<table>
<thead>
<tr>
<th>UNCLASSIFIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD NUMBER</td>
</tr>
<tr>
<td>AD432806</td>
</tr>
<tr>
<td>NEW LIMITATION CHANGE</td>
</tr>
<tr>
<td>TO</td>
</tr>
<tr>
<td>Approved for public release, distribution unlimited</td>
</tr>
<tr>
<td>FROM</td>
</tr>
<tr>
<td>Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational use; 11 Nov 1963. Other requests shall be referred to Army Medical Research Lab, Fort Knox, KY.</td>
</tr>
<tr>
<td>AUTHORITY</td>
</tr>
<tr>
<td>USARO memo 15 Feb 1968</td>
</tr>
</tbody>
</table>

THIS PAGE IS UNCLASSIFIED
NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U.S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.
ACTIVE IMMUNIZATION OF A HUMAN AGAINST NAJA HAJA VENOM

A Preliminary Report

Capt Herschel H. Flowers, VC
The animals used in this study were handled in accordance with the "Principles of Laboratory Animal Care" established by the National Society for Medical Research.

Qualified requesters may obtain copies of this report from DDC.

Foreign announcement and dissemination of this report by DDC is limited.
REPORT NO. 594

ACTIVE IMMUNIZATION OF A HUMAN AGAINST NAJA NAJA VENOM

A Preliminary Report

Capt Herschel H. Flowers, VC

Pathology Division
US ARMY MEDICAL RESEARCH LABORATORY
Fort Knox, Kentucky

11 November 1963

In-House Laboratory Initiated Research and Development
DA Project No. 3A013001A814
ABSTRACT

ACTIVE IMMUNIZATION OF A HUMAN AGAINST
NAJA NAJA VENOM

A Preliminary Report

OBJECT

To determine whether or not a human subject could be immunized against the bite of the Indian cobra (Naja naja). To study the development and titer of neutralising antibodies produced. To determine any pathological conditions produced by the injections during the course of immunisation.

RESULTS

Tests demonstrated the theoretical neutralization potential of the subject's circulating globulin to be approximately 100 mg Naja naja venom. Examination of the subject during and after the course of the immunization schedule revealed development of no pathological conditions.

CONCLUSIONS

Using venoms with little or no local toxicity, it appears that man may be safely immunised.

APPROVED: Fred D. Maurer
Colonel, VC
Director, Pathology Division

APPROVED: Svend A. Bach
Colonel, MC
Director
ACTIVE IMMUNIZATION OF A HUMAN AGAINST
NAJA NAJA VENOM

A Preliminary Report

Because of the complexity of venom proteins and their great
local and systemic effects, active immunization has been confined to
animals utilized in the production of commercial antivenins. In this
study the feasibility of a safe and practical method of immunization of
man against snakebite has been explored.

Parrish and Pollard (1) found that immunity against the effect
of snakebite did not exist among 14 human subjects, each of whom had
been bitten two or more times by Crotalid snakes. However, the de-
velopment of a persistent immunity might not be anticipated in this
group because envenomation occurred from 2-year to 14-year inter-
vals, and the members of the group were also treated with antivenins
following snakebite. The first observation of active immunization
against snakebite was reported by Haast and Winer (2). A subject
(human) was given repeated injections of crude cobra venom over a
period of 2-1/2 years. A maximal injection of 40 mg of venom was
tolerated, and this quantity of venom is lethal in the absence of im-
munity. Immunological tests were not performed with the serum or
globulin to determine the degree of protection afforded by these in-
jections, but the 40 mg immunizing dose of venom he tolerated is
significant.

Wiener (3) described in one human subject the titer rise and
persistence effected by repeated injections of Australian Tiger Snake
venom. This subject survived the bite of a snake of this species with
little difficulty subsequent to his immunization.

