taken over the mandated islands; the Soviets had occupied Manchuria, southern Sakhalin and the Kurils; and Taiwan was returned to China. North Korea was occupied by Soviet forces, and the US moved troops into South Korea. The subsequent outbreak of hostilities in Korea made it urgent that the Allies negotiate a peace treaty with Japan. Representatives of the Soviet Union attended the San Francisco Conference in 1951 when the treaty was signed, but the USSR was not a signatory.[1/4]

(b) At the time the peace treaty was signed, Japan and the US also signed a Security Treaty to the effect that US forces would remain in Japan and provide for external security until that country could assume responsibility for its own defense. As a result, Japan has enjoyed a relatively high degree of security at extremely low cost. The US was reluctant to return control of the Ryukyu Islands to Japan because of US defense commitments in the area, however, these islands were returned to Japan on 15 May 1972. Since Japan assumed administrative control, US military bases in the Ryukyus have the same status as those on mainland Japan.

(c) Japan resumed relations with other Asian nations in the mid-1950's through treaties covering reparations. Diplomatic relations with the Soviet Union were restored in 1956, and Japan was subsequently admitted to membership in the United Nations. For a number of years, Japan and Communist China have had unofficial trade agreements, but diplomatic relations have not been established.[1]

(d) Japan has not been considered an important political power in Asian politics because of her dependence on the United States. Japan, economically, is now the third strongest nation in the world. If progress continues at the present rate, within 10 to 15 years her economic strength will equal that of the Soviet Union. With less than 1% of the gross national product diverted into military programs, Japan is a minor military power. Although capable of defending herself for only a few weeks, Japan has tremendous potential to develop militarily. Within a short time (perhaps 1 year) she could become a formidable military power. Because of long standing Chinese-Japanese cultural influences, Japan feels no threat from China. Concern will increase as China's nuclear capability develops, and may hasten rearmament.[29] Added to Japan's concern for China, the withdrawal of US military protection may force her to take a military course.

3. ~~(C)~~ (U) Public Health and Microbiology

a. (U) Public health standards in Japan are not consistently high. Some aspects of the public's health are well guarded by high standards while others are almost completely neglected. Japan still has a greater incidence of infectious diseases than do most advanced nations today. In the aftermath of World War II, infectious diseases were an acute problem; much effort went into vaccine and antibiotic production to combat this problem. As a result, a sound and modern technological base was established for the prophylaxis and chemotherapeusis against infectious diseases. However, sewage facilities remain antiquated and less than 10% of the homes have flush toilets. In addition, Japan has acute environmental pollution problems created by the burgeoning industrial growth. Some anti-pollution measures have been instituted and more are planned, but much remains to be done in this area.

b. (U) The Ministry of Health and Welfare is responsible for public health research and has several research institutes under its jurisdiction that have primary responsibility for this work.[2] In addition to research, these institutes set quality and safety standards for items such as vaccines, antitoxins, diagnostic reagents, drugs, cosmetics, foods, and food additives. Ministry personnel also perform assays of these products to ensure that the standards are being met. The pharmaceutical industry in Japan has grown to be the second largest in the world, with antibiotics accounting for 13% of the total production. The Japan Antibiotics Research Association, acting in an advisory capacity to the National Board of Pharmacy, establishes minimum requirements for antibiotics and provides technical guidance to production companies. The Minister of Agriculture and Forestry is authorized by law to establish standards pertaining to the amount of active ingredients and to the maximum allowable amount of harmful ingredients for each kind of agricultural chemical produced. Manufacturers and importers must register their products before they can be sold. The law makes provisions for enforcement.

(b)(1)

d. (U) Microbiology is a flourishing science in Japan, and Japanese microbiologists have earned a world-wide reputation for the sophisticated quality of their research. They are leaders in the field of antibiotic research and have pioneered both in discovering new chemotherapeutic agents and in determining their spectra of activity and modes of action. They were among the first to initiate research on drug-resistance in bacteria, notably by defining the genetic determinants responsible for transmitting the resistance factor(s) to previously nonresistant bacteria. A prominent US microbiologist has stated that, in his opinion, significant progress on the prophylaxis, treatment, and diagnosis of bacterial diseases is certain to come from Japan in the next few years. Japanese researchers are active in numerous international scientific societies and host several congresses and symposia every year. The Japan-United States Cooperative Medical Science Program, initiated in 1961, has established advisory panels to coordinate research programs in microbiology and to arrange working visits between scientists of the two countries.

B. ORDER OF BATTLE

4. (NFD) Organization

(b)(1)

(CONFIDENTIAL)

Figure 9. Organization of the Japan Defense Agency (U).

(b)(1)

5. (C-NFD) Training

(b)(1)

(b)(1)

(b)(1)

C. BW MATERIEL

6. (C) Offensive Materiel

(b)(1)

7. (C-NFD) Defensive Materiel

(b)(1)

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Figure 10. Japanese military protective mask, Type M2 (U).

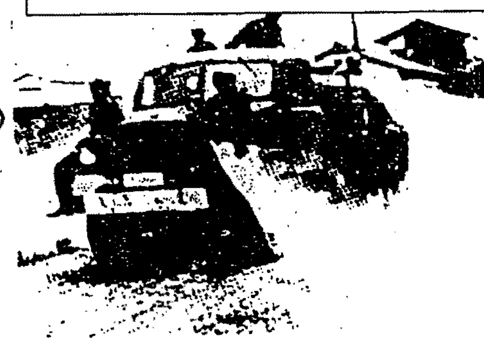

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Figure 11. Japanese truck-mounted decontamination apparatus (U).

*All tables are presented at the end of this section, beginning page 85.

D. DOCTRINE AND POLICY

8. (C-NFD) Doctrine

(b)(1)

9. (C-NFD) Policy

(b)(1)

E. PRODUCTION FACILITIES AND CAPABILITIES

10. (C) Offensive Items

(b)(1)

11. (C-NFD-CD) Defensive Items

(b)(1)

b. (U) Medical Defense. The Japanese pharmaceutical industry is well developed and is capable of producing BW defense-related antibiotics, sera, and vaccines in sufficient quantities for export and domestic needs and in sufficient quantities to permit stockpiling. Table III-6 lists producers of BW defense-related pharmaceuticals.

