# Public Health Reports 

Vol. 61 • APRIL 26, $1946 \bullet$ No. 17
Printed With the Approval of the Bureau of the Budget as Required by Rule 42 of the Joint Committee on Printing

## A PUBLIC HEALTH PROGRAM FOR RURAL AREAS ${ }^{1}$

By Frederick D. Mott, Senior Surgeon (R), United States Public Health Service ${ }^{2}$

Just as we are all against sin, so are we just as unanimously in favor of public health. There is no more popular subject for resolutions at conferences or for major emphasis in reports, articles, and addresses. There is widespread agreement, for example, that every section of the Nation should have access to complete public health services, that every rural area should have the unquestioned advantage of a health department under the direction of a full-time health officer. .There is even close agreement as to details-desirable geographic and population coverage, program, staffing, and budgeting.

Then what is holding us up? The war is over, personnel is available to be trained, materials and labor will soon be at hand for health centers, State and local coffers are fuller than usual, the Federal Government can afford the equivalent of a couple of battleships each year, and we have the professional know-how. Is the trouble that we want hard-surfaced roads more than we want health? That people simply don't know what a first-rate public health program has to offer? Is the difficulty that county rights and county jobs and stifling tax limit legislation seem obstacles just too bothersome to overcome? Is the trouble perhaps largely with us, the leaders? Has lip service had an insidious tendency to be substituted for the kind of action which can achieve results?

Let's see how important organized preventive services are to the rural population, and then let's look at the record. Despite remarkable progress since the turn of the century, rural America has largely lost its advantageous position relative to urban health. Its disadvantage today is chiefly with respect to those conditions which can be influenced directly by modern health educational and preventive services. Thus the death rates of rural infants, preschool children,

[^0]and youths 15 years of age and over where higher in 1940 than those of residents of large cities. While cities of 100,000 or more had an infant mortality rate of 34.3 in 1942, the rate was 43.3 in rural places and 44.6 in semirural towns. The rural maternity mortality rate in 1941 was almost one-third higher than the big-city rate.

The significance of a decent chance for life and good health for rural babies and mothers is far reaching. The rural birth rate exceeds the urban by a wide margin. In urban places of over 10,000 population 10 adults are raising 7 children; on farms 10 adults are raising 14 children. Over half of all the children in the Nation are found in rural communities. One result of this high birth rate and of economic and social pulls and pushes, is seen in the farm-to-city migration with which we are all familiar. If it were not for the constant flow to the cities, the urban population would decline about 24 percent in a generation. It is clear that if tomorrow's urban citizens are to have the opportunity to build sound bodies and alert minds in infancy and childhood, the benefits of scientific health care must be extended to the country as well as the city.

When we examine the causes of death as of 1940, we find that in general the infectious and more or less preventable diseases take larger rural tolls. This is true, for example, of pneumonia and influenza, diarrhea and enteritis, typhoid and paratyphoid fever, accidents, malaria, pellagra, diphtheria, measles, scarlet fever, and whooping cough. It may come as a surprise that the notifiable diseases, that is, the diseases that must be reported to health authorities, have higher case rates in the more rural States. If we take the most rural State and the most urban State in each of the nine census regions, we find that, as a group, the most rural States had higher case rates in 1942 for chickenpox, whooping cough, mumps, scarlet fever, diphtheria, septic sore throat, malaria, bacillary dysentery, typhoid and paratyphoid fever, tularemia, and smallpox.

It may be surprising, too, that trends show that tuberculosis and syphilis may soon become primarily rural. The total rural incidence of syphilis among men of draft age already has been estimated as higher than the urban rate. These trends have been accelerated by newer case-finding, treatment, and control measures which are being applied more rapidly among industrial workers and urban residents.

The whole pattern of rural deaths and rural disease is more like that found in the Nation as a whole in 1900 than is the corresponding urban pattern. In short, the picture still has some resemblance to the situation when infectious diseases and the results of grossly inadequate sanitation were prevalent everywhere. The implications are clear; organized preventive services in rural communities must be strengthened and must be broadened.

The record shows that to date far too little has been done to meet even the most obvious needs. Despite gratifying progress since passage of the Social Security Act in 1935, there were still 1,242 counties in 1942-40 percent of all the counties in the Nationwithout full-time county or district health departments. Excluding the people covered by municipal health agencies in these counties, there still remained 33 million people, one-fourth of our national population, lacking the protection of a full-time health department.

Moreover, this consideration of the counties lacking any official health coverage gives only part of the picture. Few of the rural health departments we do have are housed, staffed, or financed in a manner adequate to their jobs. We find the typical health department housed in a setting hardly fitting to an agency which should symbolize sanitary maintenance and modern medical science. The personnel of the rural health department is nearly always inadequate in numbers and in type of training. The rural health officer is all too often untrained in the techniques of modern health administration. We have far too few well-trained public health nurses. We think of the South as relatively well covered by local health departments, but in 1940 the urban Northeast had more than double the supply of public health nurses found in the South.

The most decisive reflection of public health resources is the ratio of the health department's budget to the population it must serve. Competent authorities agree that $\$ 2$ per capita is required to provide satisfactory public health services. Yet in rural counties the per capita expenditure for public health work is hardly 50 cents annually Total expenditures by local health agencies in our most rural States in 1942 were at only about half the rate of those in the most urban States.

With inadequate physical facilities, personnel, and financial resources, it is small wonder that the volume of public health services rendered by rural health departments falls far short of meeting the needs. A study of Farm Security borrower families in 1940 showed that only 37 percent of children up to 8 years of age had been vaccinated against smallpox either at public health clinics or by private practitioners. In contrast, 89 percent of children in this age group had been vaccinated in 28 large cities studied in the National Health Survey. Two out of every three rural counties in 1945 provided no regular "well baby" or "child health" conferences or clinics. And 3 out of 4 rural counties provided no regular monthly prenatal clinics. There is little doubt that high rural infant and maternal mortality rates are related to these deficiencies in public health services. Other categories of service show similar lacks. School health services, for example, are especially deficient in rural sections. The same story
holds true for tuberculosis control, venereal disease control, health education, or almost any other accepted function of a local health department.

These deficiencies point up the steps we must take to make organized preventive services available to the whole rural population. We would all agree that one of the best ways to prevent disease is to be sure that everyone has a good education and an adequate income so that he can have decent housing, a well-balanced diet, and enough rest and recreation. We know, too, that early diagnosis and prompt treatment of disease are the most potent weapons of preventive medicine. Beyond this, however, there are many specific preventive activities which should be carried out by a good public health department. It can help to provide for better environmental sanitation and prevent the occurrence of filth-borne diseases. It can teach the essentials of good nutrition and of sound hygienic practices. It can provide special care for expectant mothers and newborn infants. It can prevent the spread of devastation of venereal diseases and of tuberculosis, and can do much to control other communicable diseases. There is a tremendous field for health departments in the prevention of serious mental disorders through mental hygiene services.

Before a broad preventive program can be undertaken, an area must be served by a well-trained and adequately paid public health staff, headed by a competent medical officer. The staff should not only have a sufficient number of public health nurses (preferably one for every 2,000 people), and sanitarians (one for every 10,000 or 15,000 people), but, ideally, there also should be experts in health education, nutrition, sanitary engineering, laboratory work, and vital statistics. Attached to the staff, too, there should be public health dentists and special clinic physicians.

If a competent local staff is to be supported, greater financial resources are required than are available in most rural counties. The American Public Health Association has proposed a sound plan that would group counties with small populations into districts of at least 50,000 people. On this basis, the 3,070 counties in the Nation could be grouped into fewer than 1,200 districts, a far more sensible organization of public health than today's 18,000 independent, uncoordinated health jurisdictions.

Effective public health organization is possible only if adequate financial support is forthcoming. Federal grants-in-aid to the States for public health and maternal and child health services, and State financial aid to local health jurisdictions, have an important part to play in the attainment of these services. Nevertheless, the support which local communities give to public health must continue to play a fundamental role. If rural communities would put up about
$\$ 1$ per person per year themselves, to match about another dollar coming from outside sources, far more could be done to improve rural health than anything we have accomplished up to this time.

There is another point concerning rural public health organization which deserves the thorough study of farm groups and of the medical profession. Most States now have permissive legislation regarding the establishment of local health departments. Under these laws a county or a community may appropriate funds for public health. Surely we have reached the stage where we should insist upon mandatory State legislation under which appropriate public health units would be established throughout the State and their financial support would be required. We already have laws of this kind governing the establishment of public schools. Similar legislation would be the surest way, and an entirely practical and intelligent way, to make public health services available to every rural citizen within a reasonable period of time.