In this laboratory, in an attempt to measure the development of
neutralizing antibodies, a human subject was given 17 injections con-
taining increasing amounts of Indian cobra (Naja naja) venom. Venom
solutions were passed through a millipore filter and then added to an
equal volume of a 4% Sodium Alginate adjuvant.* The 17 injections
were given over a period of 5 months (Fig. 1). Ten ml of blood was
withdrawn from the subject after the 4th, 7th, and 10th injections.
Five hundred ml of blood was withdrawn after the 11th injection, and

*Sodium Alginate Adjuvant, Colab Laboratories, Box 66, Chicago
Heights, Illinois.
I liter after the 17th. Globulins were separated from serum by ammonium sulfate precipitation, and the antivenin titer was determined by neutralization of Naja naja venom in 18-20 Gm Swiss mice. Identical neutralization tests were conducted by a commercial laboratory (Fig. 2).

The results of this study show a development of active immunization against cobra venom. One ml of the globulin solution neutralized 3 mouse LD₅₀s (244 mg venom). Since it required 100 ml of whole blood to produce 1 Gm of the crude globulin, it is estimated on a blood volume basis that 10 Gm are present in the subject's circulation. This circulating globulin alone therefore should neutralize a dose of 100 mg cobra venom. This calculation does not take into account the extravascular globulins present in the area of envenomation, which themselves are capable of venom neutralization.

The subject receiving cobra venom was under observation by a physician. Periodic blood and blood chemistry examinations were conducted to determine possible pathological conditions arising from the injections. Examination of the subject during and after the injections indicated the absence of pathological response to the venom except for local swelling and pain which persisted from 1 to 3 days in the area of injection. For a 2-week period after the 14th injection of venom, the subject's blood pressure was elevated slightly.

The potential advantages of active immunization of man against envenomation have been recognized for many years. The presence of locally necrotizing enzymes in some venoms still presents a formidable obstacle. However, in venoms with little or no local toxicity it appears that man may be safely immunized.

ACKNOWLEDGEMENT

The author gratefully acknowledges Wyeth Laboratories, Marietta, Pennsylvania, for their assistance in neutralization tests described in this report.

REFERENCES


### IMMUNIZATION SCHEDULE

<table>
<thead>
<tr>
<th>DAYS</th>
<th>0</th>
<th>6</th>
<th>10</th>
<th>14</th>
<th>20</th>
<th>27</th>
<th>33</th>
<th>40</th>
<th>47</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOSE</td>
<td>0.25 mg</td>
<td>0.10 mg</td>
<td>0.15 mg</td>
<td>0.50 mg</td>
<td>0.25 mg</td>
<td>0.35 mg</td>
<td>0.50 mg</td>
<td>0.75 mg</td>
<td>1.0 mg</td>
</tr>
<tr>
<td>DAYS</td>
<td>54</td>
<td>61</td>
<td>72</td>
<td>86</td>
<td>109</td>
<td>30</td>
<td>130</td>
<td>130</td>
<td>145</td>
</tr>
<tr>
<td>DOSE</td>
<td>2 mg</td>
<td>4 mg</td>
<td>6 mg</td>
<td>8 mg</td>
<td>10 mg</td>
<td>DAY REST</td>
<td>6 mg</td>
<td>8 mg</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

Fig. 1. Immunization schedule of human subject.
Fig. 2. Results of neutralization tests of subject's globulin against Naja naja venom.

AG 2483-0-Army-Knox-Nov 62-5C
DISTRIBUTION


CO. US Army Environmental Hygiene Agency, Edgewood Arsenal, Md.


CO. US Army Medical Liaison Dr., Atts: Surgeon Gorges Hosp, Belene Hts, Canal Zone.


CO. US Army Medical Research Unit, Ft. Clayton, Canal Zone.

CO. US Army Medical Research Unit, Inst for Medical Research, Kuala Lumpur, Malaya.

CO. US Army Medical Research Unit, Ft. Detrick, Md.

CO. US Army Medical Research Unit, No. 1, APO 160, New York, N. Y.


CO. US Army Research Inst of Environmental Medicine, Natick Labs, Natick, Mass.