F. STOCKPILES AND STORAGE FACILITIES

12. (U) Stockpiles of Offensive Materiel

Japan has no known stockpiles of BW agents.

13. (U) Stockpiles of Defensive Materiel

(b)(1)

(b)(1)

G. RESEARCH, DEVELOPMENT, AND TESTING

14. (C-NFD) Introduction

(b)(1)

b. (U) Since the early 1950's there has been an enormous expansion of microbiological research facilities and programs in Japan. Some of these are directly supported by various ministries, some by universities, and some are affiliated with industry. Practically all, either directly or indirectly, receive some funding from the government. At those institutes that support research concerning the causative agents of infectious diseases the basic studies that are done are as applicable to a public health program as to a BW effort. Either purpose would require studies of virulence, nutrition, genetics, methods of rapid detection and identification, and therapy. Japanese law precludes the use of military funds to conduct research at state universities, thus the bulk of funds has gone to industrial groups which have large basic science laboratories. Industry has begun to establish cross funding and information exchanges between basic and applied research groups, which should provide a renewed impetus to Japanese technology and the manufacture of new products.

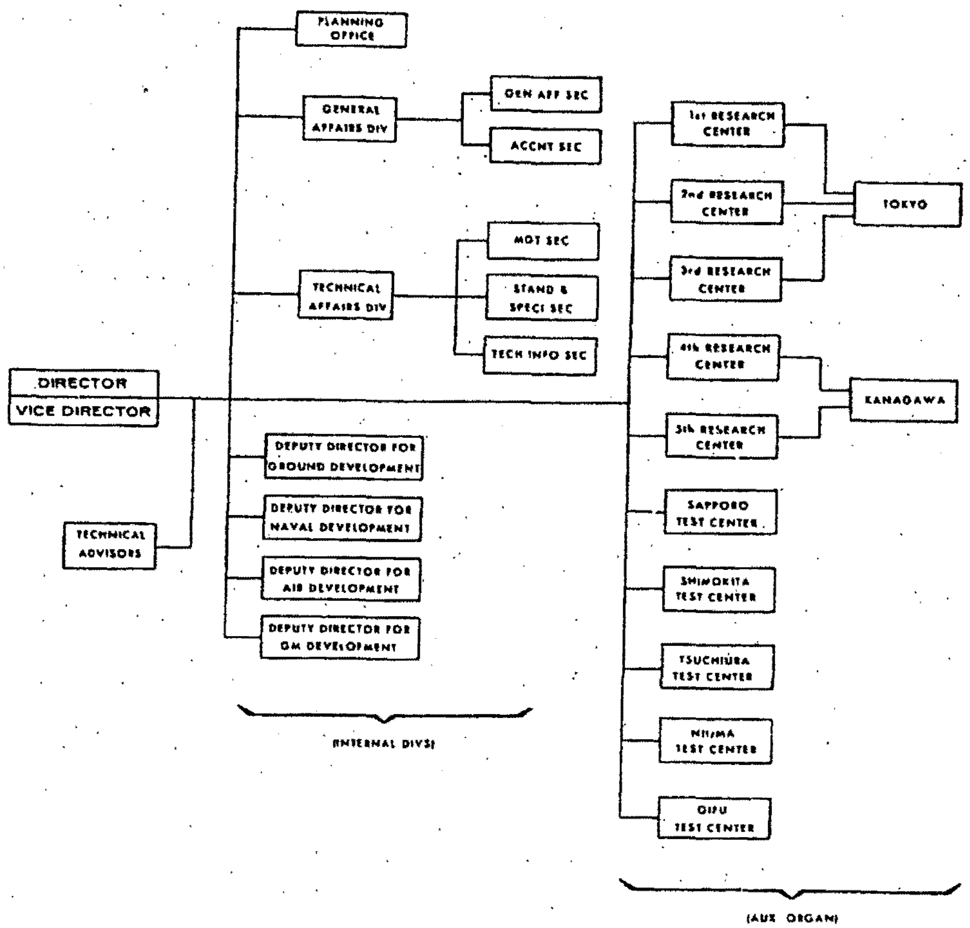
c. (U) Several research facilities characterized below could support programs having a BW application. Sufficient information was available about these particular institutes to assess their capability to undertake a BW program. A small section is included which deals with agricultural research as it might apply to anticrop or antianimal BW programs. Brief mention will also be made of the Japanese technological base necessary for large scale agent production and testing. Table III-5 is a more extensive list of medical research facilities in Japan.

15. (U) Microbiological Research

a. Technical Research and Development Institute (TRDI). A subordinate organization of the Japan Defense Agency (JDA), this institute had its beginning in 1952 as an affiliated organization of the National Safety Agency (NSA). The NSA was reorganized into the JDA and the institute gradually expanded in size. The organizational structure as of 1966 is shown in figure 12. Personnel at the institute in Tokyo, and at its five research centers and five test centers, are responsible for the research, design, development, and testing of equipment to be used by Japan Self-Defense Forces. Other scientific study and research required for the accomplishment of their mission is also their responsibility. Each section maintains coordination in its special field with civilian research groups. The biological and medical research programs of the institute are done by the Second Research Center which is composed of two divisions. One conducts research on food, clothing, and other personal equipment, and the other performs research on medical equipment and supplies, hygiene, and human aptitude.[15] Included in the program is production of antitoxins for the serum therapy of tetanus and gas gangrene. Research is being done on immunization with staphylococcus toxoid as a means of preventing infection of wounds with this organism.[16] There are no facilities at the Second Research Institute that could safely handle highly infectious materials. The institute is housed in the same facilities as the TRDI Headquarters, and there are no special security measures in force. No information was found concerning other studies having possible BW applications, the number of personnel engaged or assessments of the adequacy of facilities and equipment for such work.

b. National Institute of Health (NIH). The National Institute of Health began operation in May 1947. It is under the jurisdiction of the Ministry of Health and Welfare and was created to help meet the urgent health problems that were an aftermath of World War II. One-half of the space, facilities, and personnel of the Institute of Infectious Diseases