While public health of the more or less traditional sort demands our attention as a fundamental need in every rural community today, it would be unrealistic not to look ahead to the new horizons of public health opening before us. The major public health problems today are the diseases which are not amenable to usual public health methods. These already cause about 21 out of every 22 deaths. They are largely the degenerative diseases of advancing years-the various diseases of the heart, the blood vessels and the kidneys, diabetes, cancer, and arthritis. This whole group of diseases is one which represents not only the major killers of our day but also the major causes of both acute and chronic illness and disability.

As medicine faces this complex and heavy burden of day-to-day illness and disability, it is clear that the public health of the future (that is, our hope of preventing or diminishing the effects of illness) becomes early and adequate medical care-preventive, diagnostic, and therapeutic. This calls for the ready availability of competent physicians and other health personnel in adequate numbers, and of appropriate physical facilities within reach of the patient.

I need not repeat here the story of rural inadequacies. We are all aware of the gross lacks in health workers and in facilities, and of the steady downhill trend in the supply of rural doctors that nothing so far has interrupted or reversed. I need not review the overwhelming evidence as to the low volume of medical services received by rural people. I simply want to address my remarks to a few basic problems which I am certain are of real concern to this group. These observations are the outgrowth of considerable study in this field and of almost 10 years of full-time effort directed toward helping farmers solve some of these problems through voluntary health insurance. First,

I want to touch on the fundamental question of rural purchasing power and the medical purchasing power of farm families.

Passing over the strikingly low farm income figures revealed by the 1939 Census of Agriculture, and coming up to more recent years when the war was having a marked influence on farmers' incomes, we find that in 1941 half of all farm operators had annual net cash incomes of less than $\$ 760$ per family, including income from all nonagricultural sources.

As the war went on, farm income, of course, soared to unprecedented heights. Nevertheless, the war did not eliminate the disparity between farm and city income levels. In 1943, when farm income was approaching its peak, the total net income from all sources of persons on farms, 17.5 billion dollars, was only 12 percent of the national income of 148 billion dollars, although farm people made up 20.5 percent of the population that year. The per capita net income of all persons in the United States not living on farms, moreover, was over two and a half times as bigh as per capita net farm income. These figures give small comfort or assurance that the pull of the cities, drawing much that is best from rural life, will of itself be relaxed or reversed in the forseeable future.

The purchasing power of whole States becomes significant in any plan for tackling the medical care problem on a voluntary or even on a State-wide compulsory basis. There is an almost mathematical relationship between the proportion of rural people in a State and the State's per capita income. In fact, each 10 percent by which a State was rural in population in 1940 meant about $\$ 100$ per capita less in the income of its citizens. Thus Illinois, with a population 74 percent urban, had a per capita income of $\$ 727$; Ohio, with a population 67 percent urban, had a per capita income of $\$ 644$; and Indiana, 55 percent urban, had a per capita income of $\$ 542$. Dropping on down to the more rural States as further illustration of this striking relationship between rurality and income, we find that Nebraska, which was about 40 percent urban, had a per capita income of $\$ 432$; Georgia, 34 percent urban, $\$ 316$; and Mississippi, just 20 percent urban, $\$ 203$. The implications of these income figures are obvious in terms of the efforts which can be made within individual States to make comprehensive medical services available to their people.

So far as rural medical purchasing power is concerned, as contrasted to general purchasing power, it is revealed perhaps most readily in the annual expenditures per person for medical care by median income families. Studies show that in 1941, median income urban families spent $\$ 26.76$ per person for medical care, while median income farm families] spent $\$ 14.37$ per person, or hardly more than half the urban expenditure.

It is not surprising that there is so close a relationship between purchasing power and the distribution of physicians, dentists, and nurses; and of general and other types of hospital beds. It is perfectly clear that modern medical services of high quality cannot be provided without adequate resources in personnel and facilities. It is clear also that these essential health resources will become available only when the underlying economic factor is recognized frankly and dealt with effectively.

Before we set out to solve the whole problem of payment for medical services on a voluntary basis, we must not only face these cold factual income and expenditure figures, but we must remind ourselves that fewer than 5 percent of the whole population now receives general medical services on a prepayment basis. Less than 3 percent of all farm people are covered even by Blue Cross hospitalization, and taking whole States, the States which are over 70 percent rural had just 4.2 percent of their population in Blue Cross plans last July 1, as against 18.7 percent in the States over 70 percent urban. We must note, too, that in voluntary plans offering general medical care-aside from those sponsored by the Department of Agriculture-the greatest urbanrural disparity is found with respect to medical care insurance sponsored by medical societies. As of 1945 , medical society plans covered 3 percent of the population of the 20 States that are over 50 percent urban, but in the 28 predominantly rural States, they covered only one-half of 1 percent of the population.

Before we look at the voluntary prepayment approach with optimism, we must ask ourselves frankly how many farm families can afford to join comprehensive medical service plans. There is general agreement, I believe, that a plan offering physicians' and specialist care, hospitalization, dental services, and prescribed drugs, would cost at least $\$ 100$ for a family of average size. Studies show that farmers had to have net cash incomes averaging well above $\$ 2,000$ in 1941 before they made average expenditures of $\$ 100$ or more for medical care. The fact is that not more than 20 percent of all farm operators had such incomes in 1941, counting income from all sources. The proportion of farmers able to afford an adequate plan has doubtless increased since 1941, but there is no question that the great majority of farm families throughout the Nation simply cannot afford to purchase adequate health protection on a voluntary prepayment basis.

I shall not go into the other serious weaknesses of voluntary health insurance or the lessons gained by first-hand experience-the low participation, the turn-over, the adverse selection of risks, the resulting high cost for the services offered, the frustration of seeing the clear need for improved rural health resources and yet tackling formidable
barriers with insufficient ammunition and forces, the experience of using heavy subsidy and yet not overcoming most of the weaknesses inherent in the voluntary approach, the discouraging experience of watching rural downhill trends extend progressively on and down, most important, the sense of futility in seeing voluntary plans based on existing inadequate patterns of facilities, personnel, and organiza-tion-plans which simply lack the power of maintaining better physical facilities, of attracting more competent or more specialized personnel, or of stimulating a more effective organization of medical services.

To my mind, we have a choice to make. Each road we may choose has its toll. One road winds for a time through the field of voluntary health insurance. Although this road is an improvement over the past, its toll is one we should calculate honestly. It has its cost in almost certain failure to bring anything approaching maximum health opportunity to the majority of our 57 million rural citizens. There is also a hidden cost behind these phrases that we must face. There are people living out over this broad land-people on farms and in villages, people whose babies get sick, whose children break arms and legs, who get every physical and mental disorder known to American medicine. These people want competent physicians nearby; they want a modern hospital within reach; they want certain specialists closer than the metropolis 200 miles away. And they want a simple and sure method of paying their share for the support of these essential resources. I, for one, am unwilling to say to representatives of the farm population that these objectives are utopian. On the contrary, they are realistic, they make sense, and they are attainable. But it will take more than the road winding through the tempting pastures of voluntary health insurance to reverse the inexorable trends dictated by economic laws. We may choose this first roadfor 5 years, for 8 years, or for 10 years-but if we do, let us count the cost along with any gain.

There is another road we can choose today, the road charted by President Truman. It is broad and it is direct-the way of compulsory health insurance. In one sweep it cuts through the economic barrier, bridges the uncertainties of individual medical costs, and stretches out into the future a solid economic foundation for all the challenging measures we can devise to build good health. This road also has its toll, but of a different sort. If we choose this road, the cost we shall pay will be found largely in the taxing of our minds and our imaginations to build, and build promptly, on the solid and unaccustomed economic base the system will provide.

Think for a moment what it would mean if we had this central core of national health legislation. Medical purchasing power would be spread evenly, the country over. Hospital planning and construc-
tion proposals would suddenly have real meaning for rural people, for hospitals could be placed where needed once their maintenance was assured. The urban-rural double standard would be wiped out-rural people would be assured the number of hospital beds they need and not just those they can support today. Something like $\$ 10$ per person would suddenly become available to pay physicians' bills each year- $\$ 10,000$ for every 1,000 rural people, $\$ 20,000$ for every 2,000 people. Think of the opportunities this would create in hundreds of underserved rural counties. Picture the flow of veteran physicians and new graduates into rural districts under these changed economic circumstances and with the assurance of hospital or health center facilities.

Of course there would be problems, too-questions of training sufficient personnel, of working out patterns for continuing professional education, of affording wider opportunities for research; problems relating to the intelligent organization of medical services, the role of voluntary agencies and medical cooperatives within the system, the progressive elevation of standards, the acceptance by the medical profession of responsibility for the quality of care. Herein lies the challenge-the challenge of facing and overcoming these problems into which the medical profession and other leaders should throw their full energy and their best thinking. It is a challenge which cannot be met head-on while our force is expended in halfway efforts to solve only one problem-the problem of payment for medical services.

