1 May 1946

Dr. A. B. Sabin
The Children's Hospital Research Foundation
Elland and Bethesda Avenues
Cincinnati 29, Ohio

Dear Albert:

I have received the typewritten "Report of the "Virus Commission's" Activities in Japan, February-April 1946". Thank you for having had the manuscript typed. As you understand, the copy which is in your hands is the next to final copy but I presume it is adequate to cover most of the situations.

Yours sincerely,

John R. Paul, M.D.
Director

jrp:ads
Report

of the

"Virus Commission's" Activities in Japan

February - April, 1946

17 May 1946
Soon after American troops had occupied Japan in the fall of 1945 it became evident that various first-hand surveys of local disease conditions should be made. Among the conditions studied Japanese E encephalitis received particular attention. It has been the subject of a special Report submitted in December 1945 by Major S. E. Moolten, M.C., of the Public Health and Welfare Section, SCAP, Tokyo. Various recommendations were made in this report and to follow them up Col. C. F. Sams, Chief, Public Health and Welfare Section requested assistance from the Preventive Medicine Service, Office of the Surgeon General, in January 1946. In response to this request two members (Dr. W. McD. Hammon and Dr. J. R. Paul) of the Neurotropic Virus Commission, Army Epidemiological Board, visited Japan for purposes of consultation. They left San Francisco (by plane) on 16 February, 1946, arriving in Tokyo, 21 February, 1946; and left Tokyo (by plane) on 20 April, 1946, arriving in San Francisco 22 April, 1946.

The activities of this Commission are herewith reported, the aims of the mission having been:—

I. To review first hand and evaluate Japanese concepts and work on E encephalitis.

II. To establish a laboratory in Japan for the diagnosis and study of this disease.

III. To recommend measures to the U.S. Army and to the Supreme Command for Allied Powers in Japan which would seem to be valuable in the control of this infection.

IV. To acquire new information about other virus diseases with which the Neurotropic Virus Disease Commission has been concerned, namely:—dengue and polio-myelitis.
I. Review of Japanese Work on Japanese B Encephalitis.—During the period 1935-1942 a considerable volume of research work was carried on in Japan dealing with this disease. Much of this work was published only in Japanese journals, some of it was published subsequent to 1940; for both of these reasons it has been unavailable heretofore to American investigators. Moolten's Review,* to which reference has been made, covered a large part of this Japanese work. To supplement the data in this Review visits were made by members of the Virus Commission to various Japanese scientists, and laboratories were inspected at the Institute for Infectious Diseases, Tokyo Imperial University; Keio University Medical School, Tokyo; Kitasato Institute, Tokyo; Osaka Imperial University, and Okayama University. The calibre of the Japanese work was found to be, good, bad and indifferent. With few exceptions the work on encephalitis was at a standstill and had been so for the past 2 years.

The following Japanese scientists were among those interviewed on the subject of Encephalitis:

Dr. A. Tamiya, Institute for Infectious Diseases, Tokyo
Dr. T. Mitamura (retired), " " "
Dr. M. Kitaoka, " " "
Dr. Y. Kawakita, " " "
Dr. N. Ishii " " "
Dr. H. Kobayashi, Kitasato Institute, Tokyo
Dr. Y. Iimura, Charity Hospital, Tokyo
Dr. S. Kuriyama, Prof. of Pediatrics, Tokyo Imperial University
Dr. R. Kimura, Microbiol. Institute, Imperial University, Kyoto.
Dr. T. Taniguchi, Dir. Inst. Microbiol. Diseases, Osaka Imperial Univ.
Dr. M. Hayashi, Psychiatric Clinic, Med. Faculty, Okayama
Dr. K. Kitayama, Dept. Internal Medicine, Medical Faculty, Okayama

At the Institute of Infectious Diseases Dr. Kitaoka allowed us to make photographic copies in color, and black and white film of the charts he has used in his classes on Japanese B Encephalitis; and Prof. Kuriyama of the Department of Pediatrics, Tokyo Imperial University, showed us his moving picture film (made in 1935) demonstrating clinical aspects of the disease in children.