CO. US Army Tropical Research, APO 831, New York, N. Y.


Director, US Army SCATO, Mad Research Laboratory, APO 148, San Francisco, Calif.

Director, Walter Reed Army Inst of Res, Walter Reed Army Med Center, Washington, D. C.

Historical Unit, US Army Med Inc, Walter Reed Army Med Center, Washington, D. C.

Office of the Chief Surgeon & Women's Consultant, SGO, Washington, D. C.


Senior Medical Advisor, New EPAC, APO 102, San Francisco, Calif.

Walter Reed Army Inst of Res, Dept of Atomic Casualty Studies, Washington, D. C.

HOSPITALS

CG. Brooke General Hospital Medical Library, Ft. Sam Houston, Tex.

CG. Letterman General Hospital, Presidio of San Francisco, Calif.

CG. Hodges General Hospital, Tacoma, Washington.

CG. Wileman Department General Hospital Library, El Paso, Tex.

CG. Benning Army Hospital, Ft. Jackson, South Carolina.

CG. DeWitt Army Hospital, Ft. Belvoir, Va.

CG. Dobbins Army Hospital, Carrollton Baronne, Pa.
<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fort Knox, Ky.</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Fort Riley, Kan.</td>
<td>Kansas</td>
</tr>
<tr>
<td>Fort Lee, Va.</td>
<td>Virginia</td>
</tr>
<tr>
<td>Fort George G. Meade, Md.</td>
<td>Maryland</td>
</tr>
<tr>
<td>Aberdeen Proving Ground, Md.</td>
<td>Maryland</td>
</tr>
<tr>
<td>Fort Belvoir, Va.</td>
<td>Virginia</td>
</tr>
<tr>
<td>Fort Leavenworth, Kan.</td>
<td>Kansas</td>
</tr>
<tr>
<td>Fort McClellan, Ala.</td>
<td>Alabama</td>
</tr>
<tr>
<td>Fort Monmouth, N.J.</td>
<td>New Jersey</td>
</tr>
<tr>
<td>Fort Knox, Ky.</td>
<td>Kentucky</td>
</tr>
<tr>
<td>Fort Sill, Okla.</td>
<td>Oklahoma</td>
</tr>
<tr>
<td>Fort Benning, Ga.</td>
<td>Georgia</td>
</tr>
<tr>
<td>Fort Hood, Tex.</td>
<td>Texas</td>
</tr>
<tr>
<td>Fort Jackson, S.C.</td>
<td>South Carolina</td>
</tr>
<tr>
<td>Fort Jay, N.Y.</td>
<td>New York</td>
</tr>
<tr>
<td>Fort Leonard Wood, Mo.</td>
<td>Missouri</td>
</tr>
<tr>
<td>Fort McPherson, Ga.</td>
<td>Georgia</td>
</tr>
<tr>
<td>Fort Howard, Calif.</td>
<td>California</td>
</tr>
<tr>
<td>Fort Monroe, Va.</td>
<td>Virginia</td>
</tr>
<tr>
<td>Fort Ord, Calif.</td>
<td>California</td>
</tr>
<tr>
<td>Fort Bragg, N.C.</td>
<td>North Carolina</td>
</tr>
<tr>
<td>Fort Rucker, Ala.</td>
<td>Alabama</td>
</tr>
<tr>
<td>Fort Sill, Okla.</td>
<td>Oklahoma</td>
</tr>
<tr>
<td>Fort Stewart, Ga.</td>
<td>Georgia</td>
</tr>
<tr>
<td>Fort Wolters, Tex.</td>
<td>Texas</td>
</tr>
<tr>
<td>Camp Lejeune, N.C.</td>
<td>North Carolina</td>
</tr>
<tr>
<td>Deepcy Proving Ground, Utah</td>
<td>Utah</td>
</tr>
<tr>
<td>Redstone Arsenal, Ala.</td>
<td>Alabama</td>
</tr>
</tbody>
</table>
ARMED FORCES-HOSPITALS Cont.