The American farmer and his family want to choose the road that will lead them as smoothly and rapidly as possible to health security. Farm leaders have a responsibility to see that farmers know all the facts when they make their choice. They should know all the strong and weak points about voluntary prepayment plans. They should know the facts, too, about the President's program. They should know that the day-to-day administration of the President's program will be local. They should know that in this program local people and their doctors will serve as consultants in their localities. They should know that, as always, they would choose their own doctors and their hospitals. And they should know the cost of either course in terms of money. Under the President's proposal for a national health program, the farm family would pay from 3 to 4 percent of net income for personal health services. The average percentage of net cash income spent by farm families in 1941 (for inadequate services) was actually 8.7 and the percentage spent by low-income farmers was higher yet. It seems unlikely that farmers will miss the point or will fail to recognize the clear advantage to farm people and to entire rural States of pooling the resources of the whole Nation to tackle this problem.

The public health is the sum total of individual health. The costs of adequate health services for the whole population should be borne by all of us. Good health care-Nation-wide-is a goal that is within our reach. It is a challenging goal that is many sided, but only the faint in heart will fail to take it up.

## HOMOLOGOUS SERUM JAUNDICE

## EXPERIMENTAL INACTIVATION OF ETIOLOGIC AGENT IN SERUM BY ULTRAVIOLET IRRADIATION ${ }^{1}$

By John W. Oliphant, Senior Surgeon, and Alexander Hollaender, Senior Biophysicist, United States Public Health Service.

In previous papers (1), (2), results of ultraviolet irradiation experiments on the inactivation of two icterogenic serums and one lot of icterogenic yellow fever vaccine containing serum were presented. The amounts of radiation used varied widely in the three experiments and it seemed advisable to try to estimate within more narrow limits the amount of energy required for inactivation.

A supply of dried pooled serum known to be icterogenic was kindly furnished by Dr. Chester S. Keefer, Medical Administrative Officer, Committee on Medical Research, who obtained the material from England through the Office of Scientific Research and Development. The serum was reconstituted to its original volume by the addition of sterile distilled water.

## Irradiation Procedure.

## Bacteriological Control

The material was irradiated in a $50-\mathrm{cc}$. round-bottom flask made of transparent fused quartz. Sixteen cubic centimeters of serum was introduced in such a manner that no material touched the neck of the flask which was then stoppered tightly, attached to a "slow" motor, which held the flask at an oblique angle, and rotated at about $50 \mathrm{r} . \mathrm{p} . \mathrm{m}$.

In general, when proteins are irradiated with ultraviolet in quartz containers, the tendency of the protein is to form a layer of coagulum which sticks tenaciously to the quartz, and has high absorption for ultraviolet under $3,000 \mathrm{~A}^{\circ}$, thus reducing the radiation penetrating to the remaining serum. The $50-\mathrm{cc}$. flasks were supplied with 16 cc . only and rotated at such an angle that the upper one-third to onefourth of the flask did not come in contact with the liquid. This last point is quite important because it is necessary that the ultraviolet penetrate the quartz without obstruction and that a fresh surface is offered continuously to radiation by the rotating liquid. The above arrangement fulfills at least partially this condition.

[^1]

Figure 1.-Apparatus for the irradiation of serum with $\lambda 2537$ A. Eight 8-watt low-pressure mercury vapor lamps with glass envelopes surreund a rotating $50-\mathrm{cc}$. fused quartz flask with 16 cc . of serum. The flask is exposed from all sides to ultraviolet radiation. The upper part of the flask which does not come in contact with the serum permits the direct irradiation of the fresh surfaces which the rotating liquid presents.

Eight 8-watt low-pressure mercury vapor lamps with special glass envelopes which emit about 80 percent of their total radiation at wave length 2537 A were used as radiation sources. The lamps were arranged in two groups forming two quadrangles in which the flask revolved and was exposed practically from all sides to ultraviolet radiation (see fig. 1). The flask was cooled by a strong stream of air from a fan to avoid heating the serum to higher than room temperature.

There is no simple direct way to determine the amount of energy each individual serum or virus particle receives. However, there is an indirect way to estimate the energy received by each particle of about $1 \mu^{3}$. The method consists in irradiating bacteria of known sensitivity in the serum under standard conditions and plating them out in nutrient agar after certain time intervals of exposure for the determination of survival ratios. The organism used in this case was Aerobacter aerogene, which could readily survive in the serum for the time of the test if protected against the ultraviolet.


Figure 2.-Survival of Aerobacter aerogenes in jaundice serum irradiated with 2537 A. This serum came from the same batch as the serum which was tested for survival of virus. (Original concentration of bacteria $22,000,000$ per milliliter.)
A. aerogenes was incubated for 4 days at $37^{\circ} \mathrm{C}$. on Difco meatpeptone agar. The bacteria were washed off with physiological salt solution, shaken to break up clumps, and filtered through absorbent cotton. The bacteria were added to the serum so that each milliliter contained about $20,000,000$ bacteria. The material was well mixed in the irradiation flask and two samples removed, one for the immediate plating and one to be kept in the dark at room temperature to be plated out at the end of the experiment. At certain time intervals during irradiation $1 / 10-\mathrm{cc}$. samples were removed, diluted, and plated out. At least three plates were poured for each dilution and as many as three dilutions were plated for each exposure. Plates showing between 20 and 300 colonies per plate were counted and the average per three plates plotted (see fig. 2). The points for 15 - and $20-$ minute exposures are less reliable than those for shorter intervals because the number of colonies per plate was too low.

It takes about $80 \times 10^{-5}$ ergs per organism to kill 99 percent of $A$. aerogenes, if irradiated in physiological salt solution. If we accept A. aerogenes to be $1 \mu^{3}$ in volume, then each particle of $1 \mu^{3}$ in the serum has received approximately $80 \times 10^{-5} \mathrm{ergs}$ in 5 minutes. (Hollaender, Andrews, and Oliphant, are preparing a paper giving further details of technique and precautions necessary in this work.)

Four groups of 12 persons each, aged 16 to 40 years, of either sex, in apparently normal health, were inoculated as follows:

Group 1. Nonirradiated serum control group, serum diluted 1:4 with M/15 phosphate buffered normal saline solution pH 7.6 , dose 0.5 cc. subcutaneously into the deltoid region.

Group 2. Dosage and dilution of serum as in group 1. Irradiation time 1 minute.

Group 3. Dosage and dilution of serum as in group 1. Irradiation time 6 minutes.

Group 4. Dosage and dilution of serum as in group 1. Irradiation time 30 minutes.

These individuals were then bled weekly for 161 days. Quantitative Van den Bergh estimations and cephalin cholesterol flocculation tests were done on each serum specimen on the day of bleeding.

Cases of hepatitis observed in the four groups were as follows:

| Group | Number of subjects | Serum irradiation time (min.) | Serum dose, Sc. ${ }^{1}$ | Serum dilution | $\begin{gathered} \text { Number of } \\ \text { cases } \\ \text { hepatitis } \end{gathered}$ | Incubation period ${ }^{2}$ (weeks) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 12 | 0 | 0.5 cc | 1:4 | 4 | 12, 13, 13, 13 |
| 2 | 12 | 1 | 0.5 cc | 1:4 | 0 |  |
| 3 | 12 | 6 | 0.5 cc | 1:4 | 1 | 12 |
| 4 | 12 | 30 | 0.5 cc | 1:4 | 0 |  |

${ }^{1} \mathrm{Sc} .=$ subcutaneous injection of serum diluted after irradiation.
${ }^{2}$ Period between inoculation and rise of serum bilirubin above 1.0 mg . per 100 cc .

As to severity of the hepatitis, only two of the patients were ill enough to require bed rest for short periods while jaundiced. The highest Van den Bergh readings found in the four cases in group 1 were $1.4,5.6,8.0$, and 10.0 mg . per 100 cc . In the one case in group 3 the highest reading found was 3.3 mg .

## Discussion

The results of this experiment are statistically significant. The hepatitis incidence was 30 percent in the control group as compared with an incidence of $0,8.3$, and 0 percent in the three groups inoculated with irradiated material. The end point of irradiation at which complete inactivation of the icterogenic agent would occur (under the conditions of this experiment) would seem to be at some point in excess of 6 minutes.

It is possible, of course, that the factors of titer of the icterogenic agent and the dose of serum given would have an influence upon the "icterogenic capacity" of irradiated material.

In three previous experiments (2), three specimens, including yellow fever vaccine and two human serums, produced jaundice in normal control groups while the same materials irradiated for varying periods of 1 to 30 minutes produced no jaundice in test groups of comparable size.

It would seem, therefore, that the etiologic agent of homologous serum jaundice is susceptible to inactivation by ultraviolet irradiation. This suggests the possibility that ultraviolet irradiation might be useful as a routine procedure in processing potentially icterogenic human serum or plasma.