New Information.--Of the new impressions gained from reading the Japanese literature and from interviews, the following items deserve listing:--

1. The common occurrence of recognizable encephalitis in horses in Japan with identification of the agent as that of Japanese B encephalitis virus. This is another of the many close links between the Japanese disease and the equine encephalitides and St. Louis encephalitis in the U. S.

2. The frequency of the claims of isolation of virus from the blood of patients by one group (Dr. Mitamura, et al.) and almost constant failure by others, and the claims of isolation of virus from human saliva, and the stools during the acute disease in man.

3. The explosiveness of onset of cases in all major epidemics in any one area indicating that over 50% of all recognized cases become infected within a 1 or 2 week period of time.

4. Parallelism between the Culex tritaeniorhynchus mosquito population and the epidemic curve (similar to that of Culex tarsalis in the U. S.) and lack of correlation with Culex pipiens, which has also been found infected in Japan.

5. Trial use of mouse brain vaccine by Japanese, but unfortunately in a non-epidemic year.

6. The epidemic disease in Japan has been one of children, predominately during last 7-10 years (as in Okinawa).

7. The extensiveness of serological surveys in man from many endemic areas of Japan indicating 80-95 per cent of the adult population is immune in such areas.

8. Great concentration of cases (epidemic and endemic) in areas with climatic, agricultural and topographical similarity to involved areas in the Western U. S.
Apparent omissions in the Japanese work that were brought forcibly to our attention were:--

1. Lack of study or thought regarding extra human vertebrate reservoirs of virus.

2. Failure on the part of nearly all groups except two (Mitamura et al., in Tokyo, and Hyashi in Okayama) to regard the mosquito transmission theory as of more than academic interest.

3. Lack of knowledge regarding the feeding habits of the probable mosquito vectors.

4. Complete lack of any plan or any attempts to regard mosquito abatement as practical in the control of this disease.

5. Failure to develop complement fixation tests.

6. Failure to use neutralization tests as a diagnostic aid for clinical cases.

Critique of Japanese Work.--It would be an understatement to say that we were impressed by the volume of work which the Japanese have put out about encephalitis within the past 10 years. Their industry in some aspects, particularly neutralization test surveys, has been prodigious. We cannot fail to be impressed furthermore by the scientist Mitamura (now retired), who first demonstrated in Japan that this disease was spread by mosquitoes and who steadfastly built up this demonstration during several years of indifference on the part of some of his colleagues and rivals. The general belief in Japan still is that the disease is spread by droplet infection and therefore mosquito control in this connection seems almost ridiculous to many of them.

An outstanding impression of the recent Japanese work on this disease is that they have worked on the disease as pathologists,—and pathologists of the old school, each group studying, either one special aspect or many special aspects but
without considering the disease as a whole. No one recently has "taken over" the disease in a summary fashion correlating the epidemiology, ecology, clinical picture and mode of transmission. Summary work may have been done in the past, however, by the "Encephalitis Commission" which functioned some years ago, under Inada, but the present situation was that the disease problem had been divided up piecemeal with no one assuming responsibility for any of the aspects which lay outside his particular field.

II. The Virus Commission's Laboratory and Program of Laboratory Work.--
The location chosen for the Commission's laboratory was at the 42nd General Hospital, now established in the group of Hospital Buildings which originally represented St. Luke's Medical Center in Tokyo. The site was chosen on 25 February and on 6 March sufficient equipment and animals were available to begin limited operations. The laboratory was under the direction of Dr. W. McD. Hammon.

Purpose.--This laboratory was established with two purposes in view: (1) to serve as a diagnostic laboratory for encephalitis cases; and (2) to offer facilities for limited research on diagnostic methods and on epidemiological and other problems.