ORGANIZATION



AUTHORIZED PERSONNEL STRENGTH
1,256

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Figure 12. Organization of the Technical Research and Development Institute (TRDI) of the Japan Defense Agency (U).

of the University of Tokyo was transferred to the Ministry to form the NIH. The institute has expanded rapidly, especially in terms of budget and personnel, with additional laboratory space becoming available more slowly (see table III-7). In the legislation which established the NIH, responsibilities assigned were to conduct and coordinate research projects concerning the cause, prophylaxis and therapy of infectious diseases and other problems affecting the whole field of public health; to establish the official minimum requirements for vaccines, immune sera, and other biological products; and to produce and distribute vaccines and sera which are of importance but infrequently used, e.g., plague vaccine. There are 16 research departments, and in addition, a radiation laboratory, a library, and an administration section. The Nagasaki and the Hiroshima branches are also attached to the institute. These two branches were established to collect data concerning the effects on humans of the atomic bomb blasts. The main institute is in Tokyo while a third branch is at Murayama, about 40 km away. The "Japanese Journal of Medical Science and Biology" is published bimonthly in English by the NIH. The institute is the World Health Organization (WHO) Leptospira Reference Laboratory, the WHO National Shigella Center, the WHO Regional Center for Arthropod-borne Viruses, and the WHO Regional Center for Respiratory Viruses. It is also the National Center of Enteric Phage Typing for the International Association of Microbiological Sciences.[9]

c. The Institute of Medical Science, The University of Tokyo. The oldest and one of the most prestigious biomedical research institutes in Japan, this facility was originally called the Institute for Infectious Diseases. It had its origin in a private research institute founded in 1892 by the late Dr. Shibasaburo Kitasato who was its first director. In 1899, the institute became an affiliate of the Ministry of Home Affairs. In 1914 its administration was transferred to the Ministry of Education, and in 1916 it was incorporated into the University of Tokyo. Basic and applied research in the etiology, therapy, and control of infectious diseases received major emphasis until after World War II when the program was broadened to include studies of allergy, immunology, chemistry, cytology, and cancer. Presently, the institute is composed of 19 departments and four special laboratories and employs 359 personnel. There is a 170-bed hospital, and service sections for photography, culture media, and laboratory animals. The grounds and buildings occupy 68,450 square meters (fig 13).

(1) Bacterial research programs include the isolation and characterization of the toxic protein of *Shigella shiga*, classification of *Vibrio* species, studies of the transmission of the drug-resistance factor of dysentery bacilli, and the mode of action of diptheria toxin. Improvement of the fluorescent antibody technique as a tool for identifying and typing microorganisms is being investigated. The mode of action and kinetics of various antimicrobial substances are also being studied, and research is underway to improve

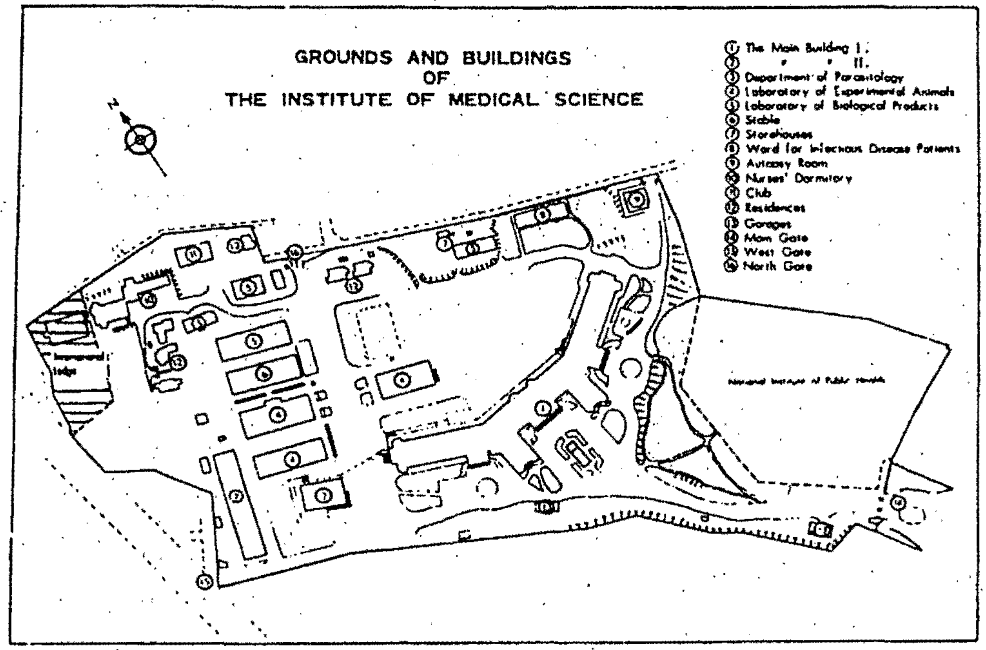

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Figure 13. The Institute of Medical Science, University of Tokyo (U).

vaccines, sera for both diagnostic and therapeutic use, and toxoids. The rickettsial agent that causes scrub typhus (tsutsugamushi disease) was identified by workers at this institute in 1930. Current studies with this organism include its antigenic analysis, mechanisms of its pathogenicity, and its identification by the fluorescent antibody technique. Isolation of the virus of Japanese encephalitis was made at the institute in 1935, and its transmission by mosquitoes was demonstrated. The pathogenesis of this agent and confirmation of its diagnosis by fluorescent antibody are under study at present. Growth of influenza and rubella viruses in newly established tissue cell lines, the investigation of neutralizing antibodies against various viruses, and the genetics of vaccinia virus comprise parts of the viral research program at the institute.[17]

(2) No information is available concerning equipment and laboratory furnishings at the institute. However, based on the sophistication of the research programs and the

world-wide recognition accorded to personnel at the facility, it is assumed that these are modern.

d. Research Institute for Microbial Diseases, Osaka University. This institute belongs to Osaka University and is supported by Japan's Ministry of Education. Established in 1934 at the Nakanoshima Campus of the university, the institute moved to new quarters on the Suita Campus in 1967. The head office, the administrative department, and the clinical department of the institute are located in Osaka. The research and development department, the production department, and the examination department are located at the Kan-onji Research Institute, Kan-onji City, in Kagawa Prefecture. Originally housed in a wooden one-story building, 4-story steel and concrete buildings were constructed in 1962, 1964, 1966, and 1968. In the research section there are 14 departments which support basic studies on microbial diseases and cancer. A hospital is attached where clinical medicine is practiced in association with the research programs.