It has been found (1), (2), (8), (4), that the serum of persons during the "incubation period" of infectious hepatitis or "homologous serum jaundice" may contain the icterogenic agent. There is at present no means for detecting the presence of the agent in blood other than by human inoculation. There is an ever-present danger in the use of human blood, plasma, or serum that the agent of infectious hepatitis may be encountered. Since the agent is filterable and quite resistant to heat, preservatives, drying, and ordinary storage conditions, (1), (2), ultraviolet irradiation appears to be the most practical method available at present for inactivating the agent in blood products.

Prophylactic irradiation would probably find its chief use in processing human immune serums and "normal" human serum before incorporation into vaccines.

Immune serum irradiation brings up the question of possible destruction of serum antibodies. Different kinds of antiserums, both
antiviral and antibacterial, have been irradiated for varying periods in the same apparatus described above, and found to be quite resistant to heavy doses of radiation. This work will be described in a subsequent paper.

## Summary

Dried human icterogenic serum was reconstituted and irradiated with ultraviolet light for periods of 1,6 , and 30 minutes. Each irradiated specimen was inoculated subcutaneously into 12 individuals in doses of 0.5 cc . in dilution of $1: 4$. A control group of 12 received the same dose of nonirradiated serum.

Subsequently 4 cases of jaundice appeared in the control group after 12-, $13-$, 13 -, and 13 -week intervals. One case of jaundice occurred after 12 weeks in the group receiving material irradiated for 6 minutes.

## References

(1) Oliphant, J. W.; Gilliam, A. G.; and Larson, C. L.: Jaundice following administration of human serum. Pub. Health Rep., 58:1233-1242 (Aug. 13, 1943).
(2) Oliphant, J. W.; Jaundice following administration of human serum. The Harvey Lectures Series, 39:254-272 (1943-44).
(s) MacCallum, F. O., and Bauer, D. J.: Homologous serum jaundice transfusion experiments with human volunteers. Lancet, 1:622-627 (May 13, 1944).
(4) Paul, J. R.; Havens, W. P.; Sabin A. B.; and Philip, C. B.: Transmission experiments in serum jaundice and infectious hepatitis. J. Am. Med. Assoc., 128:911-915 (July 28, 1945).

# INSTRUCTIONS FOR USING ANTU AS A POISON FOR THE COMMON NORWAY RAT ${ }^{1}$ 

By Curt P. Richter and John T. Emlen, Jr.

## INTRODUCTION

These instructions are intended for workers in the field of public health who are concerned with city- and country-wide problems of rat control. For this reason the emphasis has been placed on large scale control operations. No special merits are claimed for the poison alpha-naphthyl thiourea (ANTU) for this purpose. Other poisons might give as good or better results. ANTU has, however, already been given a severe test as the exclusive poison over a long period of time in a large city experimental campaign.

## Rat Control Is a Community Problem

ANTU was tested for its efficiency and safety over a 3-year period in a city-wide rat-control campaign in Baltimore, Md. During this

[^2]period more than 50 tons of poisoned baits were distributed in over 150,000 private yards, homes, and stores. Over a thousand Baltimoreans handled the poisoned bait. No persons were poisoned and the rat population was reduced on the average about 90 percent or better in treated areas.

At the same time ANTU was tested by the United States Fish and Wildlife Service, the United States Public Health Service, and by several professional exterminator companies with good results. It has been tested also in England and Australia.

Experience gained in the extensive ćampaign in Baltimore indicated clearly that the control of rats depends not only on the use of an efficient poison, but also on a systematic poisoning program and procedure. A few general principles may be emphasized at the beginning:

1. Poisoning operations should not be attempted on a small scale. It is unwise to use poison in a single house or building which is surrounded by a rat-infested area unless the house or building is well ratproofed.
2. In community programs in urban areas it is recommended that no less than an entire block be treated with poison at one time. The four streets surrounding a block form natural boundaries to most local rat movements.
3. A city block can be treated with poisoned bait in several hours by two to four men at small cost. If care and thoroughness are emphasized a single poisoning operation will kill 90 to 100 percent of the rats. Every effort should be made to kill the last rat. Some blocks that have been freed of the last rat have remained free for several years even though they were surrounded by infested blocks.
4. In rural areas a whole farm should be baited at one time, at least those parts of it which afford food and harborage to rats.
5. In a large-scale poisoning program, involving large parts or all of a town or city, preparations must be made for a wellplanned attack. Before starting operations the cooperation of the mayor and health officers should be sought, workers should be organized, and an effective publicity campaign instituted to inform and arouse all citizens. At the same time the groundwork should be laid to keep the poisoned area under permanent surveillance.
6. Whether for a small- or large-scale program the work can be done by exterminator companies, paid crews of city employees, or volunteer groups of citizens belonging to various social or civic organizations, or by a combination of these.
7. Thoroughness is of primary importance in baiting. In working in a block, every single house, yard, and cellar should be inspected and baited wherever necessary. An overlooked colony of rats may quickly reinfest the entire block.
8. The permanent surveillance is of great importance since any house, block, or district, no matter how thoroughly freed of rats, is subject to reinfestation so long as rats still exist in the vicinity, or can be brought in by freight cars, trucks, or moving vans. ANTU of course does not protect against reinfestation.

## What is ANTU?

ANTU is a highly specific poison for the Norway rat-the rat most commonly found in cities, towns, and on farms, in the United States and in most other countries. It kills a smaller percentage of roof or Alexandrine rats and house mice and so is not recommended for killing these animals. It does not poison chickens, pigeons, rabbits, guinea pigs, or squirrels. It can kill dogs and cats, but it does so infrequently since in most instances the animals vomit before the poison is absorbed. So far as is known at present it probably is nontoxic to man except in large amounts.

ANTU comes in the form of a fine bluish-gray powder (particle size 20-100 microns). It is highly insoluble, stable to heat, and deteriorates very little if at all during several years' dry storage. It has no perceptible odor, and only a very transient bitter taste.

ANTU mixes evenly with all kinds of food (or ground grain) and adheres well to dry or wet foods when dusted on them. It sticks to the feet and hair of rats when the rats run through it. It dusts well from insect dust sprayers and pump guns such as used for cyanogas powder.

ANTU kills through the stomach, not through contact with the skin. Rats die when they eat it in their food or lick it off their feet and hair.

ANTU acts chiefly on the lungs. Within a few hours after poisoning the lungs and the thoracic cavity become filled so that the rats drown in their own fluid. They die usually within 10 to 24 hours. Their breathing difficulties drive them to the outside.

ANTU is a single-shot poison; it is not an accumulative poison. Everything depends on getting a fatal amount of poison into the rats at the first meal, since after eating a sublethal dose they develop a tolerance which lasts about 30 days and an aversion which may last several months.

## How To Use ANTU

## 1. In ground baits

Thoroughly mix 2 or 3 parts of ANTU with 100 parts of finely ground grain, preferably a high grade of yellow corn. Distribute in small shallow piles.

## 2. Dusted on baits

Place freshly ground yellow corn or other grains in small piles on floor or earth and smooth out to a flat thin layer about $~ \% /$ inch
in thickness. Dust the grain and surrounding areas for 6 inches with ANTU, using a small spray gun, duster, or shaker. Use diced apples, sweet potatoes, tomatoes, cantaloupes, watermelons, ground meat, the white and yolk of eggs, and fish or chicken heads in the same manner.

Dust ANTU on fresh ears of corn, the kernels of which have been slit by running a sharp knife lengthwise along the cob. Cut the cob into 1 -inch sections and distribute. (Very useful for distribution in inaccessible places.)

## 3. Dusted on floor and on runways without baits

Spread a 50 percent mixture of ANTU and flour over ground in areas which rats frequent, especially along runways and near openings.

## 4. Pumped in burrows

Pump ANTU powder (or flour-ANTU mixture as in No. 3) into openings of rat burrows with foot or hand duster until floor of burrow is well coated.

## 5. Dusted on water or mixed with water

Use small shallow cups or dishes. Dust ANTU on water until it forms a thin film on surface; or put 1 to 2 parts of ANTU with 100 parts of water in a bottle, shake well, and pour into a shallow dish. After being shaken up with water the powder tends to settle within a few hours so that repeated shaking or stirring may be necessary.

For best results use several methods (at least Nos. 1, 2, and 5) at the same time. Try to provide an excess of bait for all suspected rats, but do not throw bait around carelessly. Make the rat's first poisoned meal its last meal.

Use those baits that are most attractive to local rats during the season of poisoning operations. Yellow corn is practically a complete food and is almost universally attractive, used either when freshly ground or fresh on the cob.

In grocery stores or other places where food is available at all times make liberal use of poisoned water.

## Where To Use ANTU Baits

1. Place poisoned baits near feeding places, especially garbage pails and food-storage places, or in sheltered spots where rats can eat without being disturbed.
2. Near sources of water for rats.
3. Near burrow entrances and harborage sites.
4. Along runways.