Personnel.--On the departure of Dr. Hammon for the States, the laboratory was left in charge of Capt. D. R. Ginder, M.C., assisted by Dr. Minori Matsumoto (Tokyo Imperial University Institute of Infectious Diseases) and two other Japanese employees who cared for the animals, sterilized glassware and performed certain other relatively unskilled laboratory tasks.

Program of Experimental Work.--A. The following experiments have been undertaken or completed to date:--

1. Comparison of encephalitis antigens prepared by various methods. Since dry ice was difficult to obtain during March and early April, antigens were first prepared by highspeed centrifugation (on basis of work by Casals and by Havens). Mouse brains were suspended in 2% guinea pig sera and subjected to
centrifugation at 15,000 R.P.M. for from 15 minutes to 1 hour. At first, low infectious and antigenic titers were obtained with most viruses (brought in lyophilized state) but after about 8 serial passages in Japanese mice, infectious titers ranged from $10^{-8}$ to $10^{-9.5}$, and antigen titers improved. These were titrated against Sharp and Dohme Co. lyophilized mouse sera, lyophilized immune guinea pig sera prepared in San Francisco, and fresh immune guinea pig sera prepared in the Tokyo laboratory. When dry ice became available comparative tests were made with antigen prepared by Casal's method and with lyophilized Japanese B and St. Louis antigens received from Sharp and Dohme Co. All antigens prepared in Tokyo were used in virulent form.* All were tested for infectious titer before and after centrifugation or freezing.

No difference in specificity or antigen titer could be noted between antigens centrifuged 30 or 60 min. at 15,000 RPM. Longer centrifugation only reduced infectious titers. Most antigens were therefore centrifuged only 30 min. Virulent antigens prepared in Tokyo titered higher than those obtained from Sharp and Dohme Co. but were slightly lower in titer than those that had been prepared in San Francisco and tested there against the same guinea pig sera. Frozen and thawed antigens had lower titers than those centrifuged only, and no difference in specificity could be noted. Inactivation temperatures of 56°C for 30 min., recommended by Havens for centrifuged antigens, were found less satisfactory for human sera than 60°C for 20 min., as recommended by Casals. Wassermann positive sera frequently required inactivation at 63°C or 65°C, otherwise positive reactions occurred with all virus antigens. Such temperatures reduced specific reactions in animal and human sera only about 1 tube.

2. **Comparison of immune mouse and guinea pig sera.** Hyperimmune mouse sera for St. Louis and Japanese B virus, obtained from Sharp and Dohme Co. were compared with "convalescent" guinea pig sera prepared at the Hooper Foundation

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*The laboratory personnel were vaccinated (with chick embryo vaccine) against Japanese B encephalitis.*
and by the same method in the Tokyo laboratory. The hyperimmune mouse sera had two to four fold higher titers. However, very satisfactory sera were prepared for all viruses except the St. Louis by using the guinea pig, and only 15 days were required to produce it.

All viruses are being passed serially in Japanese mice till maximum adaptation occurs. All Japanese B. antigens prepared to date are from the Naka- yama strain. Others are being prepared.

3. Complement fixation tests on Normal Japanese. Twenty-four sera from adults of Okayama, and 30 sera from children of Tokyo and 16 sera from adults were tested against one or several Japanese B antigens. Except for 5 non-specific, Wassermann positives, none showed more than an occasional 1+ or 2+ reaction in a 1:2 serum dilution.

4. Complement fixation tests on Normal U.S. military personnel recently arrived from United States. Out of 18 tested, none was positive to any Japanese B antigen used. Five others with positive Kahn tests were also negative.