(1) One of the unique facilities at this location is the Quarters for Experimentally Infected Animals. It is completely air-conditioned and provides many features for the safe handling of pathogenic organisms. Most of the building is sectioned off into small cubicles (2 x 6 m or 4 x 6 m in area). Each cubicle is equipped with one hood in which animal cages are held and another in which the animals are manipulated. Each cubicle also has an individual, pass-through autoclave so that all soiled materials may be sterilized before removal. Exhausted air is filtered. Experimentally infected animals can be handled in these facilities with minimum risk to laboratory personnel. There is little chance that other research animals or the external environment will become contaminated.

(2) The central laboratory is for the general use of all research personnel. There are special rooms where bacteria are grown on a large scale, while other rooms house special equipment, such as that used for high speed centrifugation, spectrophotometry, amino acid analysis, gas chromatography, electron microscopy, and in studies of cryogenics. Several full-time engineers take care of all equipment and regularly examine and adjust precision instruments. The radioisotope laboratory is in a separate building; for safety purposes, it has its own ventilating and waste disposal systems.

(3) Research programs include studies of food poisoning caused by such organizms as *Vibrio parahemolyticus* and by enterotoxin-producing staphylococci, studies of the experimental infection of animals with shigella and vibrio species, analysis of antigenic determinants of various pathogens, studies of the mechanism of action of antibiotics, and investigations of immunity and delayed hypersensitivity in tuberculosis. Live, attenuated viral vaccines against influenza, mumps, and measles have been developed

and are being field tested. Studies are underway on structural components of myxoviruses and arboviruses, and the causative agents of Thai haemorrhagic fever are being investigated in cooperation with other scientists situated at the Virus Research Institute, Bangkok, Thailand.[18]

(4) The Research Institute for Microbial Diseases is colloquially called "Biken," an abbreviation of its Japanese name. "Biken Journal" which is published quarterly in English is an official publication of the institute. A microbiologist who has visited a number of biomedical institutes in Japan has stated that the new facilities of this institute are probably the most modern and best equipped in that country, and that in his opinion the personnel are authorities in basic research.

c. The Kitasato Institute. The Kitasato Institute (fig 14) was founded at its present site in Tokyo in 1914 by Dr. Shibasaburo Kitasato following his resignation as Director of the Institute for Infectious Diseases. An affiliated research center for veterinary science was

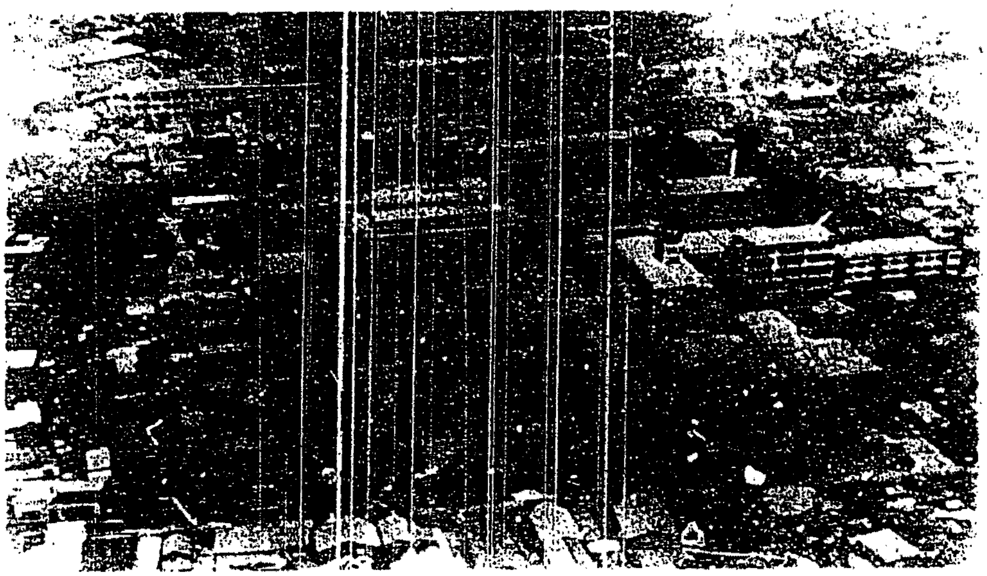

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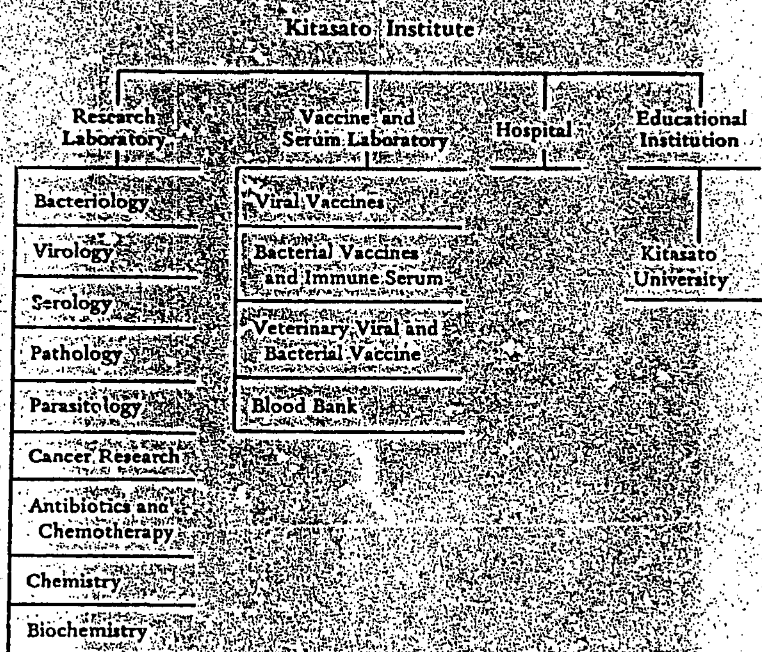
Figure 14. The Kitasato Institute, Tokyo (U).

established at Kiwasha, Chiba Prefecture in 1961. In 1962 a new vaccine and serum laboratory was constructed and the Kitasato University was established. The institute is nonprofit and autonomous in its administration and fiscal control. The major research effort is in the fields of human and veterinary medicine. The organization of the institute is shown below.