## Distribute bait liberally wherever rats have been seen or suspected at any

 time.
## When To Use ANTU

1. Distribute poisoned baits, particularly poisoned water, late in afternoon if possible.
2. Spring, summer, and early fall appear to be the most favorable times of the year for poisoning operations.

## How To Prepare for Use Of ANTU

1. Make a survey of the area to be poisoned-the buildings, houses, cellars, yards, and alleys, for signs of rats.
2. Especially when yellow corn or equally attractive baits are not available, it may be desirable to pre-bait with unpoisoned baits for several days to make certain that the rats will eat the bait freely.
3. See that all food available to rats (especially food for dogs, cats, and birds) is removed if possible 24 hours before ANTU-treated baits are distributed.

## Precautions To Be Observed

1. Warn all individuals within areas to be poisoned to keep children away from baits and to leash dogs.
2. Use only grain baits in places which dogs and cats frequent.
3. Coloring baits with an insoluble pigment (such as du Pont chrome green G-550-D) will reduce the possibility of poisoned baits being mistaken for food.
4. When poisoning operations are over, take up all uneaten baits and dispose of them in some place inaccessible to pets.

## How To Check Results

1. Look for dead rats for several days following poisoning. In cold weather few rats die on the surface.
2. On the third day close all rat holes with dirt or stones and sweep up or stamp out all fresh droppings. If any rats remain the holes will be reopened within a few days.
3. Look for fresh droppings on runways.
4. Dust flour on runways to show up fresh tracks.
5. Have everyone watch for rats and report to local rat inspectors.
Schedule for Poisoning an Entire Block, a Group of Blocks, or a Farm

Preliminary work.-Discuss situation with all people who are involved, organize workers, plan your attack. (See introduction.)

## First day

1. Notify and caution all persons within the area and tell them the approximate time of the poisoning.
2. Make survey to locate all infested places, indoors and outdoors.
3. See that all uncovered garbage, exposed food, and sources of water are removed.

## Second day

Distribute poison.

## Fourth day and thereafter

1. Remove poison; close burrows. Sweep up droppings.
2. Check for fresh rat signs. Recheck at monthly intervals.
3. If rats remain or reappear, trap or kill with cyanogas. Keep after them and try to eliminate the last rat.
4. Repeat ANTU treatment once a year if necessary.
5. Institute sanitary measures insofar as possible to eliminate rat harborage and sources of food for rats.
In Case of Accidental Poisoning of Human Beings or Pets
6. Call a doctor or veterinary.
7. Induce vomiting or pump out stomach.
8. Treat for shock.
9. Keep warm.
10. Use positive pressure oxygen inhalation if available.

## For the Doctor's Information

The symptoms of poisoning in dogs as well as rats are:

1. Drop in body temperature, increase in blood sugar.
2. Dyspnea, pulmonary edema, and pleural effusion which develop within 1 to 3 hours.

## STUDY OF CHILD HEALTH SERVICES BY THE AMERICAN ACADEMY OF PEDIATRICS

A Nation-wide study of child health services to stimulate local groups to ascertain the needs of their own communities and the existing facilities to meet them has been launched under the joint sponsorship of the American Academy of Pediatrics, the United States Public Health Service, and the United States Children's Bureau.

The project represents a cooperative attempt on the part of private and official medical and health organizations to discover the facts about medical care for children as a basis for future planning. The responsibility for the actual conduct of the study is the Academy's, but both of the Federal agencies are contributing to its success by providing the services of expert medical and statistical personnel.

Of equal importance to the success of the study will be the part played by official health agencies and other official groups in the States in supplying data and promoting the study.

The study grows out of a resolution adopted by the Academy "to make available to all mothers and children of the United States all essential preventive, diagnostic, and curative services of high quality, which, used in cooperation with other services for children, will make this country an ideal place for children to grow into responsible citizens."

A first step toward this objective is the assembling of information on every aspect of public health and medical care for children. A vast amount of data will be required before community planning can be undertaken on a sound basis.

Data will be collected from hospitals and institutions, official and voluntary health agencies, and physicians and dentists engaged in practice relating to child health. The information will be collected on a State basis by personal visits and questionnaire schedules. Each State program will be under the supervision of the State chairman of the Academy of Pediatrics, who, aided by an executive secretary and assistants, will be responsible for the administration and coordination of the study in his State.

An important aspect of the study is the collection of information concerning local official and voluntary health services for children, including well-child conferences, school health programs, dental clinics, and public health nursing activities. The American Academy of Pediatrics has formally requested the support and assistance of all public health officials-State, district, and local-to insure the success of the study. This request, addressed by a national medical organization of high standing to governmental agencies, represents another milestone in cooperative action. It affords the opportunity for the two groups to combine their resources and abilities for the successful completion of an important study.

Considerable progress has already been made. A "pilot" study has been completed in North Carolina affording much valuable experience in testing proposed procedures. Preliminary steps have been taken in some 30 States and the District of Columbia toward setting up individual State programs. Many State health officers have already been approached; others will shortly receive information and visits from State chairmen.

## DEATHS DURING WEEK ENDED MAR. 30, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

|  | Week ended Mar. 30, 1946 | Corresponding week, 1945 |
| :---: | :---: | :---: |
| Data for 92 large cities of the United States: |  |  |
| Total deaths... | 9,426 | 9,112 |
| Average for 3 prior years | 9,507 |  |
| Total deaths, first 13 weeks of yea | 132, 123 | 125,811 |
| Average for 3 prior years. | 639 |  |
| Deaths under 1 year of age, first 13 weeks of year | 7,848 | 8,336 |
| Data from industrial insurance companies: |  |  |
| Policies in force---7 | 67, 191, 152 | 67, 166, 267 |
| Death claims per 1,000 policies in force, | 13, 508 | 13, 044 |
| Death claims per 1,000 policies, first 13 weeks of year, annual rate | 11.3 | 10.9 |

## PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

## UNITED STATES

## REPORTS FROM STATES FOR WEEK ENDED APRIL 6, 1946

## Summary

Of the 13 cases of smallpox reported for the week, 17 occurred in Washington and 4 in California. (See p. 617.)

For the second consecutive week, following 3 weekly increases, the incidence of diphtheria declined. A total of 314 cases was reported, as compared with 327 last week and a 5 -year (1941-45) median of 219. Of the current total, more than reported for the corresponding week of any of the past 6 years, Texas reported 36 and New York 29. The total to date, 5,252 (as compared with 4,234 for the corresponding period last year and a 5 -year median of 4,127 ), is more than reported for the corresponding period of any year since 1939.

Of a total of 38,233 cases of measles, as compared with 35,676 last week and a 5 -year median of 25,377 , more than half occurred in the Middle Atlantic and East North Central areas. The 5 States outside of these areas reporting more than 750 cases each (Massachusetts, Kansas, Texas, Colorado, and California) reported an aggregate of 9,889 cases. The total to date is 260,450 , as compared with 36,200 for the corresponding period last year and a 5 -year median of 235,785 .

A total of 158 cases of meningococcus meningitis was reported for the week (as compared with 149 last week and a 5 -year median of 191), of which 27 occurred in New York, the only State reporting more than 11 cases. The cumulative total to date is 2,706 , as compared with a 5 -year median of 3,423 .

Of the total of 28 cases of poliomyelitis (as compared with 32 for the corresponding week of last year and a 5 -year median of 19), only 2 States, New York and Montana, with 3 cases each, reported more than 2 cases. The total for the year to date is 546 , as compared with 485 for the same period last year and a 5 -year median of 353 .

A total of 9,037 deaths was recorded for the week in 93 large cities of the United States, as compared with 9,461 last week, 9,121 and 9,295 , respectively, for the corresponding weeks of 1945 and 1944, and a 3year (1943-45) average of 9,367 . The cumulative figure is 141,698 , as compared with 135,364 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Apr. 6, 1946, and comparison with corresponding week of 1945 and 5-year median
In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

${ }^{2}$ Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Apr. 6, 1946, and comparison with corresponding week of 1945 and 5-year median-Con.


[^3]Telegraphic morbidity reports from State health officers for the week ended Apr. 6, 1946, and comparison with corresponding ueek of 1945 and 5-year median-Con.


Leprosy: Texas 1 case.