5. Complement fixation tests on blood sera of Normal U.S. military personnel from various Pacific Islands. These were men especially from Okinawa and the Philippines. Out of 18 tested, 5 gave repeated positive reactions in a 1:2, 1:4, or 1:8 dilution of serum against the Japanese B antigen and failed to react against several other virus antigens. Several of these men had been in Japan in September as well as on Okinawa or Luzon or Leyte. None had a history of an illness suggesting encephalitis. All but one, which was not tested, were negative to serological tests for syphilis. None of these persons had been vaccinated with Japanese B vaccine on Okinawa.

6. Complement fixation tests on sera of persons vaccinated with Jap B vaccine. Three persons vaccinated in August or September 1945 with mouse brain vaccine were negative to Jap B antigen. Serum from one given a booster dose (2.0 cc. chick embryo vaccine) failed to show a positive reaction after 10 and 20 days.
Fifteen persons recently arrived from the States and vaccinated with mouse brain vaccine failed to develop a positive C.F. reaction at 10 and 20 days. Two given chick embryo vaccine were also negative even after a third "booster" injection.

Two Japanese natives whose sera contained neutralizing, but no complement fixing antibodies prior to vaccination, promptly developed complement fixing antibodies after 2 innoculations with chick embryo vaccine. Both were positive 15 and 25 days after the first inoculation. This series is being extended.

It would seem possible that persons having once been naturally infected with living virus (even if infection is inapparent clinically) have a rise in complement fixing titer as a result of stimulation with killed vaccine. This could explain the unexpected findings by Hammon in vaccinated military personnel on Okinawa, if they had previously had an inapparent natural infection.

7. Complement fixing antibodies in blood of recovered cases. One Japanese who had encephalitis in August 1939 gave a specific C.F. response at a 1:4 dilution and was negative at a 1:2 dilution with 4 other antigens.

8. Neutralizing antibodies in normal Japanese. Sera from four normal Japanese adults from Okayama (2) and Tokyo (2) had high titers of neutralizing antibodies to Japanese B virus. A large series is being tested.

9. Neutralizing antibodies following vaccination for Jap B encephalitis. 15 normal military personnel recently arrived from the United States (no Pacific island experience) were given the recommended complete vaccination with mouse brain vaccine available in Tokyo (Eli Lilly Co., expiration date July 1946). Sera were tested 10 and 20 days after the first inoculation. Of the sera from 14 persons (all completed to date) only one patient's serum gave protection. The pre-vaccination serum from the one which became positive was negative and both post vaccination sera gave good protection. These results parallel closely the Okinawa findings.
Of two similar persons given 2 inoculations of chick embryo vaccine 7 days apart, one showed protection 7 days after the second inoculation and questionable protection at 15 days. Sera from the other were negative.

One person (W.M.H.) vaccinated with mouse brain vaccine in August 1945 was given one 2.0 cc. inoculation of chick embryo vaccine. Prior to the inoculation his serum failed to protect. After 7 days and 15 days his sera gave strong protection. Other persons with similar experience are under test.

B. Work now undertaken or planned to begin immediately.

1. Extension of complement fixation and neutralization tests on military personnel from other Pacific islands, before and after vaccination. This we feel is essential for interpretation of diagnostic or survey serological tests to be made later in the season.

2. Similar studies on normal, immune Japanese for comparison with the above.

3. Neutralization test survey on Tokyo children ages 6 months to 15 years (by 5 year groups) to obtain index of inapparent infection during recent years.

4. Monthly complement fixation tests on two groups of 15 persons in Tokyo area: (1) Americans new to the Pacific area, (2) Adult Japanese. Those developing complement fixing antibodies will also have all sera tested by neutralization tests. This should give some idea of infection rates in Tokyo during the summer and show the type of serological change to be expected in susceptible and immune persons following inapparent or apparent infection.

All the studies now undertaken, except the last and the diagnostic service, should be complete or almost complete before the arrival of Dr. Sabin, giving him a free hand for experimental work of his own planning.