Tetanus, tuberculosis, streptococcal infections, dysentery, poliomyelitis, influenza, and Japanese encephalitis are among the infectious diseases under investigation. Vaccines for influenza, Japanese encephalitis, poliomyelitis, smallpox, cholera, typhoid fever, and pertussis are produced and sold for human use. Veterinary vaccines are produced for hog cholera, cattle influenza, fowl poxes, and canine distemper. Diagnostic reagents and culture media are also produced. Researchers at the Kitasato Institute discovered the antibacterial or anticancer drugs, Leucomycin, Carcinophillin, and Mitomycin. These are now produced by commercial firms.[19] Dr. Fujiki Hata, discoverer of the anticancer drugs, is the present director of the Kitasato Institute. Today the institute employs the most modern equipment and technology for the research, development, and production of vaccines and sera. An incubator with a capacity of 60,000 eggs per week is used to supply embryonated eggs for growing viruses. A battery of devices used to study fermentation technologies are shown in figure 15. A production-type fermentor with an agitator drive assembly is shown in figures 16 and 17. Equipment for freeze drying vaccines and sera is also available.

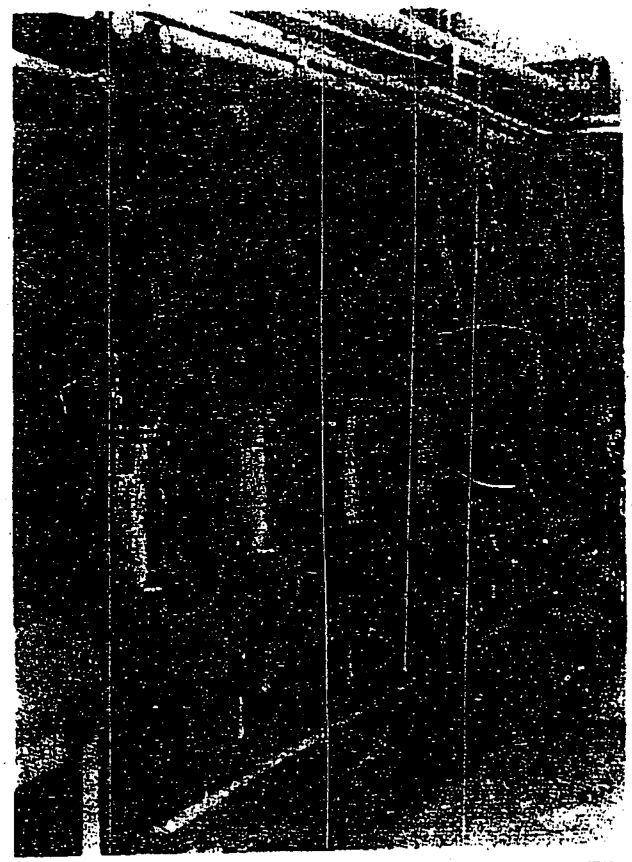


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Figure 15. Battery of fermentation devices (U).

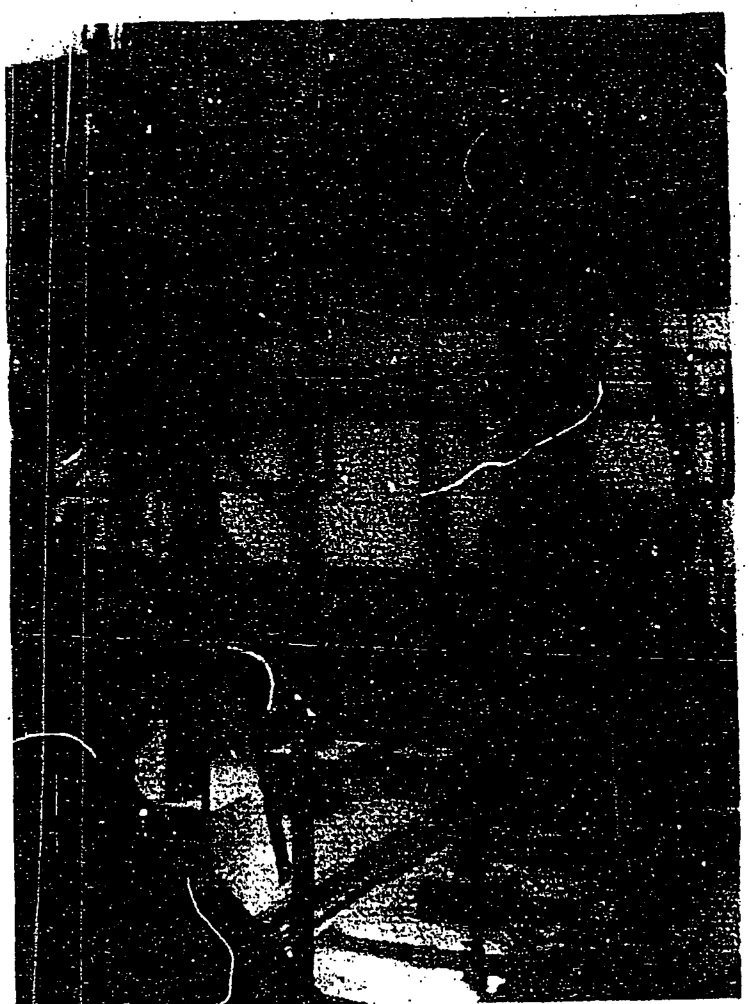

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Figure 16. Fermentor tank, Kitasato Institute (U).