## WEEKLY REPORTS FROM CITIES

## City reports for week ended Mar. 30, 1946

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States and represents a cross section of the current urban incidence of the diseases included in the table.

|  |  |  | Influenza |  |  |  |  |  | Scarlet fevercases |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{aligned} & \mathscr{Z} \\ & \text { O } \\ & \text { O } \end{aligned}$ | $\begin{aligned} & \stackrel{\Phi}{\stackrel{\rightharpoonup}{*}} \\ & \stackrel{\Phi}{\otimes} \\ & \hline \end{aligned}$ |  |  |  |  |  |  |  |  |
| NEW ENGLAND |  |  |  |  |  |  |  |  |  |  |  |  |
| New Hampshire: <br> Concord $\qquad$ | 0 | 0 |  | 0 |  | 0 | 2 | 0 | 3 | 0 | 0 |  |
| Massachusetts: |  |  |  |  |  |  |  |  |  |  |  |  |
| Boston--- | 3 | 0 |  | 0 | 356 | 1 | 7 | 0 | 48 | 0 | 0 | 17 |
| Springfield | 0 | 0 |  | 0 | 34 | 0 | 1 | 0 | 8 | 0 | 0 | $\mathbf{6}$ |
| Worcester. | 0 | 0 |  | 0 | 82 | 0 | 12 | 0 | 7 | 0 | 0 | 20 |
| Rhode Island: Providence. | 1 | 0 | 1 | 1 | 5 | 1 | 4 | 0 | 2 | C | 0 | 18 |
| Connecticut: |  |  |  |  |  |  |  |  |  |  |  |  |
| Bridgeport | 0 | 0 |  | 1 |  | 0 | 0 | 0 | 9 | 0 | 0 |  |
| Hartford | 0 | 0 |  | 0 | 2 | 0 | 1 | 0 | 3 | 0 | 1 | 5 |
| New Haven. | 0 | 0 | 1 | 0 | 50 | 0 | 3 | 0 | 5 | 0 | 0 | 2 |
| middle Atlantic |  |  |  |  |  |  |  |  |  |  |  |  |
| New York: |  |  |  |  |  |  |  |  |  |  |  |  |
| Buffialo. | 0 | 0 |  | 1 | 346 | 0 | 10 | 0 | 15 | 0 | 0 | 30 |
| New York | 17 | 0 | 2 | 1 | 1,372 | 10 | 58 | 1 | 508 | 0 | 1 | 50 |
| Rochester | 1 | 1 |  | 0 | 608 | 0 | 5 | 0 | 13 | 0 | 0 | 1 |
| Syracuse | 0 | 0 |  | , | 126 | 0 | 4 | 0 | 6 | 0 | 0 | 6 |
| New Jersey: | 0 | 0 |  | 0 | 96 | 1 | 1 | 0 | 1 | 0 | 0 | 4 |
| Newark. | 0 | 0 | 1 | 0 | 1,216 | 1 | 1 | 0 | 18 | 0 | 0 | 23 |
| Trenton. | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 9 | 0 | 0 | 1 |
| Pennsylvania: |  |  |  |  |  |  |  |  |  |  |  |  |
| Philadelphia | 3 | 0 | 2 | 1 | 806 | 0 | 23 | 0 | 89 | 0 | 1 | 19 |
| Pittsburgh_---...-.- | 1 | 0 | 1 | 1 | 5 | 2 | 7 | 0 | 22 | 0 | 1 | 3 |
| Reading...-- | 0 | 0 |  | 0 | 517 | 1 | 2 | 0 | 4 | 0 | 0 | 10 |
| EAST NORTH CENTRAL |  |  |  |  |  |  |  |  |  |  |  |  |
| Ohio: |  |  |  |  |  |  |  |  |  |  |  |  |
| Cincinnati. | 2 | 0 |  | 0 | 137 | 3 |  | 0 | 6 |  | 0 |  |
| Cleveland.- | 2 | 0 | 2 | 1 | 42 | 1 | 8 | 0 | 47 | 0 | 0 | 25 |
| Columbus. | 0 | 0 |  | 0 | 4 | 1 | 2 | 0 | 15 | 0 | 0 |  |
| Indiana: |  |  |  |  |  |  |  |  |  |  |  |  |
| Fort Wayne- | 0 | 0 |  | 0 | 665 | 0 | 3 8 | 0 | 19 | 0 | 0 | 11 |
| South Bend. | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 6 | 0 | 0 |  |
| Terre Haute. | 0 | 0 |  | 0 |  | 0 | 1 | 0 | 1 | 0 | 0 |  |
| Illinois: |  |  |  |  |  |  |  |  |  |  |  |  |
| Chicago- | 2 | 0 | 1 | 1 | 708 | 10 | 31 | 0 | 107 | 0 | 0 | 44 |
| Springfield.-...------ | 0 | 0 | ....-- | 0 | 7 | 1 | 0 | 0 | 5 | 0 | 0 |  |
| Michigan: Detroit. | 6 | 0 | 2 | 0 | 1,349 | 0 |  | 0 | 44 |  |  |  |
| Flint. | 0 | 0 |  | 0 | 19 | 0 | 3 | 0 | 11 | 0 | 0 | 8 |
| Grand Rapids. | 0 | 1 |  | 0 | 135 | 0 | 3 | 0 | 6 | 0 | 0 | 10 |
| W isconsin: |  |  |  |  |  |  |  |  |  |  |  |  |
| Kenosha | 0 | 0 |  | 0 | 1,527 | 1 | 0 | 0 | 27 | 0 | 0 | $\begin{array}{r}2 \\ \hline\end{array}$ |
| Racine | 0 | 0 |  | 0 | 1, 38 | 0 | 0 | 0 | 3 | 0 | 0 |  |
| Superior... | 0 | 0 |  | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| West north central |  |  |  |  |  |  |  |  |  |  |  |  |
| Minnesota: |  |  |  |  |  |  |  |  |  |  |  |  |
| Duluth | 0 | 0 |  | 0 | 4 | 0 | 2 | 0 | 5 | 0 | 0 | 2 |
| Minneapolis. | 0 | 0 |  | 0 | 16 | 0 | 7 | 0 | 17 | 0 | 0 |  |
| St. Paul | 2 | 0 |  | 0 | 2 | 2 | 3 | 0 | 11 | 0 | 0 | 3 |
| Missouri: ${ }_{\text {Kansas City }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
| Kansas City .-......-. | 2 | 0 |  | 1 | 83 | 1 | 9 | 0 | 4 | 0 | 0 | 2 |
| St. Joseph............- | 0 2 | 0 | 1 | 0 | 838888 | 0 | 17 | 0 | ${ }_{21}^{0}$ | 0 | 0 | $\cdots$ |

City reports for week ended Mar. 30, 1946—Continued


City reports for week ended Mar．30，1946－Continued

|  |  | 也.0 | Influ | nza |  | 高 | 嵒 |  | \％ |  | $\dot{Z}_{\dot{W}}^{\mathbf{d}}$ | 品 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{aligned} & \text { \#్ర } \\ & \text { O } \end{aligned}$ |  |  |  |  |  |  |  |  |  |
| PaClific |  |  |  |  |  |  |  |  |  |  |  |  |
| Washington： |  |  |  |  |  |  |  |  |  |  |  |  |
| Spokane．．． | 1 | 0 | 1 | 0 | 137 | 1 | 2 | 0 | 1 | 0 | 0 |  |
| Tacoma．．．－．－．－．－．－．．．－ | 1 | 0 |  | 0 | 22 | 0 | 0 | 0 | 1 | 0 | 0 | 13 |
| Celifornia： |  |  |  |  |  |  |  |  |  |  |  |  |
| Los Angeles <br> Sacramento | 6 | 0 | 13 | 1 | 441 224 | 3 0 | ${ }_{0}^{6}$ | 0 | 51 1 | 0 | 0 |  |
| San Francisco．．．－－－．－．－－－ | 2 |  |  | 0 |  | 0 | 11 | 2 | 28 | 0 | 0 |  |
| Total． | 92 | 4 | 79 | 17 | 13，265 | 51 | 360 | 4 | 1，400 | 0 | 15 | 524 |
| Corresponding week，1945 | 75 | －－－－ | 34 | 24 |  |  | 381 |  | 1，802 | 0 | 3 | 523 |
| A verage，1941－45．．．．．．．．－－ | 63 | －．．．－ | 157 | ${ }^{137}$ | 27，020 | ．－．．． | 1458 |  | 1，723 | 1 | 13 | 796 |

13－year average，1943－45．
2 5－year median，1941－45．
Anthrax．－Cases：Philadelphia 1.
Dysentery，amebic．－Cases：Boston 1；Detroit 1；Minneapolis 1；Charleston，S．C．，2；Nashville 1；Los Angeles 3；San Francisco 1.
Dysentery，bacillary．－Cases：New York 1；Baltimore 1；Los Angeles 3.
Dysentery，unspecified．－Cases：San Antonio 6.
Typhus fever，endemic．－Cases：Atlanta 1.
Rates（annual basis）per 100,000 population，by geographic groups，for the 86 cities in the preceding table（estimated population，1948， $38,845,200$ ）


## SMALLPOX IN SAN FRANCISCO, CALIF., AND SEATTLE, WASH.

Up to April 9, a total of 11 cases of smallpox, with no deaths, had been reported in San Francisco, including 4 cases from two Navy transports during the week ended April 6 and the original case, which occurred in a member of the armed forces flown from Japan. In addition to the original case, 6 other cases had been reported in San Francisco, onset of the latest local case to April 10 being on March 27.