DISTRIBUTION
CO, US Army Hospital, Sierra Army Depot, Merino, Calif.
CO, US Army Hospital, White Sands Missile Range, N. Mex.

NAVY
Aviation Psychol Laboratory, US Naval School of Aviation Medicine, Pensacola, Fl.
Naval ana of Naval Medicine, Washington, D. C.
Chief, Bureau of Yards and Docks, Washington, D. C.
Chief of Naval Air Training, Clearwater, Fl.
Chief of Naval Air Technical Training, US Naval Air Station (31), Memphis, Texas.
Commander, Naval Missile Center, Techical Library, Point Mugu, Calif.
CO, US Naval Civil Engineer Lab, Port Hueneme, Calif.
CO, US Naval Medical Field Research Lab, Library, Camp Lejeune, N. C.
CO, US Naval Ordinance Test Sta, Station Hospital, China Lake, Calif.
Director, Aerospace Crew Equipment Lab, Naval Air Engr Center, Philadelphia, Pa.
Director, Research Division (171 Bureau of Medicine & Surgery, Washington, D. C.
Director, US Naval Research Laboratory, Code 207, Washington, D. C.
Director of Laboratories NMB, National Naval Medical Center, Bethesda, Md.
Office of Naval Res Dr, Document & Tech Innr, Box 39, Navy 100, Fleet PO, New York, N. Y.
Office of Naval Research, Code 345, Washington, D. C.
Office in Charge, Operations Evaluations Group, Washington, D. C.
Special Assistant, Naval Allied Sciences, Washington, D. C.
Technical Reference Library, Naval Res NMB Inst, Nat'l Naval Med Center, Bethesda, Md.
US Naval Supply N & Development Facility, Clothing Textile Div, Brooklyn, N. Y.
US Naval Training Device Center, Code 38, Port Washington, N. Y.
US Navy Medical Neuro-psychiatric Research Unit, San Diego, Calif.

US AIR FORCE
Air Defense Cenr, Est Air Force Base, Colo.
Cenr, Naval Air Development Center, Griffiss AFB, N. Y.
Cenr, 6570 ANGL (W) Wright-Patterson AFB, Ohio
Cenr, 6570 ANGL (W) Wright-Patterson AFB, Ohio
Cenr, 6570 ANGL (W) Wright-Patterson AFB, Ohio
Cenr, Gilford Field, US Air Force Hospital, Lackland AFB, Tex.
DISTRIBUTION

ARMED FORCES - US AIR CNT.

Office of Scientific Res. (Tempo Bldg) Washington, D.C.
Langley Research Center, Nat'l Aeronautics & Space Admin., Hampton, Va.
Office of the Surgeon, Air Trg Command, Randolph AFB, Tex.
Office of the Surgeon, Air Force Command, Offutt AFB, Neb.
School of Aerospace Medicine, Aerospace Library, Brooks AFB, Tex.
AER Medical Research Laboratory Library, Holloman AFB, N. Mex.

GOVERNMENTAL AGENCIES

Armed Forces National Laboratory, Technical Information Div., Argonne, Ill.

Army Forces Radiobiology Res Inst., National Naval Medical Center, Bethesda, Md.

Naval Research Lab., Associated Universities Inc., Library, Upton, L. I., N. Y.

Chief, Radiation Br., National Cancer Institute, Bethesda, Md.

Civil Aeronautical Research Inst., Federal Aviation Agency, Oklahoma City, Okla.


Division of Biology & Medicine, US Atomic Energy Commission, Washington, D.C.

Division of Medical Sciences, National Research Council, Washington, D.C.

Executive Secretary, Committee of Vice, Nat'l Aeronautics, Washington, D.C.


Library of Congress, Division of Research Grants, Bethesda, Md.

National Library of Medicine, Bethesda, Md.

Office of Civil Defense, Technical Research Laboratory, Battelle, Wash.


OTHER AGENCIES

Abbott Laboratories, Science Information Services, N. Chico, Ill.