III. Recommendations to GHQ and SCAP.— The recommendations which the Commission believed might be useful for the protection of American troops against Japanese B encephalitis and for the control of the disease in Japanese people have
been listed in a report which has been submitted and entitled, *Policies and Program recommended by the Virus Commission for the Control and Study of Japanese B Encephalitis in Japan in 1946.*

This Policy Report was concerned with 5 activities to be carried out during the summer of 1946 in Japan.

I Education  
II Mosquito Control  
III Vaccination (indication and methods)  
IV Clinical consultants  
V Research.

At the time the Policy Report was submitted (20 April 1946) it was not deemed advisable to recommend that preseasonal ("pre-epidemic") vaccination be carried out in American troops this year. This recommendation has since been revised and a limited program is proposed to be carried out under the direction of Dr. A.B. Sabin (See letter to the Surgeon General in Appendix.).

It was suggested in the Introduction of the Policy Report that the study of Japanese Encephalitis by the U.S. Army be regarded as a "long term" project, and it is important to reemphasize the point here. The laboratory does not represent a heavy investment and it can be closed without serious loss, but it represents the only U.S. Army laboratory in Japan which at present is in a position to study virus diseases, such as encephalitis, dengue, other short fevers, and poliomyelitis. Its presence there seems to be appreciated by the medical officers now stationed in Japan.

Among the most important features of the work already started was the initiation of a course on *Culex* mosquito control for U.S. medical officers and Japanese health officials. This course has been held at Kyoto during the week 22-27 April.

It was further recommended that one or more clinical consultants be trained in the Commission's laboratory in problems relating to the diagnosis of *Submitted to SCAP, and to GHQ in Tokyo, and to the SGO in Washington.*
Japanese B encephalitis.

IV. Diseases other than Encephalitis.—

a) Poliomyelitis.— Information was obtained from whatever Japanese literature was available in local medical libraries, from the Ministry of Health* and the Bureau of the Census and from interviews in particular with the following:

Dr. S. Kuriyama  Department of Pediatrics, Tokyo Imperial University
Dr. M. Kasahara  Department of Pediatrics, Osaka Imperial University

The story of poliomyelitis in Japan is interesting. Poliomyelitis has supposedly never been common in this country and, until very recently, there have been no large epidemics. As in the case of encephalitis, it is not a reportable disease and the figures on its prevalence are inaccurate. Mortality and Hospital Statistics are, however, available. Poliomyelitis is known to most Japanese physicians under the old title: HEINE-MEDIN disease. It is regarded as a sporadic disease more prevalent in the summer than the winter but not, however, showing the very sharp summer increase that is familiar to us in the United States. It is probable that the differential diagnosis between poliomyelitis and encephalitis has been confused in the past, but the extent to which this is true is not apparent, at least (with one exception) during the years of the great epidemics of encephalitis there was no increase in deaths from poliomyelitis. The first large epidemics of poliomyelitis ever to be reported in Japan occurred in 1938 and 1940 in Osaka and Kobe. In spite of the inaccuracy of the available statistics, we now may have the opportunity in Japan to witness the interesting transition of the disease as it passes from a sporadic to an epidemic disease; — a transition which apparently took place in Scandinavia in the 1870's, and in the United States in the 1890's. In line with this observation is the fact that poliomyelitis in Japan is still a disease of infants. Almost 75% of the cases

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*We are particularly indebted to Dr. M. Yamaguchi, Chief of the Section for Quarantine, Ministry of Health and Social Affairs, Tokyo.
occur in children under three years of age:

Many statistical studies on Hospital series of patients have been made, but relatively little research on the virus of poliomyelitis has been done. However, an interesting report on the experimental transmission of poliomyelitis virus by mosquitoes (Culex pipiens and Aedes albopictus) has been made by Mitamura and his colleagues.

A so-called vaccine against poliomyelitis, which had been developed by Professor (Emeritus) Kasahara of Osaka, was investigated. It consists of virus in monkey cord suspension inactivated by sonic vibrations, and it has only been tested experimentally in monkeys by intraspinal and intranasal and other routes. 100% protection in monkeys is claimed when the vaccine is given intraspinally, 75% protection when given intranasally, and little or no protection when given subcutaneously.