A total of 40 cases with 7 deaths, had been reported in Washington State up to April 11, 37 cases and 7 deaths in the Seattle-King County area, 1 case in Longview, Cowlitz County, 1 case in Friday Harbor, San Juan County, and 1 case in Waterville, Douglas County, the latter case not associated with the Seattle-King County cases. Date of latest reported cases in Seattle-King County area, April 11.

## FOREIGN REPORTS

## CANADA

Provinces-Communicable diseases-Week ended March 9, 1946.During the week ended March 9, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

| Disease | Prince Edward Island | Nova Scotia | New Brunswick | Quebec | Ontario | $\begin{gathered} \text { Mani- } \\ \text { toba } \end{gathered}$ | Sas-katchewan | Alberta | $\begin{aligned} & \text { British } \\ & \text { Colum- } \end{aligned}$ bia | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Chickenpox |  | 2 |  | 60 | 216 | 15 | 22 | 30 | 120 | 465 |
| Diphtheria-- |  | 5 | 1 | 19 | 14 | 1 |  |  | 3 | 43 |
| Dysentery: <br> Amebic |  |  |  |  | 1 |  |  |  |  |  |
| Bacillary. |  |  |  |  | 1 |  |  |  |  | 1 |
| German measles |  | 2 |  | 51 | 27 |  | 2 | 17 | 5 | 104 |
| Influenza |  | 33 |  |  | 45 | 1 |  |  | 54 | 133 |
| Measles |  | 369 | 16 | 567 | 1,798 | 7 | 9 | 24 | 44 | 2,834 |
| Meningitis, meningococcus. |  |  | 1 | 1 | 4 | 1 |  | 2 | 1 | 10 |
| Mumps. |  |  | 2 | 74 | 267 | 61 | 4 | 78 | 103 | 589 |
| Scarlet fever |  | 9 | 2 | 87 | 78 | 11 | 4 | 19 | 18 | 228 |
| Tuberculosis (all forms) -- |  | 5 | 13 | 90 | 66 | 10 | 16 | 12 | 71 | 283 |
| Typhoid and paratyphoid fever $\qquad$ |  |  |  | 10 | 6 |  |  |  |  | 16 |
| Undulant fever-. |  |  |  | 1 |  |  |  |  |  | 1 |
| Venereal diseases: |  |  |  |  |  |  |  |  |  |  |
| Gonorrhea | 1 | 19 | 52 | 151 | 154 | 56 | 51 | 60 | 99 | 643 |
| Whphilis....-.----.---- | 1 | 13 | 6 | 140 | 82 46 | 12 | 9 | 9 2 | 49 4 | 321 165 |
| Whooping cough.-------- |  | 2 |  | 111 | 46 |  |  | 2 | 4 | 165 |

## WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA
[ C indicates cases; P , present]
Note.-Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

| Place | $\begin{array}{\|c} \text { January- } \\ \text { Decem- } \\ \text { ber } 1945 \end{array}$ | $\begin{array}{\|c} \text { January- } \\ \text { February } \\ 1946 \end{array}$ | March 1946-week ended- |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 2 | 9 | 16 | 23 | 30 |
| ASIA |  |  |  |  |  |  |  |
| Burma_..... | 7,769 165 | 22 |  |  |  |  |  |
| Ceylon: Trincomalee District | 19 |  |  |  |  |  |  |
| China: ${ }^{\text {a }}$ |  |  |  |  |  |  | 311 |
| Canton-1---7...- |  |  |  |  |  |  | . 11 |
| Kwangsi Province | 1,266 |  |  |  |  |  |  |

[^4]
## CHOLERA-Continued

[C indicates cases; $\mathbf{P}$, present]

| Place | January-December 1945 | $\begin{gathered} \text { January- } \\ \text { February } \\ 1946 \end{gathered}$ | March 1946-week ended- |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 2 | 9 | 16 | 23 | 30 |
| ASIA-continued |  |  |  |  |  |  |  |
| China-Continued Kwantung Province |  |  |  |  |  |  |  |
|  | 906 |  |  |  |  |  |  |
|  | 49 |  |  |  |  |  |  |
|  | 113 |  |  |  |  |  |  |
|  | 14,748 |  |  |  |  |  |  |
|  | 8, 000 |  |  |  |  |  |  |
|  | 137 268,884 |  |  |  |  |  |  |
|  | 208, 101 | 3,839 |  |  |  |  |  |
|  | 5,298 | 269 | 57 | 60 | 74 |  |  |
|  | 202 |  |  |  |  |  |  |
|  | 19 | 2 |  |  |  |  |  |
|  | 318 53 |  |  |  |  |  |  |
| Madras |  | 2 |  |  |  |  |  |
|  | P |  |  |  |  |  |  |
| Philippine Islands: Negros Province --.-........-C | 41 |  |  |  |  |  |  |
|  | 5,945 | ${ }^{6} 293$ |  |  |  |  |  |
| Bangkok_--.-.................................................... $C$ | 1,351 | ${ }^{6} 24$ |  |  |  |  |  |

${ }^{1}$ For the period May 1 to Dec. 31, 1945.
2 Cholera was also reported present during August in the following Provinces of China: Chekiang, Honan, Hunan and Kansu.
${ }^{3}$ For the period Mar. 1-26, 1946.
4 For the period Nov. 25 to Dec. 15, 1945.

- For the week ended Jan. 26, 1946.


## Plague

[C indicates cases; $\mathbf{D}$, deaths; $\mathbf{P}$, present]


## See footnotes at end of table.

## PLAGUE-Continued

[C indicates cases; $D$, deaths; $P$, present]


[^5]SMALLPOX
[C indicates cases; $P$, present]


See footnotes at end of table.

## SMALLPOX-Continued

[C indicates cases; $P$, present]

${ }^{1}$ Includes cases of alastrim.
${ }^{2}$ For the period Mar. 1-20, 1946.
${ }^{3}$ Includes 3 imported cases.
${ }^{4}$ For the week ended June 30 , 1945, cases of virulent smallpox were reported in the Union of South Africa.
${ }^{3}$ For the period May 1 to Dec. 31, 1945.

- Includes some cases of chickenpox.
$?$ For the week ended Jan. 26, 1946.
I Imported.
- Includes imported cases.
${ }^{10}$ Includes 1 imported case.
${ }^{11}$ For the month of March 1946.


## TYPHUS FEVER *

[C indicates cases; P, present]

| Place | January-December 1945 | $\left\lvert\, \begin{gathered} \text { January- } \\ \text { February } \\ 1946 \end{gathered}\right.$ | March 1946-week ended- |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 2 | 9 | 16 | 23 | 30 |
| APrica |  |  |  |  |  |  |  |
| Algeria ---. | 1, 024 |  |  |  |  |  |  |
| Basutoland --.-. | 1188 | 902 | 96 |  |  |  |  |
| British East Africa: Kenya | 1,40 | 9 |  |  |  |  |  |
|  | 18, 471 | 598 | 87 |  |  |  |  |
| Eritrea | 81 | 90 | 26 | 22 | 33 |  |  |
| French West Africa: Dakar ${ }^{1}$ | 20 |  |  |  |  |  |  |
| Gold Coast.--..------ | 1 |  |  |  |  |  |  |
| Libya: Tripolitania | 43 | 10 | 1 |  | 1 | 7 | --. |
| Madagascar | 1 |  |  |  |  |  |  |
| Morocco (French) | 8,143 | 914 |  |  |  | 2435 | --.- |
| Morocco (Spanish) | ${ }_{9}^{8}$ | 1 |  |  |  |  |  |
| Nigeria--1.-.-..- | ${ }_{31}^{93}$ | 1 |  |  |  |  |  |
| Rhodesia, Northern | 31 |  |  |  |  |  |  |
| Sierra Leone ${ }^{1}$ Tunisia | 11 403 | 65 |  |  |  |  |  |
| Union of South Africa | 1,016 |  | P | P |  |  |  |
| Arabia Asia |  |  |  |  |  |  |  |
| China. | 2,182 | 10 |  |  |  |  |  |
| India- | ${ }^{23}$ | 58 |  |  |  |  |  |
| Iran. | 826 | 4 |  |  |  | 3 |  |
| Iraq ${ }^{1}$ | 273 | 17 | 1 | 4 | 10 | 3 |  |
| Japan | 2,392 | 128 |  |  |  |  |  |
| Palestine ${ }^{1}$ | 191 | 4 |  |  |  |  |  |
| Syria and Lebanon. | 15 | 30 | 3 | 5 | 2 |  |  |
| Trans-Jordan .-.....-....... | 47 | 1 | 3 | 5 | 1 | 1 |  |
| Turkey (see Turkey in Europ |  |  |  |  |  |  |  |
| EUROPE |  |  |  |  |  |  |  |
| Albania. | 262 |  |  |  |  |  |  |
| Austria-. | 56 | 17 | 1 |  | 4 |  |  |
| Belgium.. | 158 |  |  |  |  |  |  |
| Bulgaria. | 1,030 | 200 | 85 | 41 |  |  |  |
| Czechoslovakia | 582 | 327 |  |  |  |  |  |
| Denmark. | 162 |  |  |  |  |  |  |
| France. | 512 | 3 |  |  |  |  |  |

See footnotes at end of table.