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Figure 17. Impeller drive for mixing cultures (U).

f. Toshiba Chemical Industry Company, Ltd. This company is a subsidiary of the Tokyo Shibaura Electric Company, Ltd., (Toshiba) and produces vaccines and diagnostic reagents. In 1945 Toshiba acquired the facilities and staff of the "vaccine serum plant" of the ex-army Military Medical School at Sekiya, Miigata Prefecture. A few years later the operation was moved to Gosen City. The modern facility that it occupies was completed in 1968 and has the most up-to-date equipment (fig 18). Large volumes of infectious material can be handled with minimum hazard to personnel. The following vaccines and toxoids are produced:

Japanese Encephalitis Vaccine (Mouse brain, formalin inactivated).
Weil's Disease (Leptospirosis) Vaccine (killed bacteria).
Influenza Vaccine (embryonated egg, formalin inactivated).
Cholera Vaccine (Inaba and Ogawa strains, heat killed).
Epidemic Typhus Vaccine (*Rickettsia prowazekii*, formalin inactivated).
Diphtheria – Pertussis – Tetanus Vaccine.
Pertussis Vaccine (killed bacteria).
Tetanus, Toxoid.
Diphtheria Toxoid.
Measles Vaccine (Monkey liver tissue culture, inactivated virus).
Smallpox Vaccine (live vaccinia virus).
Poliomyelitis Vaccine (Monkey kidney tissue culture, formalin inactivated).
Typhoid – Paratyphoid Fever Vaccine (heat killed bacteria).

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Figure 18. Centrifuge room, Toshiba Chemical Industry Company, Ltd., Gosen City, Japan (U).

The company also produces immune sera to be used as diagnostic reagents for a number of bacterial and viral diseases. Bacterial and viral suspensions are also provided for diagnostic tests. Protective clothing (fig 19) is worn by personnel who handle infectious material. The same type of clothing is worn to help maintain sterility in the areas where the products are bottled (fig 20).

g. **Serum Institute of Chiba Prefecture.** This institute is under the jurisdiction of Chiba Prefecture and is located at Ichikawa, Chiba, while a veterinary branch is situated at Sakura, Chiba. The Serum Institute is financed through the sale of its products which are marketed through the Sankyo Co., Ltd. The institute was started in 1946 to manufacture biological products for the prevention and therapy of infectious diseases. The current technical staff includes 3 medical doctors, 20 veterinarians, and 15 chemists. The institute produces vaccines for human use that are effective against the following diseases: smallpox, diptheria, cholera, typhus, influenza, poliomyelitis, rabies, measles, tetanus, and Japanese encephalitis. Over 50,000 white mice are expended each week in the production of the Japanese encephalitis vaccine which is a formalin inactivated product. Antitoxins for diphtheria, tetanus, gas gangrene, and type E botulinum toxins are produced in horses and partially purified to remove extraneous proteins.

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Figure 19. Preparation of Japanese encephalitis vaccine, Toshiba Chemical Industry Co., Ltd. (U).

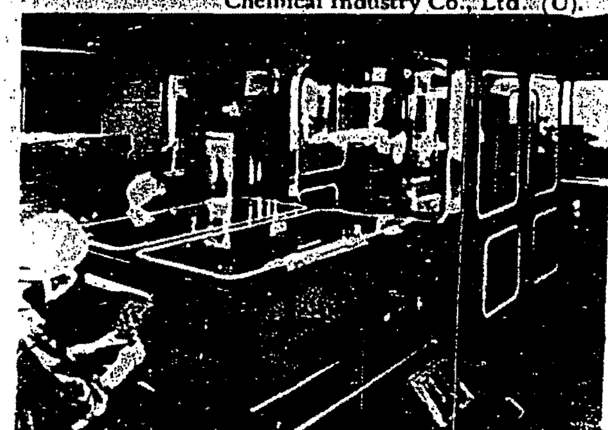

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Figure 20. Equipment for aseptic bottling of biological products, Toshiba Chemical Industry Co., Ltd. (U).

Vaccines are produced for the following animal diseases: Newcastle disease, Japanese encephalitis, swine erysipelas, rabies, swinepest, hen pox, poultry diphtheria, infectious pneumonia of swine, and black leg. Tetanus toxoid is produced for animal immunization and also an antitoxin for swine erysipelas. The institute has a modest research program which includes development of antitoxins for botulinum toxin types A, B, E, and F. Housed in modern buildings, the second of which was completed in April 1971, personnel work with the most modern scientific apparatus including some recently purchased from the United States and West Germany.

h. The Institute of Microbial Chemistry. The Institute of Microbial Chemistry was established in 1962 by the Microbial Chemistry Research Foundation. The foundation had been set up by the Japanese Government as a nonprofit organization financed by the royalties received from the sale of the antibiotic, Kanamycin. Kanamycin was isolated by Dr. Hamao Umezawa, an investigator at the National Institute of Health, who became the first director of the Institute of Microbial Chemistry. About 40 researchers are on the scientific staff. Although many of these are employed by pharmaceutical companies, they conduct research at the institute. Among the accomplishments at the institute are the discovery of several antibacterial and/or antitumor substances and the determination of their structures by X-ray analyses. Research is conducted on the chemical synthesis of these compounds, and studies are underway to elucidate their modes of action. Of particular note are studies of the mechanisms by which bacteria inactivate antibiotics, thus becoming drug-resistant. The buildings that house the institute are less than 10 years old and have the most modern equipment and facilities.