American Machine Foundry Co., New York, N.Y.

Arctic Health Research Center Library, Anchorage, Alaska.


Chief, Biometric Section, Aerospace Division, The Boeing Co., Seattle, Wash.


General Electric Co., Advanced Electric Center Library, N. Y., N. Y.

General Electric Co., Tempe Library, Santa Barbara, Calif.
OTHER AGENCIES

DISTRIBUTION

IBM Research Center, Eng Reoence Dept 675, Yorktown Heights, N. Y.
ITT Federal Laboratories, Noise Factories Group, Malley, N. J.
Kings County Hospital, Department of Anesthesiology Library, Brooklyn, N. Y.
Mayo Clinic, Director of Biophysics Division, Rochester, Minn.
McDonnell Aircraft Corp., St. Louis, Mo.
Psychological Abstracts, Washington, D. C.
Rand Corporation, Library, Santa Monica, California.
Recon Califone Corporation, Los Angeles, Calif.
Space Tech Laboratories, Subcommittee on Noise, Los Angeles, Calif.
The Boeing Company Library, Military Aircraft Systems Div, Wichita, Kan.
The John Crerar Library, Chicago, Ill.
The Research Analysis Corp Library, Bethesda, Md.
Yerkes Laboratories of Primate Biology, Orange Park, Fla.

MEDICAL COLLEGE SCHOOL LIBRARIES AND DEPTS

Albany Medical College Library, Albany, N. Y.
Boone Gray School of Medicine, Library, Winston-Salem, N. C.
Brown Univ., Psychology Dept, Consultant, Providence, R. I.
College of Medical Evangelists, Vernon Saddle Memorial Library, Loma Linda, Calif.
Columbia Univ., Dept of Psychology, New York, N. Y.
Columbia Univ., Medical Library, New York, N. Y.
Cornell Univ., Central Social Record Department, Ithaca, N. Y.
Cornell Univ., Medical Library, New York, N. Y.
Croghanlon Univ., Medical Pharmacy Library, Omaha, Neb.
Dartmouth College, Dana Niumedical Library, Hanover, N. H.
Harvard Univ., Medical Library, Boston, Mass.
Indiana Univ., Medical Center Library, Indianapolis, Ind.
Indiana Univ., School of Medicine Library, Bloomington, Ind.
Johns Hopkins Univ., Welch Medical Library, Baltimore, Md.
Kansas State Univ., Department of Psychology, Manhattan, Kan.
Loma Linda Univ., White Memorial Medical Library, Los Angeles, Calif.
MEDICAL COLLEGE / SCHOOL LIBRARIES AND DEPTS Cont.

DISTRIBUTION

Marquette Univ., Medical-Dental Library, Milwaukee, Wis.
Medical College of Virginia, Tompkins-McCaw Library, Richmond, Va.
New York Academy of Medicine Library, New York, N. Y.
New York Univ., College of Medicine, Research Division, New York, N. Y.
New York Univ., College of Dentistry, Research Division, New York, N. Y.
New York Univ., Medical Center Library, New York, N. Y.

Northwestern Univ., Department of Psychology, Evanston, Ill.
Northwestern Univ., Medical School Library, Chicago, Ill.
Ohio State Univ., Chemical Abstracts Service, Columbus, Ohio
Ohio State Univ., Engr Experiment Station, Systems Research Group, Columbus, Ohio
Ohio State Univ., Psycholinguistics Laboratory, Columbus, Ohio
Ohio State Univ., Research Center, Aviation Psychology Laboratory, Columbus, Ohio
Ohio State Univ., School of Optometry, Columbus, Ohio
Ohio State Univ., Topaz Library, Columbus, Ohio
Purdue Univ., Department of Psychology, Lafayette, Ind.
Rock Medical College Library, Chicago, Ill.
St. Louis Univ., Medical School Library, St. Louis, Mo.
Stanford Univ., Lane Medical Library, Palo Alto, Calif.