## TYPHUS FEVER *-Continued

[C indicates cases; $\mathbf{P}$, present]

| Place | $\begin{aligned} & \text { January- } \\ & \text { Decem- } \\ & \text { ber } 1945 \end{aligned}$ | $\begin{gathered} \text { January- } \\ \text { February } \\ 1946 \end{gathered}$ | March 1946-week ended- |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 2 | 9 | 16 | 23 | 30 |
| EUROPE-continued |  |  |  |  |  |  |  |
| Germany | 8, 025 | 730 | 10 | 124 | 82 |  |  |
|  | ${ }^{3} 26$ |  |  |  |  |  |  |
|  | 15 |  |  |  |  |  |  |
|  | 697 | 56 | 12 | --- | 12 |  | 6 |
|  | 198 | 189 | 54 |  |  |  |  |
|  | 67 | 15 |  |  |  |  |  |
|  | 8 |  |  |  |  |  |  |
|  | 17, 146 | 1,200 |  |  |  |  |  |
|  | ${ }^{53}$ |  |  |  |  |  |  |
|  | 10, 177 | ${ }^{5} 568$ | --- | 412 |  |  |  |
|  | 227 |  |  |  |  |  |  |
|  | 6 |  |  |  |  |  |  |
|  | 2, 795 | 403 |  |  |  |  |  |
|  | 14. 157 |  |  |  |  |  |  |
| NORTH America |  |  |  |  |  |  |  |
|  | 1 |  |  |  |  |  |  |
|  | 18 | 21 |  |  |  |  |  |
|  | 2,834 | 120 |  | 1 |  |  |  |
|  |  | 12 | 1 | 1 |  |  |  |
|  | 1 |  |  |  |  |  |  |
|  | ,687 | 217 |  |  |  |  |  |
|  |  | 1 |  |  |  |  |  |
|  | 180 |  |  |  |  |  |  |
|  | 13 |  |  |  |  |  |  |
| SOUth America |  |  |  |  |  |  |  |
|  | 79 |  |  |  |  |  |  |
|  | 770 8 | 36 |  |  |  |  |  |
|  | 655 |  |  |  |  |  |  |
|  | 533 |  |  |  |  |  |  |
|  | 4 |  |  |  |  |  |  |
|  | 594 | 169 |  |  |  |  |  |
|  |  | 1 |  |  |  |  |  |
|  | 771 | 52 |  |  |  |  |  |
|  | 144 | 22 |  |  |  |  |  |
| oceania |  |  |  |  |  |  |  |
|  | 116 | 30 |  |  |  |  |  |
|  | 104 | 12 |  |  |  |  |  |

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.
${ }^{1}$ Reports cases as murine type.
${ }^{2}$ For the period Mar. 1-20, 1946.
2 Includes imported cases.
4 For the period Jan. 1 to Sept. 1, 1945, between 8,000 and 10,000 cases of typhus fever were also reported in Hungary.
${ }^{5}$ For the week ended Jan. 26, 1946.

## YHLLOW FEVER

[C indicates cases; D , deaths]

| Place | $\begin{gathered} \text { January- } \\ \text { Decem- } \\ \text { ber } 1945 \end{gathered}$ | $\begin{gathered} \text { January- } \\ \text { February } \\ 1946 \end{gathered}$ | March 1946-week ended- |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | 2 | 9 | 16 | 23 | 30 |
| Africa |  |  |  |  |  |  |  |
|  | ${ }^{1} 13$ |  |  |  |  |  |  |
|  | 1 |  |  |  |  |  |  |
|  | 21 |  |  |  |  |  |  |
|  | 4 |  |  |  |  |  |  |
| Ivory Coast: <br> Gaoua | 1 |  |  |  |  |  |  |
|  | 1 |  |  |  |  |  |  |
|  | 2 |  |  |  |  |  |  |
| Sudan (French): Bamako........-........................ C | 81 |  |  |  |  |  |  |
| SOUth America |  |  |  |  |  |  |  |
| Bolivia: <br> Beni Department |  |  |  |  |  |  |  |
|  | 2 |  |  |  |  |  |  |
| Santa Cruz Department................................. D |  | 239 |  |  |  |  |  |
| Brazil: ${ }^{\text {a }}$ State |  |  |  |  |  |  |  |
| Goiaz State | 76 25 | - |  |  |  |  |  |
|  | 1 |  |  |  |  |  |  |
|  | 1 |  |  |  |  |  |  |
| Colombia: |  |  |  |  |  |  |  |
|  | 3 | ---1.---- |  |  |  |  |  |
| Putumayo Commissary-....................- ${ }_{\text {Santan }}^{\text {D }}$ | 19 | --......-- |  |  |  |  |  |
| Peru: |  |  |  |  |  |  |  |
| Cuzco Department.............-............... $\mathbf{C}$ | 3 |  |  |  |  |  |  |
|  | ${ }^{6} 6$ |  |  |  |  |  |  |
| Loreto Department.-.................................. C | 1 |  |  |  |  |  |  |
| Venezuela: <br> Bolivar State |  |  |  |  |  |  |  |
| Bolivar State | 3 |  |  |  |  |  |  |
|  | 20 | 72 |  |  |  |  |  |
|  | 1 | 3 |  | 1 |  |  |  |
|  | 8 | 4 |  |  |  |  |  |

## 1 Includes 4 suspected cases. <br> 2 Includes 2 suspected cases.

8 Suspected.
4 Includes 1 suspected case.

- Includes 3 suspected cases.
- A telegraphic report dated Apr. 1, 1946, states that 1 case of yellow fever was reported in Abejales, Municipality of San Antonio de Caparo, Uribante District, and 1 case was reported in La Concordia area, Municipality of San Sebastian, San Cristobal District, both in Tachira State, Venezuela.
7 Reported as cases.


[^0]:    ${ }^{1}$ Presanted at National Conference on Rural Health, sponsored by the American Medical Association, Chicago, Mar. 30, 1946.
    2 Chief Medical Officer, Farm Security Administration.

[^1]:    ${ }^{1}$ From the Division of Infectious Diseases and the Industrial Hygiene Research Laboratory, National Institute of Health.

[^2]:    ${ }^{1}$ From the Psychobiological Laboratory, Johns Hopkins Medical School; and the Sub-Department of Rodent Ecology, Johns Hopkins School of Hygiene. (The work described in this paper was done under a contract, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and the Johns Hopkins University.)

[^3]:    ${ }^{2}$ Period ended earlier than Saturday.
    ${ }^{2}$ Including paratyphoid fever reported separately, as follows: Massachusetts 1; Missouri 1; Georgia 3; Louisiana 1; Oregon 1; California 1.

    4 Correction: Week ended Mar. 23, poliomyelitis, Arkansas 0 (instead of 1).
    ${ }^{1} 2$ cases from Navy transport Marine Devil, onsets on shipboard; 2 cases from transport La Salle at Richmond.

[^4]:    See footnotes at end of table.

[^5]:    ${ }^{1}$ Includes 4 cases of pneumonic plague.
    2 Includes 7 suspected cases.
    ${ }^{3}$ Includes 5 suspected cases.
    ${ }^{4}$ For the period May 1-Dec. 31, 1945.
    SFor the period Mar. 1-26, 1946 .

    - Information dated July 5, 1945, stated that from April 1944 to May 1945, 85 deaths from plague had occurred in the mountainous region south of Kunming, China.
    7 Pneumonic plague.
    ${ }^{8}$ Includes 4 suspected cases.
    ${ }^{1}$ Includes 2 pneumonic cases.
    ${ }^{10}$ During the month of June 1945, plague infection in fleas was reported in Alberta Province. For the week ended July 28, 1945, plague infection was also reported in 6 pools of fleas in Alberta Province. For the week ended Aug. 11, 1945, 2 pools of plague-infected fleas were reported in Alberta Province, Canada.
    ${ }^{11}$ Includes 6 suspected cases.
    ${ }^{12}$ Includes 1 suspected case.
    ${ }^{13}$ Previously reported as a case, death occurring on June 2, 1945.
    ${ }^{4}$ Plague infection was also proved positive in a pool of 5 mice on Jan. 4, in a pool of fieas on Feb. 14, in a pool of 40 fleas on Mar. 14, and in a pool of 47 rats on Dec. 15, 1945.