i. Institute of Low Temperature Science, Hokkaido University. This institute is affiliated with Hokkaido University, Sapporo, and was founded in 1941. Basic research is done on snow and ice formation under simulated antarctic conditions, on aspects of meteorology and oceanography, on the effects of low temperature on living organisms, and on freeze-drying of biologically active substances, foods, and microorganisms. The institute has 30 cold rooms, each of which is individually controlled from a centrally located systems control console. The cryogenic equipment was designed for the institute and manufactured in Tokyo. Several scientific papers dealing with factors affecting survival of freeze-dried microorganisms have been published by workers at the institute in both Japanese and English language journals.[20-22] In 1968 the institute was host to an international symposium on "Mechanisms of Cellular Injury by Freezing and Drying in Microorganisms." In 1969 it was reported that no infectious biologic material was handled at the institute.[2]

j. Fermentation Research Institute. This institute is a part of the Agency of Industrial Science and Technology which is an extra-ministerial office of the Japanese Ministry of Trade and Industry. It is located in Chiba City and employs 71 persons. Studies of continuous fermentation methods and the automatic control of these are an integral part of all research conducted by the institute. The research program includes studies of how hydrocarbons are metabolized by microorganisms, the biological treatment of industrial waste water, the production and utilization of enzymes by microorganisms, microbial decomposition of synthetic organic substances, research on sulfur-reducing bacteria, and the preservation of stock cultures of industrially useful microorganisms. At the institute there is a wide variety of fermentation vessels ranging in volume from 5 liters to 200 liters. These are frequently used in "strings" or rows for continuous fermentation processes. There is equipment for the automatic control of fermentations, several freeze-drying apparatuses, and an array of sophisticated instruments for physical-chemical determinations. In 1969 it was reported that no research was being conducted on continuous culture procedures for the production of either vaccines or tissue cells.

k. The Central Institute for Experimental Animals. The institute was established in 1952 to develop and produce uniform and disease-free animals for experimental use. In 1956 it was changed to a nonprofit foundation, and a research program was established. The animal production facility was moved to Kawasaki City in 1962, and in 1965 the Central Laboratory for Experimental Animals Japan Co., Ltd., was established to handle the mass production and sale of experimental animals. The Central Institute is the largest shareholder in the company, and in 1969 sales totaled 620,000,000 yen ($1.7 million). One of their specialties is the production of gnotobiotic (germ-free) mice which requires completely self-contained facilities to isolate the mice from the external atmosphere. Personnel at the two research divisions of the Central Institute conduct studies on genetics, breeding, microbiology, nutrition, animal care technology, pharmacology and toxicology.

16. (U) Agricultural Research

a. The Japanese government, through the Ministry of Agriculture and Forestry, has taken an active role in the development of a high level of agricultural productivity by designing various programs to encourage the spread of scientific farming methods. The actual organization and administration of these programs are done by the Agriculture, Forestry and Fisheries Research Council. There are 33 laboratories and experimental stations under the guidance of the council, and a number of regional and prefectural establishments have a peripheral association. Four of the research facilities under the Ministry of Agriculture and Forestry are characterized briefly below.

(1) The National Institute of Agricultural Science. This institute is located in Tokyo but maintains close contact with the experimental stations of each of the 46 prefectures. Principal emphasis is placed on the improvement of crop plant varieties, the establishment of standards for fertilizer application, the control of insect pests and plant pathogens, and the improvement of farm management.[2,3,4] The resistance of native, exotic, and derivatives of cross bred mutant varieties of rice to domestic and foreign strains of *Piricularia oryzae* (rice blast) was experimentally evaluated. Although this research was conducted to analyse the genetic resistance of rice varieties to various strains of *P. oryzae* the methodology employed duplicates that required for screening and testing anti-crop agents. Since procedures for mass producing spores of this fungus are well established, Japan has ample expertise to develop *P. oryzae* for anti-crop purposes, if she so desires.

(2) Central Agricultural Experiment Station. The station is located near Konosu in Saitama Prefecture. The Environment Division has five laboratories where insect pests and plant diseases are studied. Nematoda affecting crops, and viral diseases of rice and upland crops, are among the major investigative areas. Virus-free plants are grown by tissue culture methods.[2]

(3) The Institute for Plant Virus Research. Located at Chiba, this institute was founded in 1964 and has two research divisions. Personnel at one perform basic studies in physical chemistry, serology, and infection, while scientists at the other study taxonomy, pathology, and therapy as these disciplines apply to plant viruses.[2] Excellent basic research is conducted to improve understanding of the infectivity process and the genetic composition of plant viruses. Japanese scientists have separated the ribonucleic acid (RNA) and proteins of both tobacco mosaic virus (TMV) and cucumber green mottle mosaic virus (CGMMV) by treatment with phenol. They have not only recombined the RNA and protein to re-form the individual viruses, but have successfully combined TMV-RNA with CGMMV-proteins. Although the new virus had a CGMMV-protein coat, the biological characteristics were the same as the RNA material from TMV. Addition of both TMV and CGMMV-proteins inhibited recombination. The ability to separate and recombine viral RNA and protein of biologically different viruses could lead to the development of antiviral viruses for control of selected viral species, or could lead to the development of new plant pathogens with unique biological characteristics. It was found in studies concerning the role of ribosomes (centers of protein synthesis in the cell) that the removal of protein coats after viral entry into plant cells was largely inhibited in mid-process. No explanation is known for this phenomenon but these findings could lead to new methods for controlling viral infectivity. Protoplasts (cells without walls) have been successfully isolated from tobacco leaves after treatment with pectinase. These isolated cells provide an extremely simplified medium in which to study viral synthesis. Viral infection can be easily established and can

be easily monitored. Flourescent antibody staining techniques applied to follow viral development within these cells could permit rapid, specific identification of viral particles. In addition, these techniques may be extended to other plant species, for example rice and wheat.

(4) National Institute of Animal Health. In addition to a central laboratory in Tokyo there are five branch laboratories in various parts of the country. All support basic research on the causative agents of animal diseases in addition to providing diagnostic services and producing some vaccines. In 1957, this institute was designated as a Food and Agriculture Organization/World Health Organization (FAO/WHO) Brucellosis Center. Among the infectious diseases studied by investigators at the research divisions are brucellosis, pasteurellosis, diseases caused by enteric bacteria, hog cholera, and equine virus diseases.[25]

b. The production of agricultural chemical (herbicides, insecticides, and compounds active against the bacteria, viruses, and fungi affecting plants) has become a big business in Japan with gross receipts amounting to $290 million in 1970.[26] Approximately 13% of the national production is exported. These chemicals have been used extensively in Japan, and crop yields have improved spectacularly. Overuse has caused the accumulation of dangerous residual levels in several food crops and other agricultural products.[27] One of the means most extensively used to apply these compounds has been spraying from helicopters for wide coverage. Hand-operated sprayers and truck-mounted tanks are also used by individual farmers. Thus, Japan has the necessary equipment and expertise for defense against biological operations aimed at crop destruction, and the capability to use herbicides against crops for military purposes.