State Univ. of Iowa, College of Medicine Library, Iowa City, Iowa
State Univ. of Iowa, Dan Hoef. Dept of Otolaryng & Head & Neck Surgery, Iowa City, Iowa
State Univ. of New York, Anesthesiology Department, Brooklyn, N. Y.
State Univ. of New York, Medical Library, Downtown Medical Center, Brooklyn, N. Y.
Texas Medical Center Library, Jesse R. Jones Library, Houston, Tex.
Tulsa Univ., Heavy Engineering Information Analysis Service, Tulsa, Okla.
Tufts Univ., School of Medicine, Boston, Mass.

Vanderbilt Univ., Hospital Library, Nashville, Tenn.
Univ. of Alabama, Medical Center Library, Birmingham, Ala.
Univ. of Arkansas, Medical Center Library, Little Rock, Ark.
Univ. of Buffalo, Department of Psychology, Buffalo, N. Y.
Univ. of Colorado, Health Sciences Library, Denver, Col.
Univ. of California, Biomedical Library, Los Angeles, Calif.
Univ. of Chicago, Radiation Laboratory, Chicago, Ill.
Univ. of Cincinnati, College of Medicine, Butterfield Lab, Cincinnati, Ohio
Univ. of Florida, College of Medicine, Gainesville, Fla.

Univ. of Georgia, Department of Psychology, Athens, Ga.
MEDICAL COLLEGE/SCHOOL LIBRARIES AND DEPTS Cont.

DISTRIBUTION

Univ. of Illinois, Aeromedical Laboratory, Chicago, Ill.
Univ. of Illinois, Aviation Psychology Laboratory, Savoy, Ill.
Univ. of Illinois, Documental Library, Urbana, Ill.
Univ. of Illinois, Speech and Hearing Clinic, Champaign, Ill.
Univ. of Illinois, Training Research Laboratory, Urbana, Ill.

Univ. of Kansas, Clendenning Medical Library, Kansas City, Kansas.

Univ. of Kentucky, Psychology Department, Lexington, Ky.
Univ. of Louisville, Medical Library, Louisville, Ky.

Univ. of Maryland, Health Sciences Library, Baltimore, Md.

Univ. of Miami, School of Medicine, Department of Ophthalmology, E. L. Flo.
Univ. of Miami, School of Medicine, Department of Psychology, Coral Gables, Flo.

Univ. of Michigan, General Library of Sciences & Documents, Ann Arbor, Mich.

Univ. of Minnesota, Sciences Division Library, Minneapolis, Minn.

Univ. of Mississippi, Medical Center, Rowland Medical Library, Jackson, Miss.

Univ. of Missouri, Medical Library, Columbia, Mo.

Univ. of Nebraska, College of Medicine Library, Omaha, Neb.

Univ. of North Carolina, Div. of Health Affairs, Memorial Hosp Library, Chapel Hill, Va.

Univ. of Oklahoma, Medical Center Library, Oklahoma City, Okla.

Univ. of Oregon, Medical School Library, Portland, Ore.

Univ. of Oregon, Department of Dermatology, Portland, Ore.

Univ. of Pittsburgh, Department of Psychology and Radiology, Pittsburgh, Pa.

Univ. of Pittsburgh, Falk Library, Pittsburgh, Pa.

Univ. of Rochester, Atomic Energy Project, Rochester, N. Y.

Univ. of Rochester, Department of Psychology, Rochester, N. Y.

Univ. of Rochester, School of Medicine & Dentistry, Rochester, N. Y.

Univ. of Rochester, Strong Memorial Hospital, Rochester, N. Y.

Univ. of Southern California, School of Medicine Library, Los Angeles, Calif.

Univ. of Southern California, Sciences Library, Los Angeles, Calif.

Univ. of South Dakota, Medical Library, Vermillion, S. D.

Univ. of Tennessee, Hospy Memorial Library, Memphis, Tenn.

Univ. of Texas, Radiological Laboratory, Austin, Tex.