In the field of treatment of poliomyelitis little was discovered except that vitamin B injections were favored in the acute and early convalescent stages. None of the Japanese to whom I talked had ever heard of the Kenny treatment!

b). Dengue.-- Considerable interest in this disease exists in Japan owing to the fact that during the war (particularly 1944) large epidemics of dengue (200,000 cases) occurred for the most part in southern Japan. Several Japanese scientists were sent to the Philippines and to Singapore to study the disease in 1942 and 1943.

The scientists interviewed on this subject were:

Dr. H. Yaoi Inst. Infect. Disease, Tokyo Imperial University
Dr. N. Ishii
Dr. R. Naito Army Medical College, Osaka
Dr. Taniguchi Microbiol. Inst., Osaka Imperial University

Surveys of the work on dengue virus have been collected. In general they have consisted in the isolation of the virus in mice, guinea pigs and monkeys; in the growth in chick embryos. Neutralization tests in mice have been done in large
numbers and the use of immune serum in the acute disease has also been studied.

Vaccines (both living and formalinized) have been prepared by Drs. Yaoi and Arkawa from suspensions of young guinea pig and monkey brains using a mouse adapted strain, and these were actually tested clinically in small numbers of subjects in 1944 in Batavia and Badong.

Protection against dengue by vaccination was claimed by means of the attenuated (living) mouse virus. More than a month seemed to be necessary for the immunity produced by vaccination to reach its maximum. No protection was obtained against dengue by means of their formalinized vaccine.

c). Short fevers.-- One "new" disease presumably of virus origin deserves mention. Information regarding it came from Lt. Col. M.A. Schnitker, M.C., medical consultant to the Surgeon GHQ. AF - WES PAC. Col. Schnitker reported that he had recently, April '46, seen in Korea several examples of an acute disease known in WES PAC as "a typical dengue." The picture consists of a short (three day) fever and with it there are spinal fluid changes (from 50-200 cells of which 60-80% are lymphocytes). These spinal fluid changes persist after the fever is over. The patients do not have a rash nor splenomegaly. None of the "break bone fever" symptoms are said to be present. This disease was apparently common in Manila in 1945-46.*

A virus encephalopathy is suspected, in that all the cases start with a leukopenia.

We believe that this condition deserves study; we did not have the opportunity of seeing any cases first hand.

In conclusion we wish to express our appreciation to Brig. Gen. S. Bayne-Jones and Brig. Gen. J. S. Simmons of the Preventive Medicine Service Office

* A report about 350 cases of this disease seen in the Philippines is being prepared by Major Shapiro, M.C., (and Major Bowie) of the 248 Gen. Hospital in Manila, P.I.
of the Surgeon General to whom we owe this interesting assignment; and to
Col. C. F. Sams, M.C., and Major S. E. Moolten, M.C., of Public Health and Welfare
Section, SCAP., for their hospitality and assistance to the Commission while in
Japan.

Respectfully submitted,

John R. Paul

William McD. Hammon
APPENDIX

2 May 1946

TO: The Surgeon General
ATTENTION: Chief, Preventive Medicine Service
THROUGH: President, Army Epidemiological Board

SUBJECT: Recommendations with regard to Vaccination against Japanese B Encephalitis.

In response to a request from General S. Payne-Jones on 29 April 1946, I am submitting herewith certain recommendations which are concerned with plans for the control of Japanese B encephalitis in Japan during the summer of 1946.