17. (U) Development and Testing

a. In order to conduct large-scale production and testing of BW agents, sophisticated technologies developed for other purposes could be utilized. Some examples are cited below.

b. The Yamatake-Honeywell Co., Ltd., has recently developed two versions of a minicomputer digital control system which can be used in conjunction with continuous fermentation processes.[28] Japan is a world leader in the field of automatic control of fermentation, and this development could facilitate large-scale production of agent materiel.

c. Several Japanese universities and industrial organizations actively support work in the fields of aerosol science and particle technology. Some of the research projects of recent years include methods of particle sampling and particle deposition, characterization of filtration techniques, and studies concerning the effects of moisture on powder dispersion by blasts of air. No biological application of any of this research was reported, but mastery of these technologies would be useful to understand principles of both agent dispersion and agent detection.

d. A variety of air and liquid filters and filtering devices are manufactured by a number of companies in Japan. Most have an efficiency of 99% or greater when filtering particles of 00.5 micron in diameter, which would provide a high degree of protection from BW agents if incorporated into devices used for individual and/or collective protection. One company has produced an "Automatic Dust Counter" which might have application as an automatic BW detection device.

H. CONCLUSIONS

18. ~~(C)~~ Offensive Capability

(b)(1)

19. ~~(C)~~ Defensive Capability

(b)(1)

I. TRENDS AND FORECASTS

20. (C) Trends

(b)(1)

21. (C) Forecast:

(b)(1)

(b)(1)

[illegible]

Table III-1. Japanese Basis of Issue, BW Equipment - Nondivisional Units (U)

(b)(1)

Table III-1. Japanese Basis of Issue, BW Equipment - Nondivisional Units. (U) (Continued)

(CONFIDENTIAL-NFD)

(b)(1)

Table III-2. Japanese Basis of Issue, BW Equipment - 7000 Man Division (U)

(b)(1)

[redacted]

(CONFIDENTIAL-NFD)

Table III-3. Japanese Basis of Issue, BW Equipment - 9000 Man Division and Airborne Division (U)

(b)(1)

[redacted]

(CONFIDENTIAL-NFD)

Table III-4. BW Equipment on Japanese Naval Ships (U)

(b)(1)

(CONFIDENTIAL-NFD)

Table III-5. Medical Laboratories, Japan, 1971 (U)

(b)(1)

[redacted]

Table III-5. Medical Laboratories, Japan, 1971 (U) (Continued)

(b)(1)

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Table III-5. Medical Laboratories, Japan, 1971 (U) [redacted]

(b)(1)

[redacted]

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Table III-5. Medical Laboratories, Japan, 1971 (U) (Continued)

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Table III-5. Medical Laboratories, Japan, 1971 (U) (Continued)

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Table III-5. Medical Laboratories, Japan, 1971 (S) (Continued)

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Table III-5. Medical Laboratories, Japan, 1971 (U) S (Continued)

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Table III-6. Selected Manufacturers of Drugs, Antibiotics, and Biologicals, Japan, 1971 (U)

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Table III-6. Selected Manufacturers of Drugs, Antibiotics, and Biologicals, Japan, 1971 (U) (Continued)

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(b)(1)

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Table III-6. Selected Manufacturers of Drugs, Antibiotics, and Biologicals, Japan, 1971 (U) (Continued)

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Table III-6. Selected Manufacturers of Drugs, Antibiotics, and Biologicals, Japan, 1971 (U) (Continued)

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Table III-7. Growth of Japanese NIH
Over a 20-Year Period (U)

(b)(1)

*330 yen = 1 US dollar

(UNCLASSIFIED)

LIST OF ABBREVIATIONS

AB	Company, enterprise, incorporated, etc. (Sweden)
BW	Biological warfare
C/B	Chemical and biological
CBR	Chemical, biological, and radiological
CERN	Centre Europeen des Recherches Nucleaires
CW	Chemical warfare
ESRO	European Space Research Organization
FAO	Food and Agricultural Organization
FDF	Finnish Defense Forces
Fmk	Finnish Mark; 1 mark = $0.025
FFV	Forenade Fabriksverksen (Defense Factory, Sweden)
FOA	Försvarets Förskningsanstalt, The Swedish Research Institute for National Defense
GSDF	Ground Self-Defense Force (Japan)
IAEA	International Atomic Energy Agency
ICSU	International Council of Scientific Unions
JDA	Japan Defense Agency
R and D	Research and development
S and T	Scientific and technical
S. Kr.	Swedish Kronor (pl), 1 krona = $0.27
UN	United Nations
UNESCO	United Nations Economic, Scientific, and Cultural Organization
WHO	World Health Organization

UNCLASSIFIED
Security Classification

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13. ABSTRACT

The purpose of this study is to review on an individual basis the biological warfare capability of selected nonaligned countries that have advanced technologies. Included in this assessment are Sweden, Finland, and Japan. (U)

Sources of information were information reports, intelligence publications, abstract publications, and the open scientific literature. The study was organized under the following topics: order of battle for BW; BW materiel; doctrine, policy, and procedures; production facilities and capabilities; stockpiles and storage facilities; BW research, development, and testing. Pertinent historical, geographic, and political considerations were included as background for making the current analyses. (U)

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Aerosol						
Agent prophylaxis						
Biological warfare						
Biological warfare agents						
Biological warfare development programs						
Biological warfare doctrine						
Biological warfare materiel						
Biological warfare procedures						
Biological warfare protective clothing						
Biological warfare protective equipment						
Biomedical research institutes						
Decontamination						
Disease therapy						
Order of battle for biological warfare						
Vaccine						