Univ. of Texas, Medical Branch Library, Galveston, Tex.

Univ. of Texas, Speech & Hearing Clinic, Austin, Tex.

Univ. of Utah, Library of Medical Sciences, Salt Lake City, Utah.

Univ. of Vermont, College of Medicine Library, Burlington, Vt.

Univ. of Virginia, School of Medicine, Biostatistics, Charlottesville, Va.
MEDICAL COLLEGE/SCHOOL LIBRARIES AND DEPT'S Cont.

DISTRIBUTION

Univ of Virginia, Medical Library, Univ Hospital, Charlottesville, Va.
Univ of Virginia, Psychology Dept, Charlottesville, Va.
Univ of Washington, Health Sciences Library, Seattle, Wash.
Univ of Wisconsin, Medical School Library, Madison, Wis.
Univ of Wisconsin, Psychology Studies Division, Madison, Wis.
Wayne State Univ, Medical Library, Detroit, Mich.
West Virginia Univ, Medical Center Library, Morgantown, W. Va.
Yale Univ, School of Medicine, Otolaryngology Research Laboratory, New Haven, Conn.
Yale Univ, Department of Psychology, Cincinnati, Ohio

FOREIGN

Academia, Dept, Nat'l Lending Library for Sci & Tech, Boston MPH, Yorkshire, England
British Army Medical Liaison Officer, British Embassy, Washington, D. C.
British Navy Staff Officer, Benjamin Franklin Bldg, Add: F. P. Ellis, Washington, D. C.
Canadian Liaison Officer, Office of the Surgeon General, Washington, D. C.
Commander P. R. Nelson, Med Enl Chef De La, Rome, Paris, France
Defence Research Member, Canadian Joint Staff, Washington, D. C.
Dr. Piet J. E. Kerssen, Dir Physical Dept, The Inst of Occup Health, Helsinki, Finland
Dr. T. V. Vennassil, Dept of Histology, Karolinska Inst, Stockholm, Sweden
Dr. G. N. F. Sathyam, Dir Appl Physiol Lab, V. & O.P.S. Chamber of Mines, Johannesburg, S. Africa
Elektra Research Inst, Add, The Nat'l Inst of Animal Health, Tokyo, Japan
Francisco de Beaufils, V. Edu Minister, Add: Espuesto C. C. Alvarado, Asuncion, Paraguay
French Ministry of Defence, Washington, D. C.
Inst of Clinical Anel Surgery, Add: Dr. Laszlo, Prague, Czechoslovakia
Inst of Preventive Med & Surg, Add: Dr. Rene Boly, Dir Univ of Montreal, Montreal, Canada
Inst of Physiology, Univ of Pisa, Add: Gino Domenico, Pisa, Italy
Laboratory of General Pathology, Add: Prof Zeus H. Buys, Leuven, Belgium
Medical School Library, University of Alberta, Edmonton, Alberta, Canada
Oxford Univ, Department of Human Anatomy, Add: Dr. J. B. Lind, Oxford, England
Prof. D. E. Torelli, Inst de Neurobiologia, Biotecnologia, Uruguay
Prof. E. V. Dittmer, J. J. Thompson Physical Lab, Berke, Univ, Berke, England
Prof. D. H. MacKay, Univ of N. Staffordshire, Keele, Staffordshire, England
Prof. J. A. F. Stevenson, Faculty of Med, Univ of Western Ont, London, Ont, Canada
Royal Air Force Inst of Aviation Med, Add: Dr. G. H. Dybd, Farnborough, England
Royal Air Force Inst of Aviation Med, Add: L. J. C. Ong, Farnborough, England
Royal Society of Medicine Library, London, England
Univ of Western Ontario Med School, Add: Dr. Allen C. Burton, London, Ont, Canada
Seventeen injections of Indian cobra (Naja naja) venom were administered to a human subject for the production of an active immunity. The development of a significant level of antivenom was demonstrated by neutralization tests. The immunization procedure produced no significant pathological effects.