Following a two month (February-April, 1946) study of the situation in Japan by the Neurotropic Virus Disease Commission, and following a conference in the Preventive Medicine Service, Surgeon General's Office on 26 April 1946, it is recommended that pre-seasonal (pre-epidemic) vaccination of American troops against Japanese B encephalitis be carried out in certain areas of that country where that disease has been most prevalent in the past. This decision is based on the belief that American troops should be susceptible to this disease and that the most effective time for vaccination would be in advance of the epidemic season. Japanese observations indicate that the causative virus of this disease is quickly and widely disseminated by mosquitoes, largely in the pre-epidemic period, that is, within a few days prior to and immediately following the onset of an epidemic and it is unlikely, therefore, that a program of vaccination could be carried out speedily enough during epidemics, to be useful.

I would respectfully recommend that plans be submitted to implement this program as follows:

1. That Dr. A.B. Sabin, "Field Director" of the Virus Commission in Japan (during the period May-August 1946), shall act as a consultant in the vaccination program.

2. That the pre-epidemic vaccination program be limited to certain areas, particularly areas around the Inland Sea of Japan and Okinawa.

3. That the vaccine be administered during the month of June or early July in the form of 2 doses of 1 cc. each of mouse-brain (or chick-embryo) vaccine given at a 4 to 7 day interval.

4. That this be followed in one month by a single 1 cc. booster dose of chick-embryo vaccine. The booster dose (chick-embryo or mouse-brain vaccine) may be given earlier, in the presence of an epidemic.
5. That a limited program of pre-seasonal vaccination be considered for the Japanese people, to be carried out under the Section of Public Health and Welfare, SCAP. This would be part of the plan which calls for the parallel use of Public Health measures in American troops and the local civilian (and in this instance, presumably juvenile) population as well.

Respectfully submitted,

/s/ John R. Paul

John R. Paul, M.D.
Director, Commission on Neurotropic Virus Diseases

With reference to recommendation 4., mouse brain vaccine should be given as a booster dose earlier in the presence of an epidemic only if chick embryo vaccine is not available and it is considered that a booster dose is absolutely essential.

/s/ FGB

Approval recommended.

/s/ Francis G. Blake

Francis G. Blake, M.D.
President, Army Epidemiological Board
JAPANESE B ENCEPHALITIS

CONSISTENCY OF APPEARANCE
(NUMBER OF YEARS THE RATE EXCEEDED 0.1/100,000/ANNUM)
JAPAN, BY PREFECTURES, 1924-1939
GHQ·SCAP

MARCH 46

LEGEND

NUMBER OF YEARS

- 0-3
- 4-7
- 8-11
- 12-15
- 16

SOURCE: YASUZO IIMURA, M.D., 1946
JAPANESE B ENCEPHALITIS
CASES BY AGE GROUPS
JAPAN, 1924-1933

NUMER
OF CASES

0-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 81-90 91-100

LEGEND

NON-FATAL
FATAL

SOURCE: Y. IIMURA, JOURNAL PUBLIC HEALTH ASSN. JAPAN, 1936
GHQ-SCAP NUMBER 41

JAPANESE B ENCEPHALITIS
RATE/100,000/ANNUM BY AGE GROUPS
JAPAN, 1924-1933

RATE

0-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 81-90 91-100

SOURCE: Y. IIMURA, JOURNAL PUBLIC HEALTH ASSN. JAPAN, 1936
GHQ-SCAP NUMBER 42

JAPANESE B ENCEPHALITIS
PERCENT OF CASES BY MONTHS
JAPAN, 1924-1933

PERCENT

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

SOURCE: Y. IIMURA, JOURNAL PUBLIC HEALTH ASSN. JAPAN, 1936
GHQ-SCAP NUMBER 43
LEGEND

ANNUAL RATE PER 100,000

0 - 0.9
1.0 - 2.4
2.5 - 4.9
5.0 - 9.9
10.0 AND OVER

SOURCE: YASUZO IIMURA, M.D., 1946.

JAPANESE B ENCEPHALITIS

AVERAGE ANNUAL RATE PER 100,000
BY PREFECTURES 1924—1939
JAPAN
GHQ SCAP

MARCH 46

NUMBER 40